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Awareness of Physical Activity Health Benefits can Influence Participation and Dose

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Abstract

Educational level is one of several factors associated with health behavior and better health. The purpose of this study was to determine if one's awareness of physical activity (PA) health benefits, independent of educational level, was associated with their participation in leisure-time PA and PA "dose" (MET• min/week). Individuals from a defined area of similar socioeconomic status (zip code) and environmental issues were surveyed (n = 2512) and placed into one of four groups based on their awareness of PA health benefits. The groups with greater awareness of PA benefits had the higher participation rates and physical activity dose, independent of education. Findings show an association between awareness of PA-related health benefits for both PA participation and dose. These findings support the continued dissemination of PA related health benefits as a means to help improve physical activity health behavior independent of educational level.

Keywords: Exercise; Health information; Health education

Introduction

A substantial amount of scientific data support the premise that participation in sufficient levels of regular physical activity (PA) can reduce the risk of chronic disease and provide numerous physical and mental health benefits. Physical inactivity has been identified as a modifiable risk factor for cardiovascular disease, diabetes mellitus, hypertension, obesity, breast and colon cancer, osteoporosis and osteoarthritis Reiner et al. [1], Warburton et al. [2]. Physical activity has benefit for psychological well being and treatment of depression Diehl and Choi et al. [3]. These benefits have been reported by many health organizations, including the Centers for Disease Control (CDC) and the American College of Sports Medicine (ACSM). While efforts have been devoted towards both the translation and dissemination of research data to increase public awareness regarding the health benefits of PA, there remains a large percentage of the population who do not engage in sufficient levels of leisure-time PA [4].

According to the CDC Behavioral Risk Factor Surveillance System, for the period of 2001-2003, 54% of U.S. adults did not engage in the recommended levels of PA Sapkota et al. [5].This number was reported at 51% in 2011 [6]. Despite the health implications of physical inactivity, as noted previously, the numbers of adults engaged in the recommended levels of PA only increased by 3% between 2003 and 2011. It is well recognized that there can be numerous barriers related to the lack of participation in leisure-time physical activity. In multiple studies, physical inactivity has been found to be more prevalent in non-Hispanic blacks and Hispanics King et al. [7], Marshall et al. [8], Pan et al. [9]. There is no question that the issue is complex and can involve personal, social, environmental and educational factors Wilson et al. [10].

Mirowsky and Ross [11] have hypothesized that educational experience is the single most important social influence on health in that it can consistently predict more of the variance in health and mortality than occupation or income. Formal education level, educational attainment and/or years of formal schooling are most often used as a measure of education for health-related studies. It has been proposed that formal education instills the knowledge and values that are important for seeking, understanding, evaluating and acting on health information Winkelby et al. [12]. However, it is not readily clear from prior studies if a higher educational status necessarily ensures a greater awareness of health information 'per se'. The health beliefs model Becker1974 suggests that more specific health information, as related to one's personal situation, may be needed to provide sufficient motivation to take appropriate action towards changing a health behavior. While some studies have reported that education is a primary factor for determining participation in PA Marshall et al. [8], Canada Fitness & Lifestyle Research Institute. [13], Zunft et al. [14]. Dishman and

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Table 1: Demographic data by physical activity benefit awareness group.

Group	A	B	C	D	
Items correct	(10-12)	(7-9)	(4-6)	(0-3)	totals
Samplesize	n=795	n=436	n=554	n=458	n=2243
	35.40%	19.40%	24.60%	20.40%	
Ethnicity within group					
African Am.(579)	20.90%	28.80%	34.80%	23.60%	25.80%
Caucasian(728)	41.80%	40.70%	23.40%	16.20%	32.40%
Hisp./Latino(773)	26.50%	24.60%	36.10%	54.90%	34.50%
Other(159)	8.90%	6.50%	5.30%	5.10%	7.10%
Gender within group					
Female(1187)	62.70%	51.70%	49.80%	48.30%	52.90%
Male(1056)	36.10%	47.60%	50.70%	51.50%	47.10%
Physically active	84.70%	69.50%	32.10%	20.10%	51.60%
-1157					

For each group, data are provided for ethnicity and gender by percent with sample size for each category indicated in parenthese.

Buckworth [15] reported that health education alone did not appear to be effective for increasing PA participation. This raises questions as to the potential importance an individual's formal education over the simple awareness of health information as related to promoting increases in PA. In other words, can public dissemination of health information regarding physical activity be an effective means for increasing PA participation, independent of an individual's pre-existing level of educational attainment?

