

# PHYSICAL ACTIVITY, SELF-ESTEEM, AND QUALITY OF LIFE AMONG PEOPLE WITH PHYSICAL DISABILITY

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**Abstract.** Physical activity (PA) can improve health and quality of life (QOL) of healthy people. However, the association between PA and QOL among people with physical disability (PWP) is inconclusive. This study was conducted to determine the relationships between factors including intensity of PA, activity in daily living (ADL), stress, and self-esteem that influences self-reported QOL among PWP. The relationships were further explored using the in-depth interview method to find out whether the intensity of PA, stress, and self-esteem are related to QOL perception in PWP. One hundred sixty PWP aged 18-48 years who studied at a vocational school were enrolled. A mixed method case study was conducted: cross-sectional survey and in-depth interview. Five questionnaires, including the Barthel Index, Perceived Stress Scale (PSS), Rosenberg Self-Esteem Scale (RSES), and Physical Activity Scale for Individuals with Physical Disabilities (PASIPD) were distributed. QOL was measured using the WHOQOL\_BREF. Multiple linear regression was used to determine factors for QOL prediction. For in-depth interview, ten persons from each group (poor-to-fair and good QOL) volunteered to explore further about life satisfaction related to physical disability. One hundred forty-six (91%) subjects completed all questionnaires. One hundred fourteen (77%) reported poor-to-fair QOL. QOL was explained by self-esteem and ADL (adjusted  $R^2$  34.7%,  $p < 0.001$ ) after adjusted for age, stress, and PA. Although PA could not explain QOL in PWP, good QOL reported high activities (28.40±30.20 MET hour/day) compared to poor and fair QOL (17.94±22.06 and 21.70±17.75 MET hour/day). Those who had good QOL reported that they were proud to be independent and did not feel inferior. PA participation among people with disabilities should therefore be encouraged.

**Keywords:** quality of life, Barthel Index, Metabolic Equivalent Task (MET), Perceived Stress Scale, Physical Activity Scale for Individuals with Physical Disabilities, Rosenberg Self-Esteem Scale, Thailand

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## INTRODUCTION

The number of people with disability has been increasing with population growth and medical advances. Estimates are that more than a billion people worldwide have disability, of which 80% live

in the developing world (ESCAP, 2011; WHO, 2011). In 2007, Thailand reported that 2.9% of the population aged 15 years and over were people with disability (NSO, 2007). There are five categories of people with disability: visual, hearing and community, physical, cognitive, and psychological impairments. The majority, approximately 500,000 persons, has physical impairments and locomotion limitations (ILO, 2009).

Although many programs and policies have been launched to improve equality, accessibility, and quality of life (QOL), poor-to-fair QOL has been found, in particular with Thai people with physical disability (PWPD) (Rukwong *et al*, 2007; Manimmanakom *et al*, 2008; Dajpratham and Kongkasuwan, 2011; Dajpratham *et al*, 2011). QOL is perceived, in these reports, to be influenced by socioeconomic status associated with employment, education, and income. A range of factors seems interrelated with QOL, including physical impairment; personal and psychological factors, such as anxiety and depression; and life satisfaction (Heller *et al*, 1996; Viemero and Krause, 1998; Rukwong *et al*, 2007; Manimmanakom *et al*, 2008; Misajon *et al*, 2008; Dajpratham and Kongkasuwan, 2011; Dajpratham *et al*, 2011). The level of functional independence is positively related to community participation and QOL.

Physical activity (PA) can improve health, physical fitness, functional independence, and quality of life in both able and non-able bodied people (ACSM, 2006). However, the PWPD commonly have difficulty performing PA required in daily living (ADL), including self-care, transfers, and home and community mobility. They may be less likely to engage in these basic PA compared to able-bodied persons (Hannon *et al*, 2006). A sedentary person is defined as being physical

inactive (ACSM, 2006). PWPD have been reported to have insufficient physical activity or inactivity (Kofsky *et al*, 1983; Washburn *et al*, 2002; ACSM, 2006; NDA, 2012). Ellis *et al* (2009) asserted that the intension of PA performance in PWPD is determined by their attitude, social norms, and perceive behavioral control.

