

**Personal, Environmental and Social
Predictors of Accelerometer Measured
Moderate to Vigorous Physical Activity
of Bruneian Adolescents**

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Research Background: Obesity Prevalence

- Brunei Darussalam: the **highest obesity rate** among Asian member countries(WHO, 2008).
- Cancers, heart diseases, diabetes, cerebrovascular diseases and hypertensive diseases are the top five leading causes of death (MOH, 2012).
- These diseases are related to lifestyle and obesity and can be tracked from the childhood to adulthood.

Research background:

Physical Activity (PA) and health

- Engaging in physical activity decreases the prevalence of obesity, risk of cardiovascular disease, diabetes, high cholesterol and cancers (Mitchell et al., 2003).
- Moderate-to-vigorous physical activity (MVPA) , as 1st public health priority, is an important independent predictor of adiposity (Goran, Ball, & Crus, 2003).
- WHO recommended that that children and adolescents should accumulate at least 60 minutes of MVPA per day (2012).

- However, physical activity are reported to decline from childhood to adolescence.
- Therefore, it is important to examine PA pattern of adolescents in Brunei.
- It is also important to examine the multiple factors that may predict their PA behaviors particularly MVPA in the special population.

Purpose of the Study

1. to examine objectively measured PA levels in Bruneian adolescents and PF's contributions to MVPA.
2. to simultaneously assess the contributions of personal (BMI, PF & self-perceptions), social (support from school, peers and family) and environmental (home, school, and neighbourhood facilities) context to MVPA.
3. To examine the differences in these predictors to MVPA and TPA.

Methods (Participants and procedure)

- Ethical clearance and consent obtained.
- **Participants** were 468 (200 boys and 268 girls Malay: 88.8%, Chinese: 6.8%, others: 5.1%) aged from 12 to 14 years old ($12.8 \pm .75$ years) adolescents from 8 secondary schools from 4 districts of Brunei Darussalam.
- **Instruments**
 - Accelerometer (objective 7-day measurement of PA)
 - Questionnaires (personal, social, environmental factors, PA)
 - PF test (PF levels: poor (1), bronze (2), silver (3) and gold (4))

Methods (Variables)

- **Personal factors**

- Anthropometric measures: BMI
- National Standard Fitness Test result
- Self-perceptions (questionnaires on enjoyment of PA, Attitude towards PE, physical activity competence scale)
- Physical Activities (accelerometer; 17 items questionnaires)

- **Social and environmental factors**

- parental participation, facilitation, encouragement
- family cars, school equipment and facilities, home equipment, proximity to playgrounds, parks, sports facilities and safety

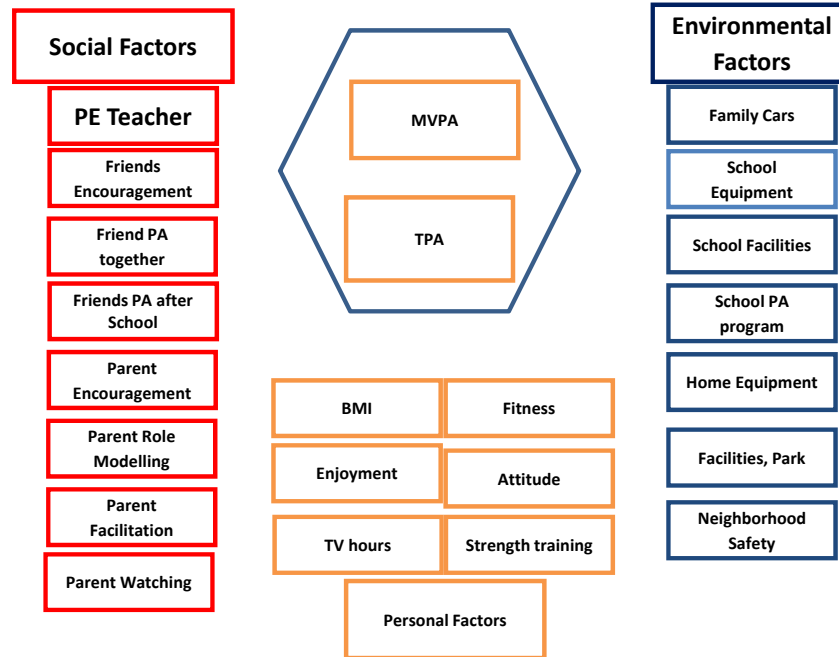


Figure 1. Personal, Social and Environmental Factors in Physical Activity Questionnaire

