Scientific Research Publishing

Open Journal of Social Sciences, 2023, 11, 159-181
https://www.scirp.org/journal/jss
ISSN Online: 2327-5960
ISSN Print: 2327-5952

Assessment of Antecedents and Barriers to Physical Activity among Pakistani Adults

Mona Aeysha Khalid

University of Stirling, Stirling, United Kingdom
Email: Mei3na4@gmail.com

How to cite this paper: Khalid, M. A. (2023). Assessment of Antecedents and Barriers to Physical Activity among Pakistani Adults. *Open Journal of Social Sciences, 11,* 159-181.
https://doi.org/10.4236/jss.2023.112012

Received: November 20, 2022
Accepted: February 12, 2023
Published: February 15, 2023

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Abstract

Objectives: Many non-communicable diseases (NCDs) are caused by physical inactivity. 71% of all deaths globally and nearly half of all deaths in Pakistan are caused by NCDs. Despite the severity of the issue, a little research has accessed young adults' physical activity (PA) in Pakistan. Therefore, this study aimed to explore the antecedents (attitudes, subjective norms, perceived behavioural control (PBC), perceived barriers, perceived gender norms and intentions) of PA while adapting the Theory of Planned Behaviour among Pakistani adults. **Design:** In this cross-sectional study, 233 Pakistani adults (18+) were recruited through the Qualtrics, based on convenience sampling. Two independent sample t-tests and four hierarchical multiple regressions were conducted to explore the predictors effect on intentions and PA. **Results:** There was no significant gender difference in PA. Females had higher perceived barriers than males. Hierarchical multiple regression revealed subjective norms (beta = .51, $p < .001$) and PBC (beta = .21, $p < .01$) as significant predictors to intentions; PBC (beta = .21, $p < .01$) and intentions (beta = .13, $p < .05$) as significant predictors to PA. Predictors' subjective norms, perceived barriers, intentions and PBC should be considered to improve females PA and subjective norms for males PA. All predictors explained 35% of variance in intentions and 15% of variance in PA in the whole sample. **Conclusion:** Extended TPB is a useful framework to express physical activity antecedents among Pakistani adults and can be utilized to develop PA interventions to improve public health and well-being.

Keywords

Physical Activity, Barriers, Theory of Planned Behaviour, Intentions, Attitudes

1. Introduction

Globally 2 million deaths each year are caused by Physical Inactivity (WHO,

2002). Physical inactivity increases the chances of developing non-communicable diseases (NCDs) (Laura et al., 2012) like cardiovascular disease (Blair, 1996), Type 2 diabetes (Eaton & Eaton, 2017; Medina et al., 2018), falls (Komatsu et al., 2018), depression (Ekeland et al., 2004), joint and back pain (Aktürk et al., 2019), and stroke and cancers (Cannioto et al., 2018). Studies (Lee et al., 2012) reveal physical inactivity contributes to 6% of the global burden of disease from coronary heart disease, 7% to Type 2 diabetes, and 10% of breast cancer, and links with obesity in children and adults (Hardman & Stensel, 2003). Besides, regular PA improves mental health in patients with schizophrenia, dementia, and substance abuse (Faulkner et al., 2005; White et al., 2017) and increases life expectancy compared to sedentary behaviour (Katzmarzyk & Lee, 2012).

World Health Organization (WHO) states, physical activity (PA) as any skeletal activity of any intensity performed at home, outside, or at work, while contributing to energy expenditure for better health and wellbeing (WHO, 2021). The United Nations Educational, Scientific and Cultural Organization's (UNESCO) international charter of physical education, physical activity, and sport (UNESCO, 2015) declares every human being has a fundamental right to be provided with freedom and equal opportunity to participate in the PA for recreation or to perform any formal sport, to improve health and wellbeing. Therefore, all government professionals, counselling sessions, information leaflets, support groups, and culture must support all without discrimination (Mawani, 2017).

WHO recommends (WHO, 2021), adults aged 18 - 64 years perform either moderate aerobic PA for 150 - 300 or intensive aerobic activity for 75 - 150 minutes or both in combination throughout the week. UK government guidelines state moderate intensity-based PA includes a brisk walk, cycling, hiking, gardening, dancing, housework, and swimming, and the vigorous intensity-based PA consists of running, climbing, fast cycling, aerobics, fast swimming, carrying heavy loads, and competitive sports (Public Health England, 2020).

In Pakistan, nearly half of all deaths are caused by NCDs (Laar et al., 2020). Females are at increased risk of developing many NCDs and infections due to higher obesity rates (Tanzil & Jamali, 2016) and higher inactivity (Bareeqa et al., 2018; Mawani, 2017). Evidence suggests that increased PA with or without weight management is a critical determining factor in reducing obesity among adults (Barry et al., 2014; Wiklund, 2016). Despite this there is a huge gap in the literature addressing insufficient PA in Pakistan (WHO, 2015). Therefore, this research will examine Pakistani adults' PA to raise the awareness and determine which factors should be considered to exercise to stay fit and healthy.

