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Perceived behavioral control regarding regular physical activity and healthy diet: An observational study among school-going adolescents in an urban area of West Bengal, India

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Abstract:

BACKGROUND: Healthy children are the foundation for a healthy and developing nation. Perceived behavioral control (PBC), comprising control belief and perceived power, is a person's perception of the ease or difficulty of performing the behavior of interest. For facilitating regular physical activity and regular healthy dietary practices among the adolescents, PBC is an important construct to develop and implement appropriate interventions. The aim is to assess PBC to perform regular physical activity and regular healthy dietary practices and measure their statistical relationship among the school-going adolescents in an urban area in West Bengal.

MATERIALS AND METHODS: A school-based cross-sectional study was conducted among 251 adolescents aged 12–16 years after taking consent and assent for participation in the study. Data were collected with self-administered questionnaire on sociodemographic variables and the two domains of PBC, i.e., control beliefs and perceived power, related to regular physical activity and regular healthy dietary practices. Each PBC total score was calculated by multiplying control belief score and perceived power score for each respondent. Partial correlation coefficient was calculated between regular healthy dietary practices and regular physical activity.

RESULTS: Among the total 251 responses analyzed, 34.7% and 27.5% students belonged to age group 14 and 15, respectively. It was observed that the mean (\pm standard deviation) score of PBC regarding regular healthy dietary practices was 100.7 (± 27.7) and for regular physical activity was 106.0 (± 21.4). The correlation between PBC of regular healthy dietary practices and regular physical activity was 0.421 and was statistically significant.

CONCLUSION: In case PBC score over any behavior is higher, behavioral intention and ultimately chances of performing that particular behavior increases. Designing appropriate school-based health promotion strategies can lead to healthier children fostering regular healthy dietary practices and regular physical activity in their homes and communities.

Keywords:

Adolescents, health promotion, healthy diet, perceived behavioral control, physical activity

Introduction

The World Health Organization defined adolescents as individuals in the 10–19 years age group.^[1] Adolescence is one of the fastest and flying phases of human

development when biological maturity goes in advance of psychosocial maturity. In this phase of life, people become independent individuals, build up new relationships, develop social skills and learn behaviors that will last forever in their life span.^[2]

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There are nearly 1.2 billion adolescents (10–19-year-old) worldwide.^[2] Around 243 million of them reside in India.^[3]

Physical activity is defined as any bodily movement produced by skeletal muscles that need energy expenditure.^[4,5] Physical inactivity (insufficient physical activity) is one of the major risk factors for noncommunicable diseases (NCDs) and death globally. Physical inactivity overloads society through the unseen and masked and growing cost of medical care and loss of productivity.^[4] Children and adolescents aged 5–17 years should perform at least 60 min of moderate to vigorous-intensity physical activity daily. Physical activity of more than 60 min daily has added health benefits.^[6] Eating a variety of foods and consuming less salt, sugars and saturated and industrially-produced trans-fats are essential for healthy diet. A healthy diet helps to protect against malnutrition in all its forms, as well as NCDs, including such as diabetes, heart disease, stroke, and cancer.^[7]

Perceived behavioral control (PBC) is a person's perception of the ease or difficulty of performing the behavior of interest. PBC is defined as the extent to which a person believes he or she controls a behavior.^[8] Ajzen (1988) introduced the construct "PBC". The Theory of Planned Behavior is a determinant of both behavioral intention and of the behavior itself.^[9] A randomized controlled trial conducted in Tehran among adolescent girls by Darabi *et al.* reported that the baseline means score of PBC of regular physical activity was 14.5 ± 12.1 .^[10] In a cross-sectional study conducted among adolescents by Grønhøj *et al.*, the mean score of PBC for healthy diet was 4.22.^[11]

In India, there is a scarcity of evidence regarding Perceived behavioral control of healthy habits such as regular physical activity and regular healthy dietary practices. Furthermore, research with model-based conceptual framework is lacking in the Indian context. While the world is focusing more and more on healthy behaviors and newer health promotion strategies are evolving every day, precise and specific strategy regarding the same in India has become a necessity. To build such a tailored health promotive intervention, focus on applicable model frameworks deserve due attention. In terms of regular physical activity and regular healthy dietary practices among the adolescents, perceived behavioural control appears to be a key construct worthy of consideration for developing and implementing interventions toward facilitating adoption of regular physical activity and healthy dietary practices by school going adolescents.

The current study was conducted to assess PBC to perform regular physical activity and regular healthy

dietary practices, among the school-going adolescents in an urban area in West Bengal. In the current research, the statistical relationship between PBC to perform regular physical activity and to perform regular healthy dietary practices was explored.