Method (Data analysis)

- Mean and standard deviations were computed.
- Correlation analysis of BMI, PF, PA components, self-perceptions and total social and environmental scores were conducted.
- Stepwise regression analysis was used to determine these individual, social and environmental predictors of MVPA vs TPA.
- The significant levels were set at $p \leq .05$.

RESULTS

Physical Activity Levels

- All of the Bruneian adolescents accumulated **inadequate MVPA** (the median on MVPA was 4 minute·day⁻¹) even though boys and girls have positive enjoyment scores and reported that more than 50% achieved 60 minute MVPA daily.
- **Boys** were engaged in **more** high intensity of **PA** including MVPA (boys: 5.69 ± 4.14 minute·day⁻¹) **than girls** (girls: 2.93 ± 2.26 minute·day⁻¹)

BMI, PF and Self-perceptions

- **BMI**

- **unrelated** to all the **PA** components ($p > .05$).
- significantly **related** to the **PACES** scores ($r = -.18, p < .01$) and ATPE scores ($r = .18, p < .01$)

- **PF**

- significantly **related** to the **PACES** score ($r = .24, p < .01$) and **ATPE scores** ($r = .27, p < .01$).
- significantly **related** to **MVPA** ($r = .21, p < .01$) and TPA ($r = .13, p < .01$)

- **PA and self-perception**

- significantly **related** to total **social** ($r = .16-.23, p < .01$) and **environmental** scores ($r = .16-.19, p < .01$)

Table 2. Correlations between MVPA, TPA, and Personal, Social and Environmental Factors

Variables	BMI	FIT	MVPA	TPA	ATPE	PACES	SOCIAL
BMI	1						
FIT	-.32**	1					
MVPA	-.01	.19**	1				
TPA	-.01	.13**	.67**	1			
ATPE	-.09	.23**	.01	.05	1		
PACES	-.18**	.21**	.04	.19**	.21**	1	
SOCIAL	-.01	.02	.23**	.21**	.19**	.15**	1
ENVIRON	-.04	.08	.17**	.16**	.13**	.15**	.52**

*Significant differences (**p ≤ .01)

Table 3. Comparisons of Personal, Social and Environmental Predictors of MVPA and TPA

Predictors	MVPA				TPA			
	B	SEB	β	p	B	SEB	β	p
Fitness	.16	.22	.17	.001**	.12	.13	.16	.001**
Enjoyment					1830.46	460.5	.23	.001**
Attitude					.04	.12	.10	.04*
Parent role modelling	1.03	.16	.15	.001**	23515	4512.2	.35	.001
Friend PA together	.80	.25	.16	.001**	18548.12	4326.26	.27	.001
PE teacher	-.60	.13	-.12	.02				
School equipment	.42	.18	.11	.02*				
Family cars					-7338.37	2777.48	-.14	.01**
Neighbourhood park	.39	.13	.14	.003**	10804.4	3040.7	.30	.001
Neighbourhood safety					8296.69	4280.15	.11	.05*
Strength training	.46	.14	.16	.005**				
TV hours					-11336.14	3268.51	-.20	.001
R2	.170				.251			

*Significant differences (*p ≤ .05. **p ≤ .01)

DISCUSSION

1. Physical activity and BMI

- It is **inconsistent** with the previous research that there was **significant relationship** between **PA** and **BMI**.
- However it should be reported cautiously because of extremely low PA levels of the adolescents.