Pakistan is a patriarchal Muslim country, ranked second to last in gender equality (Kazmi, 2018) due to separate gender roles pervasive in all areas of life (Akram, 2018) evident from separate places for females in households, institutions, and markets (Singh et al., 2016). Even in female-only environments, religious and social reasons dissuade women from PA (Laar et al., 2019a; Laar et al., 2019b). They are discouraged from traveling alone (Taymoori et al., 2008),

which results in a considerable mobility gap between men and women (Adeel et al., 2017). Family members and cultural prejudices also hinder from adopting healthy habits (News Desk, 2018) as women's PA is taken as detrimental (Siddiqui et al., 2018), and sports as frivolous (Benn, 1998). In short physical fitness is not prioritised in Pakistan (Evans et al., 2004) like they are in Western nations.

Various hypotheses exist in the literature regarding the antecedents of performing a particular behaviour. Most can be traced back to the framework provided by the Theory of Reasoned Action (Ajzen & Fishbein, 1980) and Theory of Planned Behaviour (TPB) (Ajzen, 1991). Researchers have successfully applied TPB to assess exercise behaviours worldwide (Carter-Parker et al., 2012). TPB antecedents, attitude, subjective norms, and perceived behavioural control (PBC) predict intentions, whereas intentions and PBC predict behaviour directly.

Ajzen (2020) described normative beliefs through incorporating injunctive and descriptive aspects. We perceive others' acts under descriptive and their approval of our behaviour under injunctive norms. Each belief contributes to subjective norms; yet it is contingent upon one's attachment to compliance. The injunctive norms are further divided into proximal and distal norms (Ji, 2022). In proximal norms, we refer to persons in our immediate vicinity, whereas we refer to a broader community in distal norms. Randazzo (2016) found descriptive norms were more predictive of intents and behaviour than injunctive ones, and proximal norms were more predictive of PA than distal ones. Thus, subjective norms will be examined through descriptive and injunctive norms as an indirect predictor of PA among Pakistani adults.

Attitudes are also an essential determinant of intentions with two dimensions: affective and instrumental (Godin, 1987). The affective aspect is involved with liking an activity, whereas the instrumental aspect is concerned with perceived utility. Studies reveal that affective attitudes are stronger predictors of intentions (Lowe et al., 2002) than instrumental ones. Some researchers (Eves et al., 2007; Godin et al., 1993) found emotional attitudes and PBC are substantial predictors of intentions while intentions alone explain PA.

Ajzen (2002) extended the concept of self-efficacy with perceived control beliefs resulting in a construct called perceived behavioural control (PBC). PBC comprised two distinctive but interlinked constructs: self-efficacy and perceived controllability (Ajzen, 2002). These control beliefs can indirectly influence one's behaviour through intentions and can predict behaviour directly if there is a small or no gap between actual and perceived control beliefs.

The "sufficiency hypothesis" states that perceived barriers and other environmental and cultural influences (part of control beliefs) indirectly affect behaviour while being mediated by intentions or PBC (Ajzen, 2011). Alternatively, external factors like age, economics, and environment predict PA directly while controlling for TPB predictors (Sniehotta et al., 2014). Arguably self-efficacy beliefs can be viewed as a component of perceived barriers (Glasgow et al., 2001)

and can be thought of as two different but related concepts (Russell, 2020). Moreover, the concept of barriers is not limited to one's ability combined with the confidence to perform the required behaviour; instead, it assists professionals in understanding the inherent obstacles that one may experience before evaluating one's ability to perform a specific act (Russell, 2020).

Women face religious/cultural constraints in PA worldwide (Benn et al., 2011; Daskapan et al., 2006; Uddin et al., 2018). In Pakistan, family structure, social support, culture, and economic factors influence women's PA (Laar et al., 2019a; Laar et al., 2019b; Samir et al., 2011). Given the cultural diversity (Macdonald et al., 2009), this study would focus on Pakistan and incorporate perceived barriers and perceived gender norms (PGN) as determinants of PA in TPB.

TPB was extended with self-efficacy and past behaviour (Wang & Zhang, 2016) for Chinese adolescents, social-ecological barriers (Úbeda-Colomer et al., 2019) to Spanish students, and habit and environmental facilities (Thomas & Upton, 2014) among British children. A few Pakistani studies have assessed adult PA, most with inadequate theoretical foundation (Laar et al., 2019b; Laar et al., 2020) and non-standardised measures (Samir et al., 2011) to assess barriers. Therefore, this study aims to explore PA among Pakistani adults extending the TPB model to include additional predictors (perceived barriers and PGN) to PA. This extended model is expected to promote PA, weight loss, an active lifestyle, and longevity (Public Health England, 2020) among Pakistani adults.