While there is a strong relationship between lower educational level and the prevalence of physical inactivity Marshall et al. [8]. It is not known if this relationship involves only formal educational attainment and/or some combination of educational level and specific knowledge or awareness of PA health-related benefits. The purpose of the study was to determine if a greater "awareness" of PA-related health benefits was associated with greater PA participation. It was hypothesized that for individuals from a similar environment and socioeconomic status, those with a greater awareness of the PA-related health benefits would be more likely to participate in leisure-time PA; and secondarily, those with a greater awareness of the PA-related health benefits would have a larger PA "dose" (dose = MET • min / week), independent of educational level attained. Findings could increase our understanding regarding the potential effectiveness of health information dissemination as related to the audiences' educational level and participation in PA. A survey instrument was distributed within a predefined region of a large metropolitan city to help insure ethnic diversity and uniformity in socioeconomic status and environmental factors.

Methods

Approval for the study was provided by the University of Texas Southwestern Medical Center Institutional Review Board. A health information survey was developed from existing instruments to include knowledge of physical activity benefits and physical activity participation. The physical activity and participation questions were tested for reliability at an on-site clinic (r=0.95). The survey was available in both English and Spanish and took approximately five to seven minutes to complete. The survey was distributed and collected by health professions students to participants attending various church functions, small group meetings, social gatherings, and health fairs within a pre-defined geographical region located near by the medical center campus.

The area (defined by zip code) sampled represented a diverse cross-section of Dallas County proper with population of 18,163, median income of $32,030, age of 29.5 years, and ethnic mix of 34% white, 42% Hispanic, 21% Black and 3% Asian/other U.S. Census Bureau et al. [16]. For comparison, Dallas county has population of 2.368,139, a median income of $49,925, age of 33.3, and ethnic distribution of 33.6% white, 38% Hispanic, 22.4% black and 6% Asian/other U.S. Census Bureau et al. [16]. The area sampled has often been the target of medical center community outreach activities and was selected for student convenience and University name recognition by individuals living within the area. The community events were selected based upon organizer's willingness to allow survey distribution, size of event (projected minimum of 20 attendees), and date and time allowing the student's attendance. All participants at each function were allowed to complete the brief survey and return it on-site, on a voluntary basis. No incentives were offered. With the student available to address questions, as needed, the overall completion and return rate was 96% (range 92% to 100% across all events).

The health information survey included questions about knowledge or awareness of physical activity and physical activity participation. Awareness of physical activity benefits was posed as a simple yes or no response to the question: Do you think regular physical activity (like walking, biking, aerobics, or other similar activities) can help to treat or prevent any of the following conditions? The conditions listed had both medical and lay terminology presented when appropriate: arthritis (sore joints), depression, diabetes (poor blood sugar), cancer, heart disease, high blood pressure (hypertension), cholesterol, low back pain, overweight / obesity, osteoporosis (weak bones), poor blood circulation (vascular disease), stress. There was also a "yes or no" question asking participants if they participated in leisure-time physical activity (any physical activity beyond that performed as part of their job). If they answered "yes", they were asked to describe the type(s) of leisure-time activity in which they participated (e.g. walking, biking, swimming, etc.). Further, they were asked how many days per week they performed the activity and how many minutes they usually performed the activity (e.g. how long they went at it) each day. For those participants reporting that they do not engage in leisure-time PA, they were asked to identify the two main reasons

Table 2: Physical activity data by group for all subjects.

Group	A	B	C	D	
	n=795	n=436	n=554	n=458	significance
Items correct	10.9±01.6*	7.8±01.3*	05.2±01.0*	1.9±01.4*	p<0.05
Age(years)	36.3±11.2	37.1±11.6	35.7±10.5	36.2±11.8	ns
Education(years)	13.2±03.2*	12.3±03.1	11.9±05.3	12.2±03.1	p<0.05
BMI	26.1±05.5*	27.4±06.1*	29.1±05.6	29.9±06.3	p<0.05
Dose(MET•min/wk)	549±198*	215±087*	26±065	7±049	p<0.05
MET	4.2±01.9*	3.1±02.1*	1.7±02.6*	0.9±01.8*	p<0.05
Minutes per day	34.4±14.9*	25.7±18.1*	13.8±19.6*	6.9±16.5*	p<0.05
Days per week	3.8±01.9*	2.7±01.7*	1.1±01.6	0.9±01.5	p<0.05

*Denotes significant difference from all other groups.

