SELF-EFFICACY AND MOTIVATION PREDICT LEISURE TIME PHYSICAL ACTIVITY: A CROSS SECTIONAL STUDY FROM INDIA

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Abstract: Correlates of physical activity are relatively less understood in India. This study was conducted in the state of Kerala which suffers from a high burden of chronic diseases in the country due to epidemiological transition. A cross-sectional survey was conducted among 500 adults in Kottayam district of Kerala. Multivariable logistic regression analysis determined that high fitness motives (OR=8.45, 95%CI 1.58-11.34), high self-efficacy (OR=3.71, 95%CI 1.75-8.08), support from friends and family (OR=4.46, 95%CI 1.09-18.20) and being married (OR=2.59, 95%CI 1.08-6.23) were key predictors of leisure time physical activity than their counterparts.

Keywords: correlates; factors; physical activity (PA); inactivity, prevalence, Kerala, India.

Resumo: Variáveis que interferem na atividade física são relativamente pouco compreendidas na Índia. Este estudo foi realizado no estado de Kerala, que sofre com uma elevada carga de doenças crônicas no país devido à transição epidemiológica. Uma pesquisa transversal foi conduzida com 500 adultos no distrito de Kottayam, em Kerala. A análise de regressão logística multivariada determinou que a alta aptidão física (OR = 8,45, IC 95% 1,58-11,34), alta autoeficácia (OR = 3,71, IC 95% 1,75-8,08), apoio de amigos e familiares (OR = 4,46, 95% IC 1,09-18,20) e ser casado (OR = 2,59, IC 95% 1,08-6,23) foram os principais preditores de atividade física no tempo de lazer.

Palavras-chave: variáveis; fatores; atividade física; inatividade; prevalência; Kerala; Índia.

Physical inactivity accounts for substantial morbidity and mortality across the globe. However, there is little importance given to investigate physical activity (PA) in low- and middle-income countries (LMICs). The health benefits of physical activity are well established and include lower risk of several chronic diseases. As low- and middle-income countries go through the demographic and epidemiological transition, chronic diseases account for more morbidity and mortality in these countries (WHO, 2008). Labour intensive occupations are giving way to mechanized to work (WHO, 2008). In 2016, cardiovascular diseases, respiratory diseases, and diabetes killed around four million Indians, among ages 30–70 years. These premature deaths signify the enormous health and economic loss to the country (AROKIASAMY, 2018) WHO global health observatory data shows prevalence of insufficient physical activity levels in India at 14% (WHO, 2019a). Most of the studies conducted in India put the figure around 17-30%. A large-scale study done in India found the prevalence of inactivity as 54% in selected states (ANJANA *et al.*, 2014). In Kerala, 22% of the study population reported low levels of physical activity.

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Only 30% of study population reported leisure related physical activity and it seems to reduce as age increases (AMCHSS RESEARCH TEAM, 2018, p. 57).

Studies reporting physical activity levels among Indians have found that a very low proportion of adults (3 to 15%) are active in leisure time (ANJANA *et al.*, 2014). This implies that overall physical activity levels in India are expected to decline in future. In recent years, the prevalence of overweight and obesity among adults has also seen a steady rise (IIPS and ICF, 2017). As societies move away from traditional labour-intensive occupations and lifestyle activities including motorized travel, leisure time takes over as the chief component in variability of physical activity. Knowledge of multiple levels of determinants is required to improve physical activity levels of populations in low- and middle-income countries. More than two third global deaths from chronic diseases are reported from low- and middle-income countries (MATHEWS *et al.*, 2012). The existing evidence regarding the factors that affect physical activity is derived from studies and theoretical constructs developed in high income countries. There is paucity of research in this area from developing countries. Therefore, we are unable to evaluate the effect of interventions and strategies in these countries. Measurement of physical activity determinants at various levels remains a major challenge especially psycho-cognitive and physical environmental variables

Today, chronic disease prevention requires a consorted effort and lifestyle interventions like physical activity promotion. This study aims to explore various intrapersonal and environmental variables that influence leisure time physical activity. This information can be used in future intervention strategies that target health promotion through physical activity.