Hypothesis

It is hypothesized that females in Pakistan would be less likely to do PA compared to males and more likely to perceive exercise barriers. Moreover, there will be a significant effect of subjective norms, attitudes, PBC and perceived barriers on intentions, as well as intentions, PBC, and perceived barriers would predict PA while controlling for demographic variables (age, education, socioeconomic status, marital status, and BMI), overall and by gender. Further PGN will contribute significantly to females' intentions and PA.

2. Method

2.1. Participants and Procedure

In this cross-sectional study, the target population was adults (18+), proficient in English language, living in Pakistan, and the accessible sample consisted of the students from three selected universities of Pakistan. This criterion is consistent with the WHO recommendation of being physically active for the adults aged 18 - 64.

At least 92 participants were required to achieve 80% power and to detect a moderate effect size (Cohen, 1988), as indicated by power analysis conducted in G * Power 3.1. Assuming 50% attrition (Eccles et al., 2004), and considering the power (Bell et al., 2014), 600 participants were invited to participate based on convenience sampling, and 572 took part (95% response rate). It was decided participants more than 10% missing response will be discarded. Therefore 339

(59%) participants were removed with 60% or more missed responses, including 20 (3%) with irrelevant answers (e.g., 'do not know), resulted in 233 (41%) potential participants included in the final analysis.

The University of Stirling General University Ethics Panel granted the ethical approval. A Qualtrics link was sent to the participants through valid emails by their professors at universities. The first page of the Qualtrics survey had the information sheet and the consent form. The anonymity and confidentiality of the data were ensured. At first, participants willing to proceed gave their consent and completed the questionnaires. After gathering data, participants were debriefed on the research's aims and utility. All the questionnaires were administered in English as English is the official language in Pakistan, and people at the university level would not need any translation to assess the meanings. The survey took about 15 minutes to finish.

2.2. Quantitative Measures

Socio-Demographic Variables. Demographic data included participants' age, gender, weight, height, waist circumference, education, marital status, income, work nature (if the work requires PA), and general health. We estimated body mass index (BMI) using the standardised formula (kg/m^2) based on weight and height.

Physical Activity. The International Physical Activity Questionnaire (IPAQ)-short version, with high reliability and validity (Craig et al., 2003; Cleland et al., 2018; Oyeyemi et al., 2011), suitable to use at the international level (Fagaras et al., 2015; Ibrahim et al., 2013) was adapted to measure PA in Pakistani adults. A total PA score, measured from three levels (low, moderate, and vigorous), was assessed for each participant during the previous week, expressed as a continuous variable in the form of Metabolic Equivalent of Task (MET)-minutes/week. This study aimed to explore the effect of predictors on the behaviour, rather than categorising PA, hence the continuous score was utilized.

The MET-Minutes represent the energy expenditure of PA, taken as resting metabolic rate (Ekelund et al., 2016), using the formula (IPAQ, 2004) given below:

PA-MET-minutes/week = MET-level * minutes-of-activity * events/week

1) Low-activity-MET-minutes/week = 3.3 * low-activity-minutes * low-activity-days.

2) Moderate-activity MET-minutes/week = 4.0 * moderate-activity minutes * moderate-activity-days.

3) Vigorous-activity MET-minutes/week = 8.0 * vigorous-activity-minutes * vigorous-activity-days.

Total PA MET-minutes/week = sum of low + moderate + vigorous MET-minutes/week

Each category had a maximum of 4 hours (240 minutes) of PA each day, and any activity less than 10 minutes was rated "0" (IPAQ, 2004). This scale showed

a moderate/acceptable reliability (α = .50).

PA Antecedents. Adapting the framework by Cheng et al. (2019), a questionnaire using TPB was utilized to assess Pakistani adults' attitudes, subjective norms, PBC, and intentions. Participants indicated to what extent they agree or disagree with four statements on intentions, five on perceived norms, and four on PBC on 7-point Likert scale. Attitudes were measured on eight bipolar adjectives, including both experiential and instrumental beliefs.

Subjective norms were modified by two items. The first one (Most of the people I know do exercise at least 30 minutes, three days per week) measured descriptive norms; and the second one (When it comes to the matter of wellbeing, I would like to do exercise like my friends) assessed the motivation to comply with the norms. The intentions were expanded by one more item (In the past three months, I have exercised for at least 30 minutes 3 days per week). The past behaviour was added to intentions due to the combined effect of past behaviour and intentions on future behaviour (Ouellette & Wood, 1998).

A mean value in each sub-scale was assessed for each participant, and the higher score represents a positive attitude, high social pressure and PBC, and strong intentions. The Cronbach's alpha (α = .89) indicated a high internal consistency. The reliability for subscales attitudes, intentions, and subjective norms, was also high (.95, .83, .73) respectively and moderate (.52) for PBC. The items were added in these scales following the given criteria (Ajzen, 2002; Eccles et al., 2004).