Table 3: Physicalactivity data by group for only those participatingin PA.

Group	A	B	C	D	
	n=673	n=303	n=178	n=92	significance
Items correct	11.0±01.4*	08.6±01.1*	05.5±1.8*	02.8±0.8*	p<0.05
Age(years)	35.7±10.4	36.6±11.0	35.0±8.5	35.5±6.8	ns
Education(years)	12.9±03.1	12.5±02.9	12.3±04.3	12.8±02.3	ns
BMI	25.2±05.1#	25.7±05.3#	27.3±04.1	27.5±04.7	p<0.05
Dose(MET•min/wk)	654±103*	474±97#	267±85	312±29	p<0.05
MET	04.4±01.7	03.8±01.5	04.1±01.4	03.8±01.8	ns
Minutes per day	36.3±14.9	34.7±12.1	31.1±08.6	34.2±04.2	ns
Days per week	04.1±01.9#	03.6±01.2#	02.1±0.6	02.4±0.4	p<0.05

The*de notes significance from all other groups and the # de notesa significant difference (p<0.05) from groups C and D.

why they did not participate from either a list of choices or if not listed, to write their answer in the space provided.

For those answering "yes" to participation in leisure-time PA and reporting specific physical activity information, a "physical activity dose" (PA dose) was calculated. For the PA dose calculation, the metabolic equivalent (MET) for each reported activity was estimated for using the Compendium of Physical Activities Ainsworth et al. [17]. The MET value was multiplied by the reported minutes of activity and number of days of activity each week to calculate the PA dose (MET • min/week). In addition to the question regarding PA participation, the survey also addressed demographic, educational and general health information. Only completed surveys from persons between 18 and 65 years of age reporting to be in good health (e.g. not with PA limiting disease or disability) were used for analysis. Of the 2512 surveys collected, 12% were excluded, with 7% reporting ages outside of the accepted age range and 4% within age range reporting significant health issues (e.g. heart or lung conditions, musculoskeletal problems limiting mobility, pain, etc.) that precluded them from participating in physical activity and 1% incomplete (illegible) or reporting zip codes outside of the predefined region. From the remaining surveys (2243) subjects were grouped into one of four categories based solely upon the number of correct responses (i.e. yes) to questions regarding their awareness of benefits of physical activity. The four categories or groups included: A = 10-12 correct, B = 7-9 correct, C = 4-6 correct, or D = 0-3 correct responses and were used for subsequent statistical analysis.

Statistical analysis

A univariate analysis was used to assess data distribution and it was determined that data were normally distributed. Frequency data were reported for responses to PA awareness questions by condition and for subject responses as to why they do not participate in physical activity. For categorical data (i.e. group, participation, ethnicity) a Pearson's chi square test was used for comparisons. Associations between ordinal data for awareness and educational level and PA dose data were assessed using a Spearman's rank correlation. A one-way ANOVA was used to assess differences for the dependent variables (age, education, BMI, PA dose, MET value, minutes per day, days per week) across the four awareness groups (termed A, B, C, and D). A general linear model (GLM) was employed to account for difference in sample sizes across awareness categories. A bonferroni correction was used to account for multiple comparisons. If significance was detected, a Tukey post-hoc analysis was performed to determine specific differences for pairwise comparisons. The alpha level was set at $p < 0.05$ for statistical significance.

Results

A detailed breakdown by ethnicity and gender of the respondents is provided in (Table 1). The overall ethnic distribution of the sample did not differ significantly from the expected distribution for the region. However, the ethnic distributions for each group differed significantly ($p < 0.05$) from the expected distribution (from census data). Of note, group A was largely Caucasian (42%) and female (63%), while group D was more equally distributed by gender (48% female and 52% male), but was predominately Hispanic (54%). There was a strong association ($p < 0.001$) between groups and physical activity participation. In group A, the category with the greatness awareness of the benefits of physical activity, 85% of the respondents reported "yes" to leisure-time PA, while only 20% of those in group D reported leisure-time physical activity participation. The PA dose showed a stronger correlation with PA awareness ($r = 0.39$, $p < 0.001$) than to educational level attained ($r = 0.11$, $p < 0.02$).