METHODS

The study was conducted in Kottayam district of Kerala, using a cross-sectional design during the period July2018-December2018. The aim of the study was to identify individual, physical, and social environmental factors that affect physical activity among adults 18-65 years of age. Sample size was 440 (with a 10% non-response rate, effective sample size=500) and confidence level of 95% considering an absolute precision of 6% and design effect of 2.

Stratified cluster sampling was used to select the participants. Kottayam has 73 Grama Panchayats (rural unit) and 4 municipalities (urban unit). Two rural and urban units were randomly selected. Five wards were selected randomly from each of these rural and urban units. Twenty-five participants were randomly selected from each ward to get the sample size of 500. All the participants who consented were included in the survey. People with physical deformities which restricted physical activity, those who have not lived in the area for the last 6 months, and those with disease conditions where PA was contraindicated were excluded from the survey. Complete data was collected for 467 adults.

ETHICS STATEMENT

Ethics approval for the study was obtained from the Institutional Ethics Committee of Sree Chitra Tirunal Institute for Medical Sciences and Technology (SCTIMST), Trivandrum. Informed written consent was obtained from the participants before the commencement of the study.

MEASURES

PA was assessed using the Global Physical Activity Questionnaire (GPAQ), validated in India. Low PA was defined as <600 metabolic equivalent task (MET) min per week; moderate as, 600-

2999, and high as ≥3000 (MET) min per week. The GPAQ obtains activity levels of moderate and vigorous intensities under various domains like work, transport, and leisure. Total PA was calculated by adding PA in all domains. Participants were categorised -active and inactive depending on their weekly physical activity levels. Correlates of PA were assessed at individual level and social and physical environment levels. Individual level factors like motivation and self-efficacy, social environment factors like emotional and instrumental social support and physical environment factors like availability, accessibility, safety etc were assessed using validated scales. Covariates like age, sex, household, income, area of residence, history of disease, education were also assessed. Data analysis was done using SPSS Version 21.0 (SPSS Inc: Chicago, Illinois, USA). Multivariable logistic regression method was used to determine the key predictors of PA.

RESULTS

The mean age of study participants was 44.13±12.15. years. The mean level of total PA was 1282±1013.6 MET min/wk. Only 20% and 27% participants reported MVPA in LTPA and TPA domains respectively.

Overall description of the data

The overall descriptives provide insights into how the physical activity levels are influenced by different variables. The dependent variable, physical activity level has been categorised into two categories; active (those who achieve =>600 Mets per week) and inactive (those who achieve less than 600 METs per week. The descriptive characteristics of the sample have been shown in Table 1.

A total of 467 adults participated in the study. The sample consisted of healthy adults (healthy enough to be able to perform light to moderate intensity physical activity) from two urban and two rural units of Kottayam district. The mean age of the study population was 44.13±12.15. The response rate of the survey was 93%.

Table 1 – Descriptive characteristics of the study sample

Characteristic	Overall		Rural N=232		UrbanN=234	
	N	%	n	%	n	%
Age						
18-44	228	48,9	115	49.6	113	48.3
45-65	238	51.1	117	50.4	121	51.7
Sex						
Male	198	426	115	49.6	83	35.5
Female	268	57	117	50.4	151	64.5
Education						
Secondary	199	428	108	46.6	91	38.9
Senior secondary	104	22.3	47	20.3	57	24.4
Graduation	131	28.1	63	27.2	68	29.1
Above graduation	32	6.9	14	6	18	7.7
Occupation						

Sedentary	114	24.4	50	21.5	64	27.4
Non sedentary	72	15.4	49	21	23	9.8
Manual labour	63	13.5	44	19	19	8.1
Home making	190	40.8	76	32.8	114	48.7
Unemployed	27	5.8	13	5.6	14	6
Vehicle ownership						
Bicycle	4	0.9	0	0	4	1.7
Two-wheeler motorized	161	34.5	90	38.8	71	30.3
3/4wheeler	67	14.4	39	16.8	28	12
Combination	103	22.1	44	19	59	25.2
None	131	28.1	59	25.4	72	30.8
Household income						
<10000	260	55.8	139	60.1	121	51.7
10000-20000	114	24.5	59	25.3	55	23.5
20000-30000	85	18.2	33	14.2	52	22.2
>30000	7	1.5	1	0.4	6	2.6
Marital status						
Married	397		200	86.2	197	84.2
Unmarried	57	12	28	12.1	29	12.4
Widowed/divorced	12	2.6	4	1.7	8	3.4
Total PA						
Low 40	76	16.3		17.2	36	15.4
Moderate-high	390	192				
	390			82.8	198	84.6