Perceived Barriers. Barriers are usually associated with exercise behaviours (Koshoedo et al., 2015; Lovell et al., 2010). Therefore, Exercise Benefits/Barriers Scale (Rechrist et al., 1987), with sound psychometrics (Brown, 2005; Grubbs et al., 2002; Sechrist et al., 1987), was adapted to examine the barriers in PA. The scale comprised 43 items, 14 of which related to perceived barriers, were included in this study. A forced Likert type scale was used to rate the items from strongly agree (4) to strongly disagree (1), and a mean score for each participant was assessed. The higher the score, the higher the barrier perception. The scores ranged from 14 to 56. This scale yielded a reliable Cronbach's alpha of .89.

In addition, to assess PGN, ten items on a 4-point forced Likert-type scale were developed (e.g., I do not feel safe going out for exercise), and a mean score was assessed for each participant. This scale had high reliability (α = .84).

2.3. Quantitative Analysis

The required analysis was carried out using IBM SPSS version 27. In the descriptive analysis, frequencies for categorical and means and SDs for continuous variables were considered. Two independent sample t-tests were conducted to evaluate the gender differences in PA and perceived barriers; four hierarchical multiple regression analyses were utilized: first to examine the effect of predictors on intentions, second to analyse the effect of predictors on PA while controlling for demographic variables in the whole sample, and separately for males

and females. Additionally, the effect of PGN on females' intentions and PA was assessed by extending a step 3 in regression models.

The significance level for the present study was set at α = .05.

3. Quantitative Results

Demographics

Table 1 shows the descriptive statistics. The sample (n = 233) with average age 30 ± 12, ranged 18 - 69. Most participants were married (54%) and university students (61%). 53% had moderate to good standard of living and 32% had an average to poor background. More than half (65%) were healthy adults; 32% had minor health issues and 3% had chronic illnesses. Table 2 shows other socio-demographic characteristics.

Pearson's Correlations

Pearson's Correlations were conducted to examine the relationship between antecedents of TPB and PA (Table 3). Confirming TPB assumptions, intentions' significant association with TPB predictors and PA suggests that positive attitudes, social pressure and few barriers help people make strong intentions to do PA. However, the weak correlation between PBC and intentions reminds us of intention-behaviour gap in TPB (Sniehotta et al., 2005). Moreover, PA is significantly positively correlated with PBC and intentions, and negatively associated with perceived barriers implying active people exhibit more behavioural control while perceiving less barriers. A significant positive association between perceived barriers and PGN explains females' perception of barriers increases with higher PGN.

Further, no independent variables are substantially correlated in this table, ensuring the assumption of singularity.

Table 1. Participants and variables characteristics (N = 233).

Variables	Total Sample (N = 230) *M* (*SD*)	Male Sample (N = 96) *M* (*SD*)	Female Sample (N = 134) *M* (*SD*)
Age (years)	32.98 (11.95)	39.21 (13.86)	28.71 (7.99)
Height (metre)	1.65 (.13)	1.7 (.13)	1.5 (.09)
Weight (kg)	66.44 (14.71)	76.43 (11.88)	59.45 (12.36)
BMI	24.58 (5.14)	25.99 (4.64)	23.63 (5.31)
Intentions	5.58 (1.20)	5.62 (1.24)	5.54 (1.17)
Attitude	6.10 (1.30)	6.03 (1.34)	6.13 (1.29)
Subjective Norms	5.48 (1.11)	5.54 (1.13)	5.42 (1.11)
Perceived Behavioural Control	4.64 (.97)	4.90 (1.01)	4.46 (.90)
Perceived Barriers	2.11 (.50)	1.96 (.54)	2.22 (.45)
Perceived Gender Norms	2.24 (.52)	2.02 (.51)	2.39 (.48)
IPAQ (MET-minutes)-Mean	2566.41 (3342.91)	2727.28 (3695.26)	2369.62 (3016.60)
IPAQ (MET-minutes)-Median	1369.80 (3342.94)	1440 (3695.26)	1177.50 (4353.82)

Table 2. Socio-demographic characteristics of the sample (N = 233).

Baseline characteristic	Total Sample		Male		Female	
	n	%	*n*	%	*n*	%
Gender	230	99	96	42	134	58
Prefer not to say	3	1				
Marital Status						
Married	126	54	62	65	64	48
Single	98	42	30	31	68	49
Divorced	2	1	1	1	1	1
Widow/widower	4	2	2	2	2	1
Prefer not to say	3	1	1	1	2	1
Education						
Primary	3	1	2	2	1	1
High School	10	4	3	3	7	5
College	6	3	1	1	5	3
Undergraduate	67	29	22	23	45	33
Postgraduate	142	61	65	68	77	57
Prefer not to say	5	2	3	3	2	1
Income (Pakistani Rs)						
<10,000	18	8	5	5	13	10
b/w 10,000 - 30,000	57	24	18	19	39	29
b/w 30,000 - 70,000	**54**	23	23	24	30	22
70,000 or above	**69**	30	39	41	29	22
Prefer not to say	**35**	15	11	11	23	17
Nature of Work						
light	**146**	63	60	63	84	63
Moderate	22	9	10	10	12	9
Intensive	7	3	4	4	3	2
Not Applicable	**58**	25	22	23	35	26
Health Status						
Fair	**151**	65	69	72	80	60
Moderate	**74**	32	23	24	50	37
Poor	8	3	4	4	4	3
Prefer not to say	0	0	0	0	0	0

Note: "Nature of work" variable was applicable to only participants engaged in some work. Some difference in total (shown in bold) is due to "gender not disclosed" cases.