Materials and Methods

Study design and ethics

A school-based cross-sectional study was conducted in two co-educational schools in an urban area (Uttarpara-Kotrung Municipality) of West Bengal, India. The data collection for this study was conducted between June 2019, and January 2020. Approval for the study was obtained from the Institutional Ethics Committee of All India Institute of Hygiene and Public Health, Kolkata. Permissions from head of the schools were taken before data collection. Assent and consent were obtained from the study participants as per applicability.

Study participants

Adolescents studying in classes seven to ten aged 12–16 years, studying in selected schools, whose parents gave consent and who provided assent for participation were included in the study. A pilot study was conducted among a class of 32 students in a separate school in the urban area before beginning of the current study on PBC regarding regular healthy dietary practices and regular physical activity. Based on the validated study tool, the mean (\pm standard deviation [SD]) scores were, respectively $86.9 (\pm 19.8)$ and $98.4 (\pm 22.9)$ from the pilot study. Taking into account these values, the minimum required sample size (considering the larger sample size between healthy diet and physical activity) for 95% confidence was 112. Taking into account a design effect of 2 and a nonresponse of 10%, the target sample size was 248. Based on the enrolment and attendance, considering Probability Proportionate to Size method, two schools were chosen from the listed schools in the study area. In the study area, there were total sixteen higher-secondary schools. The enrolment and attendance of the students in these schools were considered before selecting the two schools based on adequacy of sample size. In the selected schools, in each selected class, larger section was chosen and complete enumeration was done. Finally, considering all the classes, a total of 251 responses were considered for the final analysis.

Study tool and data collection

Pre-designed, pretested, and validated questionnaire was applied which comprised of sociodemographic variables and the two domains of PBC, i.e., control beliefs and perceived power, related to regular physical activity and regular healthy dietary practices. Data were collected from students of classes VII-X of two schools with the help of

the self-administered questionnaire after taking assent. Healthy dietary practices comprise daily consumption of a diverse combination of different foods, e.g., staples like cereals or starchy tubers or roots, legumes, fruit and vegetables, and foods from animal sources so that it provides sufficient nutrition and energy to engage in daily activities; typically excluding the habit of consumption of junk foods and soft drinks.^[7,12] Items related to PBC of regular healthy dietary practices were based on different conditions like being hungry, taste of food, depressed or sad state of mind, junk food availability, celebrations, visiting mall, while travelling. Regular physical activity has been regarded as moderate to vigorous-intensity physical activity daily for a duration of at least 60 min.^[6,13] For PBC over regular physical activity, the items representing the domains were based on conditions like no playground nearby, academic pressure, teasing or embarrassment, outdoor games playing difficulty, preoccupation with mobile phone or video games, celebration of special occasions, laziness. Each item was recorded for response in terms of control beliefs and perceived power in separate dichotomous scales (Agree-Disagree). Control beliefs referred to perceived likelihood of occurrence of each facilitating or constraining condition, and perceived power noted the perceived effect of each condition in making the behavior difficult or easy.^[9] The standardized Cronbach's alpha coefficient for the questionnaires on PBC regarding regular healthy dietary practices and regular physical activity were respectively 0.690 and 0.619, among the study sample.

Statistical analysis

Data collected were entered into spreadsheet software and subsequent analysis was conducted in IBM SPSS Statistics for Windows, version 21 (IBM Corp., Armonk, N.Y., USA). For computation purposes, item-wise responses were coded 1 and 2, with 2 indicating a favorable response. Items were reverse coded for negatively framed questions. Reverse coding of negatively framed items was done maintaining the directionality of scoring, i.e., a favorable response was coded higher. Proportion of participants was noted as per control belief and perceived power regarding the relevant domain-specific items. There were seven items each in control belief and perceived power for healthy dietary practices and regular physical activity separately. For the separate total control belief scores for regular healthy dietary practices and regular physical activity was calculated by adding up all the item-wise control belief codes in respective groups. Total perceived power score was calculated similarly for regular healthy dietary practices and regular physical activity separately. PBC was considered as the mutually dependent outcome of control belief and perceived power.^[9,14] Each PBC total score was calculated by multiplying control belief score and perceived power score for each respondent.

PBC total score was calculated separately for regular physical activity and regular healthy dietary practices. The attainable scores for PBC regular physical activity and healthy dietary practices were within a range of 49.00–196.00. The PBC scores thus calculated were found to be normally distributed (*P* value in Shapiro–Wilk test for both the PBC variables were > 0.05) and did not have any outliers (Extreme Studentized Deviate test revealed no outlier values in the distributions). To understand the relationship between PBC of regular physical activity and regular healthy dietary practices, partial correlation coefficient was calculated controlling for age, gender and type of family. A two-tailed *P* < 0.05 was considered statistically significant.

Results

Background characteristics of the participants

Among the final 251 responses, a greater proportion of students belonged to the age of completed 14 years (34.7%) and 15 years (27.5%). Majority of the participants were Hindu males from nuclear families. The sociodemographic characteristics of the participants are shown in Table 1.