MVPA-moderate to vigorous physical activity
LTPA-leisure time physical activity
TPA-transport physical activity
Total PA-total physical activity
Low - less than600 MET mins per week
Moderate-high ->=600 MET mins per week

Physical activity

The participants reported engaging in an average sum of 1282 minutes per week in moderate to vigorous intensity physical activity in all domains of physical activity. The sample reported engaging in leisure time physical activity and walking mean duration per week of 83 minutes which is less than the recommended levels of physical activity for health benefits (Table 2).

Table 2 – Summary statistics of physical activity in various domains

Domain (N=466)	Mean± SD	Median	Minimum	Maximum
Total PA (minutes per week)	1282±1013.6	1112	20	3150
Work domain (minutes per week)	1104.2±1040.3	905	10	3150
Travel domain (minutes per week)	126.8±216.7	60	10	2160

Sedentary time (minutes per day)	213.54±142.7	180	30	720
Leisure time (minutes per week)	82.5±148.04	0	0	840

The prevalence of inactivity in each domain was: leisure (80%), work (34%), transport (73%). Prevalence of physical inactivity in various domains and their distribution by various socio-demographic factors has been presented in Tables 4--.7. The difference in physical activity in the domains of work and leisure time with respect to household income per month have been presented in Figure 1.

Table 3 – Summary statistics of intrapersonal factors affecting leisure time physical activity

Characteristic (N=466)	Mean±SD	Median	Minimum	Maximum
Interest motivation score	1.51±1.45	1	1	7
Competence motivation	1.27±0.91	1	1	7
Fitness motivation	2.71±2.51	1	1	7
Appearance motivation	1.72±1.66	1	1	7
Social motives	1.30±1.07	1	1	7
Self-efficacy	15.13±25.78	0	0	90

Socio-demographic disparities in different domains of physical activity

Table 4 – Distribution of low and moderate to vigorous physical activity: domains and area of residence

Domain	Overall n (%)		Rural n (%)	Urban n (%)	X^2	*P* value
Total PA	Inactive	76 (16.2)	40 (17.2)	36 (15.4)	0.294	0.617
	Active	390 (83.3)	192 (82.8)	198 (84.6)		
Transport PA	Inactive	339 (72.7)	169 (72.8)	170 (72.6)	0.002	0.962
	Active	127 (27.3)	63 (27.2)	64 (27.4)		
Leisure time PA	Inactive	372 (79.8)	191 (82.3)	181 (77.4)	1.79	0.204
	Active	94 (20.2)	41 (17.7)	53 (22.6)		
Work time PA	Inactive	159 (34)	71 (30.6)	88 (37.6)	2.54	0.119
	Active	307 (65.9)	161 (69.4)	146 (62.4)		

Inactive-less than 600 MET mins per week Active->=600 MET mins per week

Table 5 – Distribution of low and moderate to vigorous physical activity: domains and sex differences.

Domain Level	of Male n (%)	Female n (%)	X^2	*P* value	
	PA	N=198	n=268		
Total PA	Inactive	58 (33.3)	18 (6.7)	42.5	0.000
	Active	140 (66.7)	250 (93.3)		
Transport PA	Inactive	146(73.7)	193 (72)	0.170	0.680
	Active	52 (26.3)	75 (28)		
Leisure time PA	Inactive	146 (73.7)	226 (84.3)	7.93	0.005
	Active	52 (26.3)	42 (15.7)		
Work PA	Inactive	113 (57.1)	46 (17.2)	80.67	0.000
	Active	85 (42.9)	222 (82.8)		

Inactive-less than600 MET mins per week Active->=600 MET mins per week

Figure 1 – Distribution of low and moderate to vigorous physical activity: domains and household income per month