Table 4: Percent age by item a cross group for no PA

Group	A	B	C	D
Pa has no benefit tome	4.60%	9.30%	16.80%	25.50%
I have no time	31.70%	28.00%	33.70%	24.00%
I don't like to exercise	22.00%	17.80%	15.20%	21.20%
I have no PA plan	8.60%	10.10%	12.20%	10.60%
PA is not safe	4.80%	2.60%	2.00%	4.70%
I have no company	10.20%	10.60%	8.10%	4.40%
If ear an injury	1.50%	1.00%	2.20%	3.80%
I am in good health	9.10%	10.30%	6.20%	3.50%
I have child care issues	9.10%	6.40%	1.80%	2.20%
other	1.50%	1.10%	1.50%	1.00%

For each group, the percent for the totals within each group for each item are shown. Items have been sorted by highest percent based on group D responses (with greater number of total respondents). Order of listing reflects perceived "barriers" to physical activity participation. The "other" category was used for infrequent responses including "weather, no proper attire, too tired" etc.

Physical activity data are presented by awareness groups in (Table 2). With significant differences across all groups for "awareness". Although group A had a significantly higher educational level (13.2 +2.2 yrs; $p < 0.05$), there were no differences across the other groups (with average of 12.1 years). The PA dose was higher and BMI was lower ($p < 0.05$) for both groups A and B, as compared with groups C and D. When PA dose was divided into METs, minutes and days, both METs and minutes were different across all groups ($p < 0.05$). Groups A and B were significantly greater ($p < 0.05$) for number of days per week of PA as compared with groups C and D.

Given that 80% of group D and 68% of group C did not participate in PA, the group mean for PA dose did not accurately represent the mean PA dose for those participating in PA. Therefore, (Table 3) shows PA data only for those participating in PA by group. Similar to findings in (Table 2), the PA dose was higher and BMI was lower ($P < 0.05$) for both groups A and B, as compared with groups C and D. When PA dose was again divided into METs, minutes and days, only the number of days of PA were greater ($p < 0.05$) for groups A and B as compared with groups C and D. For those subjects not participating in physical activity in groups C and D, the three most common responses were: no benefit to me, I don't have time, and I don't like to exercise. (Table 4) For those subjects having a good awareness of PA benefits in groups A and B, but who did not engage in PA, the most common responses were: I don't have time, I don't like to exercise, and I have no exercise companion.

Table 5: Correct response for PA benefit items by percent age across groups.

Group	A	B	C	D
Items correct(range)	(10-12)	(7-9)	(4-6)	(0-3)
Average correct(SD)	10.9±01.6	07.8±01.3	05.2±01.0	02.8±01.4
overweight/obesity	99.90%	98.80%	94.80%	88.50%
Heart disease	99.50%	91.90%	79.50%	69.20%
High blood pressure	99.30%	94.50%	67.20%	51.70%
Poor circulation	99.30%	93.90%	34.30%	5.70%
High cholesterol	98.70%	82.40%	82.60%	41.20%
stress	98.50%	86.80%	32.50%	13.30%
Low back pain	96.50%	56.60%	18.20%	8.10%
diabetes	98.10%	59.30%	39.10%	9.10%
arthritis	88.60%	48.40%	26.50%	12.20%
osteoporosis	84.50%	40.10%	8.50%	2.20%
depression	78.80%	42.30%	15.10%	4.10%
cancer	63.80%	12.50%	3.40%	2.50%

For each category, the percent of correct responses are listed. Items have been sorted by highest percent correct (based on category A responses). Order of listing reflects over all awareness of the physical activity related health benefit for each item. Items with lower percent value suggest lower awareness of benefits associated with physical activity for the specific disease/condition.

The percent of correct PA benefit responses for each condition by group are show in (Table 5). Data are sorted by highest percent correct (based on group a responses). Order of listing reflects overall awareness of the PA-related health benefit for each item. Items with lower percent value suggest lower awareness of benefits associated with PA for the specific disease/condition. All four groups tended to show higher awareness of physical activity benefits related to obesity, heart disease, high blood pressure and high cholesterol. On the other hand, there was generally lower awareness of PA related benefits for osteoporosis, depression and cancer.