Regression Analysis Predicting Intentions

A two-stage hierarchical multiple regression was utilized to see the effect of predictors on intentions while controlling for demographic variables (**Table 4**). Preliminary analysis ensured no violation of the assumptions of multicollinearity, normality, linearity, and homoscedasticity (Pallant, 2016).

Table 3. Pearson's correlation coefficients between PA antecedents and PA entered in the regression model based on TPB, with mean and standard deviation.

Variables	1	2	3	4	5	6	7	*M*	*SD*
(1) Intentions	1							5.58	1.20
(2) Attitudes	.27***	1						6.10	1.30
(3) Subjective Norms	.53***	.34***	1					5.48	1.11
(4) Perceived Behavioural Control	.10	.07	−.15*	1				4.64	.97
(5) Perceived Barriers	−.21***	−.15*	−.12	−.39***	1			2.11	.50
(6) Perceived Gender Norms	−.17**	−.15*	−.21***	−.25***	.74***	1		2.24	.52
(7) Physical Activity	.18**	.05	.04	.27***	−.23***	−.08	1	1.94	.85

Note: *Correlation is significant at $p < .05$, **significant at $p < .01$, ***significant at $p < .001$, (2-tailed). Note: "perceived gender norms" variable is applicable to female sample only.

Table 4. Hierarchical multiple regression analysis to predict intentions from demographic variables first and then from TPB predictors.

Step	Variables	R^2	R^2 change	R^2 adj	*B*	*SE*	β
		.03	.03	.01			
1	Age				−.02	.01	−.20**
	Gender				−.02	.13	−.01
	Education				.06	.08	.04
	Marital Status				−.07	.08	−.05
	Socioeconomic Status				−.05	.06	−.05
	BMI				.00	.01	.01
		.35	.32	.33			
2	Attitude				.06	.06	.06
	Subjective Norms				.07	.01	.51***
	Perceived Behavioural Control				.26	.08	.21**
	Perceived Barriers				−.28	.15	−.12

Note: *$p < .05$; **$p < .01$; ***$p < .001$.

The demographic variables entered in step 1 explained 3% of variance in intentions. The full model with added variables (Attitudes, Subjective norms, PBC, Perceived Barriers) in step 2 was statistically significant, $R^2 = .35$, $F(10, 218) = 12.13$, $p < .001$. The addition of four TPB predictors led to a significant increase in R^2 of .32, $F_{change}(4, 218) = 27.18$, $p < .001$). In the final model, subjective norms, and PBC were statistically significant predictors. The remaining variables did not make any significant contribution.

Regression Analysis Predicting PA

A hierarchical multiple regression was conducted to determine the effect of predictors on PA over and above demographic variables (Table 5). There was no violation of the multicollinearity. However, PA was highly positively skewed (skewness = 2.62). Therefore, the data was transformed into a new variable

Table 5. Hierarchical multiple regression analysis predicting PA from demographic variables first and then from TPB predictors.

Step	Variables	R^2	R^2 change	R^2 adj.	*B*	*SE*	β
		.05	.05	.02			
1	Age				.00	.01	.04*
	Gender				−.05	.11	−.03
	Education				.09	.06	.09
	Marital Status				−.00	.07	−.00
	Socioeconomic Status				−.02	.05	−.03
	BMI				−.03	.01	−.16*
		.15	.10	.09			
2	Intentions				.09	.05	.13*
	Perceived Behavioural Control				.18	.07	.21**
	Perceived Barriers				−.18	.12	−.11

Note: *$p < .05$; **$p < .01$; ***$p < .001$.

through Visual Binning procedure (Pallant, 2016). This transformation ensured no violation of the assumptions of normality (skewness = .00), linearity, and homoscedasticity.

Demographic variables entered in step 1 accounted for 5% of the variance in PA. The full model with added variables in step 2 was significant, $R^2 = .15$, $F(9, 214) = 3.78$, $p < .001$. Adding intentions, PBC and perceived barriers to predict PA led to a significant increase in R^2 of .10, $F_{change}(3, 214) = 7.56$, $p < .001$. Path analysis revealed that PBC and intentions were significant predictors to PA and perceived barriers were not significant.

Thus, both regression models (Table 4, Table 5) represent our hypothesis is partially accepted.