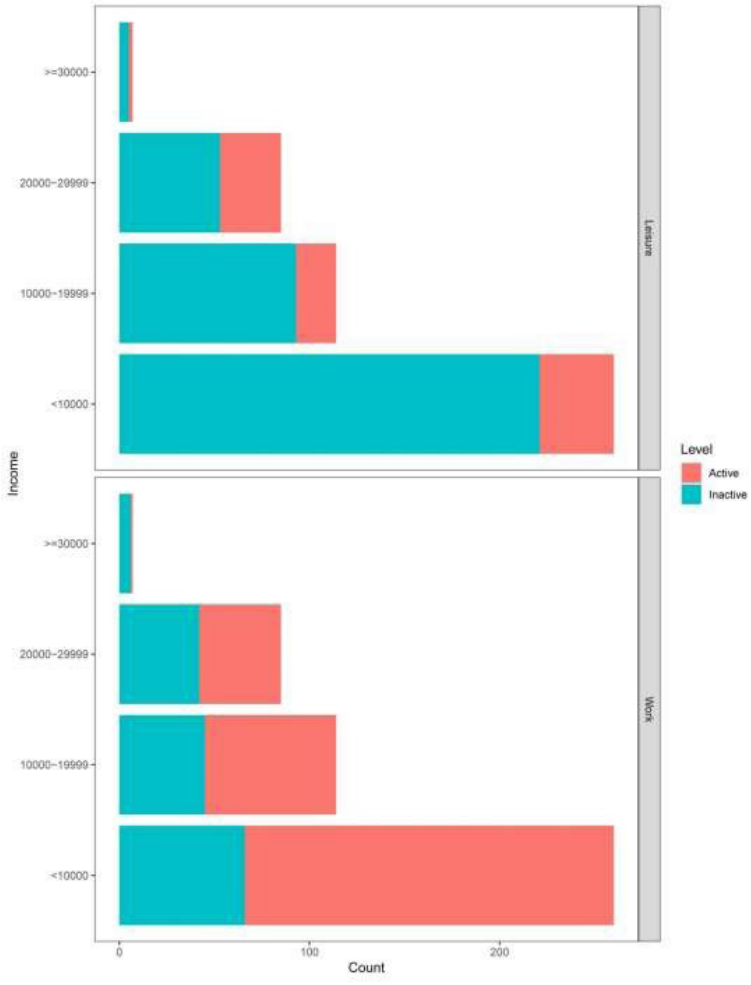

Table 6 – Distribution of low and moderate to vigorous physical activity: domains and age differences

Domain	Level of PA	18-44 years N=228	45-65years N=238	X2	*P* value
		n (%)	n (%		
Work PA	Inactive	81 (35.5)	78 (32.8)	0.393	0.531
	Active	147 (64.5)	160 (67.2)		
Total PA	Inactive	43 (18.9)	33 (13.9)	2.128	0.145
	Active	185 (81.1)	205 (86.1)		
Leisure time PA	Inactive	188 (82.5)	184 (77.3)	1.91	0.166
	Active	40 (17.5)	54 (22.7)		

Inactive-less than 600 MET mins per week-low physical activityActive->=600 MET mins per week-moderate to vigorous physical activity PA-physical activity

Table 7 – Occupational physical activity and type of occupation

Level of PA	Sedentary*	Non sedentary**	Manual labour	P value
	n (%)	n (%)		
Inactive	104 (73.8)	54 (20.6)	1 (1.6)	.000
Active	37 (26.2)	208 (79.4)	62 (98.4)	

*Includes unemployed, desk jobs, sales, driving
**Includes, homemaking, jobs that require lot of walking like nurses, doctors

Table 8 – Regression model for the predictors of leisure time moderate to high physical activity (MVPA)

Variables	Categories	Odds Ratios	95%CI	P value
Fitness motivation	High	8.45	1.58-2.34	0.000
	Low	Ref		
Self-efficacy	High	3.771	1.75-8.08	0.000
	Low	Ref.		
Friends and family support	Yes	4.46	1.09-18.20	0.037
	No	Ref.		
Marital status	Living with spouse	2.59	1.08-6.23	0.017
	Not living with spouse	Ref		

DISCUSSION

The current results provide an in-depth evaluation of determinants of physical inactivity among adults of Kerala. This population segment represents a particularly important study target given its elevated risk of having chronic diseases. The inclusion of study variables representing different domains (e.g., socio-demographic, health related, psychosocial, and environmental), along with the fact that significant correlates emerged from virtually all these domains, underlines the significance of ecological models in expanding our knowledge of influences on physical inactivity in adult men and women.