Discussion

The main purpose of the study was to determine if an increased "awareness" of PA-related health benefits, as contrasted with educational level alone, was associated with greater PA participation and a greater PA-dose (MET • min / week). One of the main findings from this study was that PA participation was more strongly correlated with PA awareness than with educational level. Only group A (with the highest PA awareness) was found to have a higher educational level, with a mean of 13 yrs. as compared to an average of approximately 12 yrs. for the other groups. Although this difference is not large in terms of years, it does suggest more college level education for group A, as compared to more high school level education for other groups. Lesuire-time PA participation rates varied across groups with 85% participation for group A (greatest awareness), 70% for group B, 32% for group C, and 20% for group D (lowest awareness). While these findings do not discount previous work indicating the importance of formal education on health behavior Marshall et al. [8], Mirwosky and Ross et al. [18], Winkleby et al. [12]. They do suggest that awareness of PA-related health benefits may be an important component of PA participation, given other factors being similar.

It is well recognized that multiple factors can influence PA participation Sallis and Owen et al. [19]. These may include personal (age, gender, health status), environmental (physical environment, barriers to PA), and/or psychosocial (socioeconomic class, intention, self-efficacy) factors, in addition to education. In the present study, we attempted to minimize variations in socioeconomic status and physical environment (or environmental barriers) by limiting the sample to a specific region (zip code) of the city. With respect to personal factors, those participants reporting poor health status, such that they were not able to engage in PA, were not included in the data analyses. Although the categorization into PA awareness groups was made solely based on the survey responses to PA questions, there was no significant difference in the mean age across groups. While we did not collect information related to behavior, intention or self-efficacy, data were collected regarding reasons for not participating in leisure-time PA as shown in (Table 4). The reasons most frequently reported by groups C and D were "no benefit to me", "I don't have time" and "I don't like to exercise". Of these, "no benefit" was found to be higher in groups D (25%) and C (17%) and lower in groups A (5%) and B (9%). This difference in recognizing PA benefit further supports the

current groupings based on correct responses to PA benefit questions. Of note, groups C and D, representing approximately one-half of the sample, did not know (or did not answer as true) that regular physical activity can help to treat or prevent at least six (group D less than three) of the twelve conditions listed. It has been reported by Burton, Turrell and Oldenburg (2003) that one of several key factors in the promotion of physical activity participation is dissemination of expected physical and health benefits. Since groups C and D consisted largely of Hispanic and African American individuals (group C with 71% and group D with 78%), this would suggest that PA-related health information is not effectively reaching these populations.

While the ethnic distribution of the current study sample was representative of the area according to census data, the ethnic distribution within each group based on PA awareness differed from the overall sample. From Table 2 groups A and B were predominately Caucasian, at 42% and 41% respectively, while the majority in groups C (36%) and D (55%) were Hispanic. With the assumption that the lower socioeconomic status did not vary greatly within our sample, these data support findings by Marshall et al. [8]. That hispanic men were less active than white men of the same economic status. This suggests that in those groups of individuals with lower income, other factors are more influential with respect to PA participation. Further, Crespo Smit et al. [20]. Found that differences in leisure time inactivity among racial/ethnic groups were not entirely explained by education, occupation, employment, poverty status and marital status. In line with these findings, our data would suggest that within social class, environment and educational level, one's awareness of benefits of PA (and/or the ability to act on this information) could potentially have more a substantial influence on PA participation.

In addition to participation, one's awareness of benefits of PA may also have an influence on the quantity or dose of PA as defined by MET • min / week. A major finding of this study was that the PA dose was greater for groups with higher PA awareness. When those individuals reporting no participation in leisure-time physical activity were excluded, Group A had the highest overall PA dose, with group B being greater than groups C and D. In support of the self reported activity data, BMI was lower for groups A and B as compared to C and D. Interestingly, the differences in PA dose were related only to the number of days of PA per week, as MET level and minutes per day were similar across groups. Thus, even the groups with a lower awareness of PA-related health benefits performed activities at similar intensity (~ 4 METS) and duration (~30 minutes) as the groups with a higher awareness. However, groups C and D only engaged in leisure time PA approximately two days per week, while groups A and B reported and average of almost four days per week. These findings support the concept that one's awareness of PA-related benefits may influence PA dose, specifically related to the number of days of leisure time PA performed each week.