Regression Analysis Predicting Intentions w.r.t Gender

Hierarchical multiple regression was run to predict intentions among males and females (Table 6). Demographic variables entered in step 1 in male model accounted for 13% of variance in the intentions. After entering the predictors (attitude, subjective norms, PBC and perceived barriers) in step 2, the total variance explained by the model was 33%, $F(9, 84) = 4.62$, $p < .001$. The four TPB predictors explained an additional 20% of variance in male intentions after controlling for demographic variables, R^2 change = .20, $F_{change}(4, 84) = 6.27$, $p < .001$. In the final model, only the subjective norms resulted in significant effect on male intentions.

The female model revealed 8% of variance in intentions after entering demographic variables in step 1. After entering the predictors (attitude, subjective norms, PBC and perceived barriers) in step 2, the total variance explained by the model was 43%, $F(9, 122) = 10.37$, $p < .001$. The four TPB predictors explained an additional 35% of variance in female intentions after controlling for demographic variables, R^2 change = .35, $F_{change}(4, 122) = 19.24$, $p < .001$. In the final

Table 6. Hierarchical multiple regression analysis predicting intentions among males and females.

		Males						Females					
Step	Variables	R^2	R^2 change	R^2 adj.	*B*	*SE*	β	R^2	R^2 change	R^2 adj.	*B*	*SE*	β
		.13	.13	.08				.08	.08	.04			
1	Age				−.02	.01	−.24*				−.01	.01	−.10
	Education				.06	.13	.04				.05	.10	.04
	Marital Status				.06	.14	.04				−.16	.10	−.12
	Socioeconomic Status				−.01	.14	−.01				−.10	.07	−.10
	BMI				−.04	.03	−.14				.02	.02	.11
		.33	.20	.26				.43	.35	.39			
2	Attitude				−.01	.09	.22				.09	.07	.10
	Subjective Norms				.53	.12	.48***				.51	.08	.48***
	Perceived Behavioural Control				.27	.16	.22				.19	.10	.14
	Perceived Barriers				−.15	.25	−.07				−.51	.20	−.19**
3	Perceived Gender Norms				NA	NA	NA	.43	.00	.39	.08	.23	.03

Note: *$p < .05$; **$p < .01$; ***$p < .001$.

model, subjective norms and perceived barriers significantly contributed to female intentions.

Both regression models for each gender to predict intentions were significant. Subjective norms were significant predictors for both males' and females' intentions. However, for females, perceived barriers significantly predict intentions. Overall, the TPB predictors explained more variance in female intentions (43%) compared to males (33%).

Regression Analysis Predicting PA w.r.t Gender

Hierarchical multiple regression was conducted to predict PA among males and females (Table 7). Demographic variables entered in step 1 in the male model accounted for 7% of variance in the behaviour. After entering the predictors (intentions, PBC and perceived barriers) in step 2, the total variance explained by the model was 20%, $F(8, 83) = 2.47$, $p < .05$. The three TPB predictors explained an additional 13% of variance in male PA after controlling for demographic variables, R^2 change = .13, $F_{change}(3, 84) = 4.36$, $p < .01$. The unique effect of all variables on male PA was not significant.

In female model, demographic variables entered in step 1 accounted for 3% of variance in PA. After entering the predictors (intentions, PBC and perceived barriers) in step 2, the total variance explained by the model was 13%, $F(8, 120) = 2.24$, $p < .05$. The three TPB predictors explained an additional 10% of variance in female PA, R^2 change = .10, $F_{change}(3,120) = 4.44$, $p < .01$. In the final model, intentions and PBC were significantly positively associated with female PA.

Thus, regression models for each gender to predict PA were significant. However, intentions and PBC significantly predict female PA. Overall predictors explain more variance (20%) in male PA than female PA (13%), also supported by previous research (Wang & Wang, 2015).

Table 7. Hierarchical multiple regression analysis predicting physical activity among males and females.

		Males						Females					
Step	Variables	R^2	R^2 change	R^2 adj.	*B*	SE	β	R^2	R^2 change	R^2 adj.	B	SE	β
		.07	.07	.01				.03	.03	−.01			
	Age				.01	.01	.13				−.01	.01	−.09
	Education				.00	.10	.00				.13	.08	.13
1	Marital Status				−.04	.10	−.05				.01	.09	.01
	Socioeconomic Status				−.04	.10	−.06				−.01	.06	−.02
	BMI				−.03	.02	−.17				−.02	.02	−.12
		.20	.13	.11				.13	.10	.07			
	Intentions				−.80	.42	.21				−.88	.41	.21*
2	Perceived Behavioural Control				.17	.11	.20				.18	.09	.19*
	Perceived Barriers				−.20	.10	−.13				−.08	.18	−.04
3	Perceived Gender Norms				NA	NA	NA	.13	.02	.06	.30	.20	.17

Note: *$p < .05$; **$p < .01$; ***$p < .001$.