On an average both males and females reported engaging in the recommended amounts of physical activity. Total activity (average time spent doing an activity in all domains-leisure, work, and transport) minutes per week were 1282 minutes (Table2). The prevalence of inactivity in each domain was: leisure (80%), work (34%), and transport (73%). The results are similar to various studies from the country (AMCHSS RESEARCH TEAM, 2018; ANJANA *et al.*, 2014; MATHEWS *et al.*, 2015).

Work domain explained most of the activity among adults. Physical activity levels differed by gender in the work and leisure time domain (Table5). It is likely that many of those in manual labour, are engaging in physical activity as part of their job responsibilities (e.g. labourer, cleaner, construction etc.) (Table7) Studies have reported that household chores formed a major part of PA in women especially in middle aged women (MATHEWS *et al.*, 2015). Adults who owned a motorised vehicle (two, three or four-wheeler) were less active in the transport domain. Car ownership was related with rising rates of sedentariness and obesity (DOUGLAS *et al.*, 2011). The recent advances in technology have resulted in affordableotor vehicles for a larger proportion of the population, consequently increasing vehicle ownership in developing countries (GRADIDGE *et al.*, 2014)

Leisure time physical activity showed familiar patterns with men reporting more moderate to vigorous physical activity than women(LIAN *et al.*, 2016; TEH *et al.*, 2014). Gender differences were one of the most consistent findings in the literature. Promoting physical activity among women appears to be a specific challenge. One possible reason for the gender difference is the socialisation of boys and girls at a young age to believe that physically challenging activities are 'male' oriented, for example contact sports (BIDDLE; MUTRIE, 2001).

It is interesting to note how physical activity levels differ by socioeconomic factors across different domains in developing and developed nations. In developed countries, higher socioeconomic status is associated with increases in leisure time PA, however, in developing countries total physical activity declines with increasing socioeconomic status (BAUMAN *et al.*, 2011; LIAN *et al.*, 2016; VAIDYA; KRETTEK, 2014)and examines whether physical activity associations with socioeconomic status follow similar patterns across the six countries.\nMethods Population-wide representative surveys of non-communicable disease risk factors and socioeconomic factors conducted in Australia, China, Fiji, Malaysia, Nauru and the Philippines between 2002 and 2006 were used. Survey respondents aged 18e64 years who provided information on their socioeconomic status (age, education, income, area of residence. The current study also found significant association between household income, leisure time PA and occupational PA—strengthening the evidence on socioeconomic inequities in PA behaviour (Figure 1). This might be a result of differences in our knowledge about various health outcomes of physical activity or the economic cost associated with leisure-time PA, such as membership fees for various facilities or cost of such equipment to practise at home (BEENACKERS *et al.*, 2012; UIJTDEWILLIGEN *et al.*, 2011)2012; Uijtdewilligen

et al., 2011. Physical activity is socially distributed even in developed countries. Australians who belonged to more socially advantaged background were more likely to be regularly physically active and thus less likely to experience adverse health outcomes associated with inactive lifestyles than their less advantaged peers (BALL *et al.*, 2015).

Self-efficacy and motivation: Among the psychological correlates of exercise that have been examined, exercise self-efficacy has emerged as the strongest and most consistent predictor of exercise behaviour. Self-efficacy predicts both exercise adoption and maintenance (CHOI *et al.*, 2017; CLELAND *et al*, 2010; DANIEL *et al*, 2013)and the CCA ranged from 0 to 4.3%. For personal factors, selfefficacy was shown as the strongest factor for participation in physical activity (7 out of 9. Overall, the sample had very low self-efficacy levels for physical activity (*M*=15, *SD*=25.7) (Table 3). The improvement of self-efficacy depends on positive experiences, watching others who are similar to you succeed and an encouraging environment. Mc Neill et al recently demonstrated that self-efficacy differed with different intensities of physical activity. More challenging activity entailed greater competence. Therefore, activities requiring least self-efficacy for example, walking to school or work, hold the promise for the promotion of physical activity.