Control beliefs and perceived power regarding consumption of healthy diet

Table 2 depicts control beliefs and perceived power regarding regular healthy dietary practices. In most of the situations, the students reported greater perceived power for regular healthy dietary practices, compared to respective control beliefs. Mean (\pm SD) scores for control beliefs and perceived power regarding regular healthy dietary practices were respectively 9.7 (\pm 1.5) and 10.3 (\pm 1.7).

Table 1: Sociodemographic profile of the participants (n=251)

Sociodemographic profile	n (%)
Age (years)	
12	19 (7.6)
13	53 (21.1)
14	87 (34.7)
15	69 (27.5)
16	23 (9.1)
Gender	
Male	146 (58.2)
Female	105 (41.8)
Religion	
Hinduism	237 (94.4)
Islam	8 (3.2)
Others	6 (2.4)
Type of family	
Nuclear	164 (65.3)
Joint	87 (34.7)

Numbers within parentheses represent percentage values. *n*: Number of participants

Control beliefs and perceived power regarding regular physical activity

Control beliefs and perceived power regarding regular physical activity are depicted in Table 3. In most of the situations, the responses denoted a greater perceived power for performing regular physical activity compared to respective control beliefs. Mean (\pm SD) scores for control beliefs and perceived power regarding regular physical activity were 9.7 (\pm 1.2) and 10.9 (\pm 1.6), respectively.

Perceived behavioral control of regular healthy dietary practices and regular physical activity

Mean (\pm SD) score of PBC regarding regular healthy dietary practices was 100.7 (\pm 27.7) and for regular physical activity was 106.0 (\pm 21.4), as depicted in Figure 1a. Figure 1b depicts the scatter plot with

fit-line (unadjusted) for PBC scores of regular healthy dietary practices and regular physical activity. Adjusted for age, gender, and type of family of the respondents, the partial correlation between PBC of regular healthy dietary practices and regular physical activity was 0.421, which was statistically significant ($P = 0.000$). Hence, the study participants with higher levels of PBC over regular healthy dietary practices had higher levels of PBC over regular physical activity.

Discussion

Key findings

In the study, the mean (\pm SD) scores for control beliefs and perceived power regarding regular healthy dietary practices were, respectively 9.7 (\pm 1.5) and 10.3 (\pm 1.7). Mean (\pm SD) scores for control beliefs and perceived

Table 2: Distributions of participants according to control beliefs and perceived power regarding regular healthy dietary practices

Items	Control beliefs	Perceived power
Choosing healthy diet even when hungry	72 (28.7)	145 (57.8)
Not choosing unhealthy food even if they are tasteful	91 (36.3)	115 (45.8)
Choosing to eat healthy diet even when depressed or sad	127 (50.6)	136 (54.2)
Opting to eat healthy diet even when junk food is easily available	104 (41.4)	98 (39.0)
Choosing to eat healthy diet even during celebrations or parties	85 (33.9)	87 (34.7)
Choosing to eat healthy diet even while visiting any mall/multiplex/hub	85 (33.9)	108 (43.0)
Choosing to eat healthy diet while traveling	109 (43.4)	115 (45.8)

Numbers within parentheses represent percentage values

Table 3: Distributions of participants according to control beliefs and perceived power regarding regular physical activity

Items	Control beliefs	Perceived power
Performing regular physical activity even when there is no playground nearby	72 (28.7)	169 (67.3)
Playing outdoor games despite homework and academic pressure	88 (35.1)	106 (42.2)
Performing regular physical activity despite embarrassing thoughts of people teasing an obese person	97 (38.6)	171 (68.1)
Performing regular physical activity even if playing outdoor games become difficult (e.g., in rainy season)	71 (28.3)	125 (49.8)
Performing regular physical activity despite the attraction to video games and/or mobile phone	110 (43.8)	156 (62.2)
Performing physical activity even during special days/occasions	115 (45.8)	105 (41.8)
Doing regular physical activity/exercises overcoming the feeling of laziness	119 (47.4)	154 (61.4)