Full model, predicting intentions with 35% of variance (Table 4), is stronger representative of TPB than full model explaining 15% of variance in PA (Table 5); variance partially consistent with other studies (39% and 27%) (Armitage & Conner, 2010). "Subjective norms" was the largest and "intentions" was the least contributing factor in the whole model whereas perceived barriers and attitudes were not significant.

PGN to Predict Intentions and PA (Female Sample)

Finally, another hierarchical multiple regression was run with the inclusion of PGN in step 3 (Table 6), to ascertain if the addition of PGN improved the prediction of intentions over and above demographic variables. The full model was statistically significant, $R^2 = .43$, $F(10, 121) = 9.28$, $p < .001$. The addition of PGN led to a non-significant increase in R^2 of .00, $F_{change}(1,121) = .13$, $p = .720$.

Similarly, to assess PGN effect on females' PA, a hierarchical multiple regression was run with the inclusion of PGN in step 3 (Table 7). The full model was not significant, $R^2 = .13$, $F(9, 119) = 1.89$, $p = .059$ and the addition of PGN led to a non-significant increase in R^2 of .02, $F_{change}(1, 119) = 2.27$, $p = .134$.

In line with other research (Shelton et al., 2009), PGN could not contribute significantly towards Pakistani females' PA, and our hypothesis was not supported. There might be a fatigue effect (Eccles et al., 2004; De Koning et al., 2021) as PGN was added at the end.

Independent Sample t-test

An independent sample t-test revealed gender's non-significant effect on PA, in the predicted direction, $t(219) = .79$, $p = .43$; with males' higher score ($M = 2727.28$, $SD = 3695.26$) than females ($M = 2369.62$, $SD = 3016.60$). The magnitude of the mean difference (.07) (95% CI: −.24 to .39) is small (eta squared = .000) (Cohen, 1988). Therefore, the hypothesis to have gender difference in PA was not supported.

However, the perception of barriers among females (M = 2.22, SD = .45) was significantly higher than males (M = 1.96, SD = .54; t (179) = −3.89, p = < .001; 95% CI: −.39 to −.13) with moderate effect size (Cohen's d = .49). Thus, the hypothesis to find gender difference in perceived barriers was supported.

4. Discussion

Consistent with previous research, the main result of this study was quite encouraging that PA was not significantly different among males and females (Ainsworth et al., 1993; Al Kubaisy et al., 2015; Lee, 2005; Rhodes et al., 2006; Trost et al., 2002). By contrast, some Asian studies reveal boys' PA is higher than girls (Ishii et al., 2015; Naseer et al., 2012; Wang & Wang, 2015).

Factors participants young age (M = 33), university education (90%), and middle-class background (53%) might help maintain an average healthy weight (BMI = 24.6 ± 5) with a moderate PA (MET-Minutes = 1369.80), which is more than minimum weekly requirements (600) set by WHO (2021) for health benefits. However, Asians with BMI 23 or higher are at increased risk of chronic diseases (NHS, 2018). Given that the most health benefits are associated with 3000 - 4000 MET-Minutes/week, increasing the average MET-Minutes from 600 to 3600/week reduces the risk of chronic diseases by 19% (Kyu et al., 2016).

This research, partially supporting the hypothesis (**Table 4**), suggests that extended TPB with antecedents (attitude, subjective norms, PBC, and perceived barriers) seems an appropriate model for young adults over a short time, similar associations found in previous research (Gellert et al., 2015; Úbeda-Colomer et al., 2019). Surprisingly attitudes had little effect on intentions, contrary to studies showing a substantial effect of attitudes on intentions and PA (Chatzisarantis et al., 2005). This discrepancy might be attributed to the uncertainty generated by Covid-19, which prevents people from intending to exercise despite their enjoyment of it (see Conner & Armitage, 2006).

The significant contribution of subjective norms and PBC to participants' intentions suggests that people are motivated to overcome obstacles with confidence and competence to comply with the desires of others who want to see them active and healthy. Partially supporting this, Sas-Nowosielski (2006) found an association between social pressure and PA; PBC and intentions as moderate predictors to boys' PA and weak for girls. Social norms, a weaker predictor of behaviour in TPB studies (Armitage & Conner, 2010), are the common significant predictor to Pakistani males and females' behavioural intentions (**Table 6**). This finding may partly be explained by the collectivist cultural norms prevalent in Pakistan (Hassan et al., 2019).

The extended TPB (**Table 5**) with predictors (intentions, PBC, and perceived barriers) to PA also seems an appropriate model, with PBC's largest unique contribution. This result is opposite to what McEachan et al. (2011) found from a systematic review in which TPB constructs explained 19.3% of variance in behaviour, with intention, the largest contributing factor. This inconsistency could be

explained by "inclined abstainers", in which individuals fail to act despite their intentions (intention-behaviour gap), a TPB's shortcoming (Orbell & Sheeran, 1998; Sheeran & Webb, 2016). Moreover, it might be attributed to the proximity of intentions with subjective norms and perceived barriers (**Table 3**) demanding high behavioural control to perform PA in Pakistan.