Motivation levels were also low in the study population (Table3). With rising burden of chronic diseases in Kerala external motives of health and fitness might play an important role when habitual activity starts declining.

For leisure time physical activity, participation in the active group was predicted by fitness motivation, self-efficacy, friend, and family support and being married (Table 8). In previous studies, being married was associated with physical activity among women as married women who have children bear more childcare and household responsibilities compared to single or divorced women (HAWKINS *et al.*, 2009; PETTEE *et al*, 2006; TEH *et al.*, 2014). Another study has found education and marriage to be negatively associated with physical activity among men (BROWN; ROBERTS, 2011)and to the overall burden of disease. The deindustrialisation of developed economies and move to more sedentary employment has impacted on the opportunities of working individuals to participate in physical activity. This can have negative effects on productivity and worker health potentially influencing economic growth. Thus, it is important to determine the factors influencing the frequency of participation in physical activity for employed individuals. This paper uses a modified time allocation framework to explore this issue. We use data from the first six waves of the Household Income and Labour Dynamics of Australia survey (HILDA. It seems that being married and having children (below 12 years of age)was protective against sedentary behaviour among both men and women (HUFFMAN; SZAFRON, 2017).

This study reiterates the importance of individual level factors like self-efficacy and motivation for improving health related behaviours. Motivations like health and body image were significant drivers. This study finds that to improve population level physical activity, we must work on improving self-efficacy and motivations. This could be done by various measures including motivation by health professionals and technology. Various studies have recorded improved self-efficacy among adults and older adults with the use of reinforcing technologies like mobile phones and social media. These could be indirectly improved using social and environmental support like peer groups and changes in working environment.

Motivational interviewing by health professionals and family may improve motivation levels of individuals. Since mostly people are engaging due to external motivations, other incentives can

be institutionalised like insurance waivers and wellness packages.

Marital status has come out a significant predictor in this study. Spouses seem to be acting as a motivator for pursuing physical activity. Other studies have also reported similar findings.

Support from family and friends is an important correlate of physical activity. It acts by improving motivation where main motivators are social reasons to meet friends and peers. It can also act directly where people find lack of instrumental and financial support as a barrier to physical activity. In societies where cultural norms are biased against leisure time physical activity, emotional support, or lack of it can be a major barrier for pursuing such behaviour.

Several limitations of this study warrant discussion. First, this survey relied on self-reported information. Although objective measurement might be more accurate in measuring physical activity, it is costly and methodologically difficult for large studies. This potential bias was addressed by using one of the most valid and reliable lifestyle physical activity assessments available for the general population and complex behaviour. Differences in perception could have contributed to variance in responses. In addition, because this study was cross-sectional, temporality of results cannot be implied. Despite the limitations, this study significantly contributes to the understanding on the topic.

CONCLUSION

There are important constructs which are related to participation in physical activity, like self-efficacy and motivation, support from friends and family and socio-economic status. Although interventions possible at individual level factors to improve population level activity levels are not sustainable, it can be easily done by implementing interventions at community and organisational level. Providing opportunities to be active may help in improving daily physical activity levels of individuals. Extrinsic motivations like health can be utilised, so the strategy should emphasise health care professional knowledge and motivate them for opportunistic counselling regarding physical activity to all patients regardless of age and sex Research needs to be done on promoting exercise and physical activity as enjoyable ways of spending one's time. There is no better way than to inculcate this habit at an early age. Habitual physical activity is easy to start and maintain rather than an additional activity.

Nevertheless, motivations like health and appearance might trigger adoption. However, for maintaining long term physical activity, it is important that physical activity be included in regular life, like school, community, and worksite activities, replacing mechanised travel with active travel. The promotion of a physically active lifestyle as an affordable and effective means to prevent and treat chronic disease and to improve quality of life and well-being should be a priority for, government agencies, policy makers and health professionals especially in low resourced settings which are hardly in a position to take the burden of chronic diseases

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