Numbers within parentheses represent percentage values

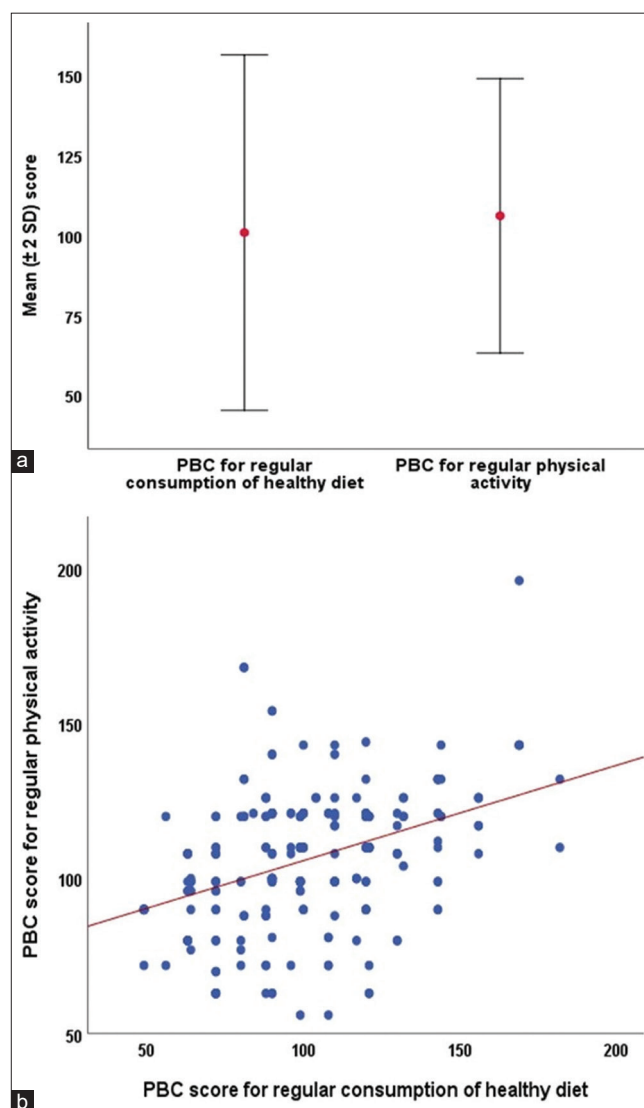


Figure 1: Comparison and relationship of perceived behavioral control scores for regular healthy dietary practices and regular physical activity (a) error bar graph showing mean (\pm 2 standard deviation) score; (b) Scatter plot with fit-line

power regarding regular physical activity found to be 9.7 (± 1.2) and 10.9 (± 1.6), respectively. It was observed that the mean (\pm SD) score of PBC regarding regular healthy dietary practices was 100.7 (± 27.7) and for regular physical activity was 106.0 (± 21.4). The correlation between PBC of regular healthy dietary practices and regular physical activity was 0.421 after adjusting for age, gender, and type of family of the respondents and was statistically significant.

What is already known and what this study adds

In the current study, the mean score of PBC for regular physical activity was 106.0 (± 21.4). In a randomized controlled trial among adolescent girls by Darabi *et al.*, it was reported that the baseline mean score of PBC of regular physical activity was 14.5 ± 12.1 .^[10] In a cross-sectional study conducted among adolescents by Grønhøj *et al.*, the mean score of PBC for regular healthy dietary practices was 4.22.^[11] In the present study, the mean score of PBC for regular healthy dietary practices was 100.7 (± 27.7). The differences in mean scores could be explained as different number of items present in each domain between the current study and the relevant literatures, and also due to regional differences. Proportion of participants reported to have control belief of “performing regular physical activity even when there is no playground nearby” were on the lowest end. Minu^[15] reported in their study from India that presence of playground and sports club in neighbourhood was significantly associated with meeting recommended levels of physical activity of the adolescents.

The partial correlation between PBC of regular healthy dietary practices and regular physical activity was 0.421 after adjusting for age, gender, and type of family of the respondents and was statistically significant. The finding of correlation between regular healthy dietary practices and regular physical activity was a novel attempt. A study by Morin *et al.* revealed that the physically active children were generally more likely to eat fruit, vegetables, and whole-grain products and to have breakfast.^[16] Healthy dietary practices and regular physical activity are the two very important behavioral factors for healthy life and prevention of NCDs. Hence, the correlation between the two provides insights for designing intervention programs to jointly address both regular physical activity and regular healthy dietary practices based on the assessment of behavioral intentions towards both these healthy practices among the adolescents.

Conclusion and Implications

Healthy children are the foundation for a healthy and developing nation. The behavioral patterns developed

during childhood and adolescence are continued, retained, and sustained into adulthood. A physically active lifestyle and regular healthy diet have been associated with the prevention of a number of health problems during adolescence and adulthood. PBC is considered to be key construct in determining both behavioral intention and behavior. It can be postulated that if (PBC) score over any behavior is better, then chances of performing that particular behavior will also be more. Mean (\pm SD) score of PBC regarding regular healthy dietary practices was 100.7 (± 27.7) and for regular physical activity was 106.0 (± 21.4). The correlation between PBC of regular healthy dietary practices and regular physical activity was 0.421 adjusting for age, gender, and type of family of the respondents and was statistically significant. Designing appropriate school-based health promotion and education interventions relying on assessment of behavioral intention among school students can lead to healthier children fostering regular healthy dietary practices and regular physical activity in their homes and communities.

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Conflicts of interest

There are no conflicts of interest.

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