Researchers have long sought a gender effect on TPB constructs to explain behaviour (Ajzen, 1988; Wang & Wang, 2015). Consistent with previous literature (Abraído-Lanza et al., 2017; Randazzo, 2016), social pressure and cultural norms substantially predict intentions among both genders (**Table 6**) whereas barriers indirectly predict females' PA through intentions, confirming earlier observations (Aljayyousi et al., 2019; Juhari et al., 2015; Laar et al., 2019a; Laar et al., 2019b) of social, cultural, and religious obstacles faced by females in PAs.

Further, despite having supportive social pressure, participants do not feel competent to plan PA when they are assessed separately by gender (**Table 6**), which indicates a mediating effect of barriers for females who, despite having similar PA, perceive more barriers than males ($p < .05$). However (**Table 7**), the competency skills along with strong intentions, help females to engage in PA with more confidence and control. A similar expanded model of TPB revealed that females were more likely to have positive attitudes, high intentions, and high self-efficacy towards leisure-time PA, whereas intentions were the only predictor of PA among males (Beville et al., 2014).

Moreover, when females are likely to have strong intentions and PBC to perform PAs, males show neutral intents, little behavioural control, and perceive low constraints while performing PAs (**Table 7**). Despite having neutral predictors to PA, males' PA (*Med* = 1440) is slightly higher than females' PA (*Med* = 1170). A possible explanation of this incongruence is that Pakistani females may want to identify with role models/celebrities due to the media's negative effect on body image (Khan et al., 2011), causing females to be more concerned about fitness (Najam & Ashfaq, 2012) in Pakistan. Moreover, they perceive barriers in fulfilling these demands, instigating a need for more control and planning skills in PAs. Contrarily, boys' natural desire to conserve energy for outdoor activities conforms to societal and cultural norms (Al Kubaisy et al., 2015). They acknowledge social pressure to do PAs (may be in sports), but they may not need any competency skills to plan for it as they do not perceive any barriers.

In summary, the extended TPB explains the relationship between TPB constructs and PA among Pakistani adults. Overall, subjective norms (indirectly), intentions (directly) and PBC (directly & indirectly) predict PA. However, due to the gender differences in the predictability of the constructs, subjective norms, perceived barriers, intentions, and PBC should be targeted to improve females' PA and subjective norms to improve males' PA.

5. Limitations

First, most participants were educated, middle-class young adults recruited over the internet by convenience sampling, which may preclude individuals from

disadvantaged backgrounds with limited resources and less technical expertise. Therefore, the results could not be generalizable to a larger population. Second, due to selection bias in passive recruitment approaches, participants might overrate it due to social desirability or recall bias, which can be reduced through the projective approaches in future (Podsakoff et al., 2003). Third, more than half of participants (59%) dropped out owing to missed responses (≥60%), leaving a huge gap in data. It warns cautious interpretations as the participants who missed responses might be less interested in PA (De Koning et al., 2021) or who completed might be more interested with 100% response in *health status*. Fourth, objective PA measures (e.g., pedometers) may produce precise results (Deng et al., 2008; Gellert et al., 2015), which was infeasible in this study. This factor may have increased the scales' (IPAQ) reliability (α = .52), one of the limitations of this research. Further, this could be a case of "scale correspondence", in which one scale is assessing continuous frequencies (IPAQ), and another is ascertaining the degrees of certainty. Studies with perfect correspondence show better intention-behaviour association (Downs & Hausenblas, 2005). Lastly, we can only predict the unique contribution of independent variables on the dependent variable in cross-sectional designs, whereas experimental designs can prove cause and effect relationships (Tabachnick & Fidell, 2001).

6. Recommendations

This research aimed to examine the relative effect of predictors on behaviour to assist the policymakers in designing the interventions. While replicating and extending the present approach, future researchers may focus on qualitative longitudinal designs (Baron & Kenny, 1986) to explore the mediation effect of intentions on PA over a long period by undertaking culturally relevant measures. Besides, to increase the generalizability of the results, future researchers may consider a larger sample based on random sampling while including participants from diverse age groups, education levels, and socioeconomic backgrounds (Kosma et al., 2004).

7. Conclusion

This study illustrates that policymakers consider the culturally relevant extended TPB model to modify Pakistani adults' behaviour (PA) to promote health and well-being. Though social norms, behavioural control, and strong intentions contribute towards Pakistani adults PA, females' PA can be improved by providing them social support and skills to overcome obstacles, thus strengthening their intentions; males' PA can only be promoted through increasing societal pressure. However, the findings should be interpreted with caution, as the model could not explain 65% of variance in intentions and 85% of variance in PA.

Data Availability Statement

The data that was gathered during this study is available on the request from the

corresponding author [Mona Aeysha Khalid, mei3na4@gmail.com]. It is not available online as the participants' privacy would be compromised.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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