These findings show that a greater awareness of PA benefits is associated with increased PA participation and dose, when environmental factors, socioeconomic status, age and educational level are similar. It could be suggested that while PA awareness or health information alone may not lead to increases in PA, as previously reported by Dishman and Buckworth et al. [21]. It may be that an awareness of PA-related health benefits is one of several key factor needed to promote PA participation. It should be noted that approximately 20% of those with higher awareness did not participate in PA, with "no time" being the primary reason. On the other hand, approximately 20% of those with lower awareness did participate in PA. It is possible that those with lower awareness who participate in PA are aware of a specific PA benefit of importance to them. For example, an individual may be participating in PA because they are prone to hypertension and are aware PA is effective for treating hypertension, without necessarily being aware of other PA-related benefits. This line of thought implies that persons with stress or depression who do not participate in PA may be more likely engage in PA if they learn that PA can be effective in treating these conditions. A greater awareness of more benefits of PA may provide an appropriate stimulus for a greater number of individuals towards initiating appropriate behavioral change. While it is not known if an increased awareness of PA benefits could be a sufficient stimulus to influence PA behavior, the concept is supported in that "educational programs" to improve specific health knowledge/awareness and behavior changes related to cardiovascular risk factors have proven to be successful. Dale et al. [22], Davidson et al. [23], Mundey et al. [24].

Limitations

There are well recognized limitations of self-reported data for physical activity. However, since this limitation applies to the entire sample, any error in PA dose is more likely to be distributed equally across groups derived from the sample when categorized based on PA awareness. Thus, while the exact PA dose may be in error, the differences observed between groups should have validity. While we cannot be certain that PA dose is exact, the differences in PA dose data across groups appear to be in line with what was observed for BMI data, in that a higher PA dose should result in lower BMI values. Although employed by numerous investigations, years of education was used as an index of educational level without further evaluation of educational quality (e.g. location or rigor of study). It should be noted that the focus of the study involved leisure-time physical activity in an effort to avoid more sensitive community issues involving unemployment (and income related issues) and to help increase survey participation.

The sample assessed in this study represented a lower socioeconomic region of a large city and only for those individuals attending community functions. It should be noted that the ethnic distribution of the sample was similar to census data reported the area, suggesting a representative sample. Furthermore, while data were collected for all persons attending these community functions, data for individuals under 18 and over 65 years of age and those reporting significant health problems that would preclude them from participating leisure-time PA were not included in the analysis. Thus, the findings are not representative for those persons unable to attend community events, younger (< 18) or older (> 65) persons, or individuals in poor health. As this report represents a cross-sectional study, it cannot be discounted that persons may have initially engaged in PA for reasons other than increased awareness, but subsequently became aware of benefits through their participation. However, despite these limitations, the general findings of lower participation in PA and higher levels of obesity in Hispanic and African Americans is consistent with prior findings Pan et al. [9].

Implications for Practice

While the present study has focused on one aspect of health behavior, the health care provider must recognize that changing health behavior is indeed a complex process which may involve a wide range of variables. Nevertheless, the present study suggests

that health care professionals should be aware of physical activity health related benefits and then consistently try to promote a general awareness of physical activity related health benefits to their clients. This message can be simple. For example, simply making clients aware of the numerous health benefits and preventative aspects of physical activity may serve as a beneficial first step, especially for Hispanics and African Americans. The American College of Sports Medicine has recently revised its recommendations for pre-participation health screening to "remove any unnecessary and unproven barriers" to physical activity Thompson et al. [25]. Increasing the awareness of health benefits of physical activity in conjunction of streamlining the screening process may help increase participation overall.

Conclusions

It was hypothesized that for individuals from a similar environment and socioeconomic status, those with an awareness of more of the PA-related health benefits would be more likely to participate in leisure-time PA. Secondarily, those with an awareness of more of the PA-related health benefits would have a larger PA "dose" (dose = MET • min / week), independent of their educational level attained. In this study, the survey respondents most knowledgeable regarding the simple benefits of physical activity in treating and/or preventing many health conditions had the highest participation rates and a higher PA dose. These findings support the continued dissemination of PA related health benefits as a factor with potential to influence health behavior independent of educational level. Further, information should be provided concerning the potential health benefits of physical activity for all appropriate diseases or conditions, especially for lower income Hispanics and African Americans. Williams et al. [22]. Found that mass media campaigns have been successful in increasing knowledge and awareness about physical activity but that these campaigns need to be broadened in order to be more successful. It would be important to establish the most effective means of dissemination, as increasing awareness of PA health benefits would appear to be a relatively easy task, as opposed to effectively elevating an individual's socioeconomic status, increasing formal educational level, or changing a local environment. As a next step regarding dissemination of PA-related health information, future studies could focus on identifying the primary sources used by the target audience for obtaining reliable and trusted health information.

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