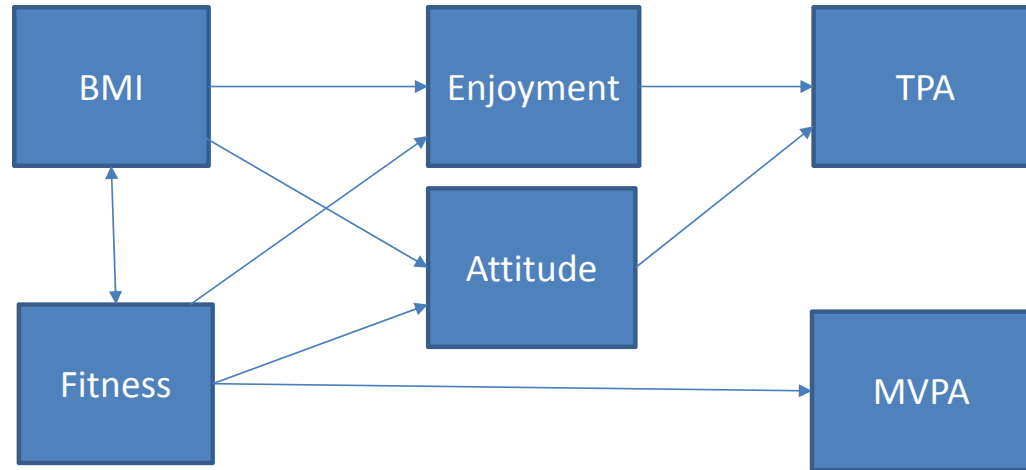
2. PF, Social and environmental factors significantly predicted MVPA

- **PF** was significantly and **positively related** to enjoyment and attitudes while **BMI** was significantly and **negatively related** to **enjoyment and attitudes**.
- As the 1st attempt, **PF** was found to be an only **predictor** of **MVPA**.
- **Parent role modelling (social)** was **strongest predictors** of **PA** than **neighborhood park(environmental)**. This finding was consistent with previous findings.
- Neighborhood park, PF, friend do PA together was the **strongest predictors** of **MVPA** and **TPA**

3. Predictors of MVPA vs TPA

- Enjoyment and attitudes were significant predictors of TPA but MVPA.
- PF was an only predictor of MVPA among all personal factors while self-perceived enjoyment and hours spent on TV watching are the predictors of TPA.
- Social and environmental factors are similar from previous research findings while parental role modelling as a strongest predictor is a new finding.

4. A Possible Explanation by SCT (Bandura, 1986)



5. Problems may exist in defining MVPA in Children and Adolescents

- **MVPA or MPA and MPA:** MVPA was historically defined using heart rate (HR 140-160 $\text{beat}\cdot\text{min}^{-1}$), LPA (120-1399 $\text{beat}\cdot\text{min}^{-1}$) Current cut point using accelerometer may significantly overestimate MVPA by include some LPA.
- **METS** derived from adults: currently used cut points of MVPA using accelerometers had used MET based on adults which may lead to potential overestimation (an adolescent has 1/3 to 1/2 body mass of an adult's).
- Thus, cut point of MVPA used in this study used is **2500 $\text{count}\cdot\text{min}^{-1}$** or at **6 $\text{km}\cdot\text{hr}^{-1}$** a brisk walking speed (our unpublished data using direct observation).

Conclusion

- The 3 strongest predictors are parent role modeling, physical fitness, neighborhood parks for both MVPA and TPA.
- Physical fitness is the only personal predictor of MVPA
- Self-perceived enjoyment but attitudes significantly predict TPA but MVPA.

Implications for Practice and Policy

- It appeals physical and health educators to make PA more enjoyable without overlooking and compromising PF in order to promote MVPA.
- The findings of this study also suggest government policy makers to improve sports environments in both schools and communities, increase adolescents' and their parents' awareness of the roles of physical fitness, parental role modeling and peer participations to encourage adolescents to participate in MVPA.

Thank you !

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