Findings about the associations between PA and QOL in PWPD are inconsistent (Manns and Chad, 1999; Crawford *et al*, 2008; Stevens *et al*, 2008). Manns and Chad (1999) reported that PA was highly correlated with the level of disability, physical independence, and mobility in people with quadriplegia. However, they found that PA and the type of spinal cord injury (paraplegia and quadriplegia) were not related to the subjective assessment of QOL. Gutierrez *et al* (2007) examined the correlation between subjective QOL, PA measured by physical activity scale for individual with physical disability (PASIPD), and community participation in 80 persons with paraplegia who had shoulder pain. The median of PA was 14.4 Metabolic Equivalent Task (MET) hour/day and higher in males comparing to females (15.3 and 9.2 METs hour/day). They found that PA had low correlation with QOL and community participation ( $r_s=0.14$  and  $0.24$ ,  $p>0.05$ ). By contrast, Chang *et al* (2012) described the factors related to QOL in person with spinal cord injury. Persons who were independent for transportation or driving cars demonstrated good QOL ( $12.57\pm 2.17$  of WHOQOL\_BREF) compared to those who were dependent and significantly correlated with the QOL ( $R^2=0.269$ ). Stevens *et al* (2008) reported that life satisfaction was highly associated with QOL perception. They found that only PA could explain QOL in people with spinal cord injury after adjusting for level and time

since injury. Additionally, PA was found to significantly explain 56% of total variance of QOL (Stevens *et al*, 2008).

Crawford *et al* (2008) described levels of PA in relation to health, community integration, and social participation among PWPDP. PA was classified into three groups (high active, low active, and inactive) in PWPDP. Those who reported high active status had greater social participation, better health, and higher levels of returning to normal community life compared with those who had low active or inactive status.

A systematic review found strong correlations between PA and QOL (Ravenek *et al*, 2010). Thirteen studies of randomized control trials, pre- and post-designs, and cross-sectional surveys were included from 2003 to 2011. Of these, 12 studies supported that PA significantly improved QOL in persons with spinal cord injury. However, another meta-analysis, which included 21 experimental studies, found a small to medium effect size (0.21-0.45) for PA positively related to life satisfaction in person with spinal cord injury (Ginis *et al*, 2012).

Numerous studies have been conducted over the past decade, but the relationships between PA and QOL in PWPDP remain inconclusive. To effectively plan health care policy and resource management for PWPDP, we need to identify possible factors that contribute to a good level of QOL. This study was undertaken to study possible factors, including the intensity of PA, stress, and self-esteem that potentially influence self-reported QOL in PWPDP who studied at the Vocational School in Pattaya, Thailand. We further explored the quantitative assessment of QOL results using qualitative techniques. We considered whether the intensity of

PA, stress, and self-esteem are related to QOL perception in PWPDP.

## MATERIALS AND METHODS

### Study site

In 1984, the Vocational School at Pattaya Metropolis, Chon Buri Province was founded for people with disabilities, including physical disability, and visual and hearing impairments. They are educated and trained for jobs matching with their disabilities. According to the Thai Ministry of Labor and Public Welfare (Murray, 1998; ILO, 2009) this vocational school was launched to improve equality, accessibility, and quality of life of people with disability.

### Research methodology

We undertook a case study to determine the relationships between PA, stress, and self-esteem on self-reported QOL. A mixed-methods methodology used a cross-sectional survey and in-depth interviews.

### Sample size calculation

According to the previous studies (Gutierrez *et al*, 2007; Rukwong *et al*, 2007; Chang *et al*, 2012) and the sample size was calculated according to the following formula:

$$n = \left[ \frac{(Z_{\alpha/2} + Z_{\beta})}{[F(Z_0) + F(Z_1)]} \right]^2 + 3$$

The probability of types I ( $\alpha$ ) and II ( $\beta$ ) error were 0.05 and 0.1, the Fisher's Z transformation ( $q$ ) were 0.3 and the sample was 142 subjects including 20% of nonresponse rate.

### Respondents

Two hundred fifteen PWPDP who study in the vocational school, Pattaya were selected as respondents. Person with

other type of impairments including vision, hearing, communication, and cognitive were excluded. Person with physical disability who aged older than 18 years and studied in a vocational school, Pattaya were included into this study. They had an identity card that certified their physical disability.

Person with disabilities have been defined as: *....persons who encounter certain limitations in performing their daily activities or social participation due to their impairment in vision, hearing, mobility, communication, mind, emotion, conduct, intellect, learning or any other impairments/disabilities along with various difficulties, and specifically need some assistance to enable them to perform their daily activities of social participation same as ordinary persons. The types and prescriptions of disabilities shall be determined and announced by the Minister of Social Development and Human Security (Persons with Disability Empowerment Act, 2007).*

### Questionnaire

The questionnaire of survey research comprised four sections: demographics, psychological factors, physical activity, and QOL. Demographics recorded were age, gender, educational level, and the type and duration of physical disability. The Barthel Index (BI) assessed the ability to perform activities of daily living (ADL) (O'Sullivan and Schmitz, 2007). The psychological factors were measured by questionnaires regarding stress and self-esteem. The Perceived Stress Scale (PSS) measured the degree to which one's life situations are appraised as stress (Cohen *et al*, 1983). The Rosenberg Self-Esteem Scale (RSES) measured the perception of global self-esteem (Rosenberg, 1965; Rosenberg *et al*, 1989; Schmitt and Allik, 2005). Higher scores indicated higher self-esteem and stress perceptions.

The Physical Activity Scale for Individuals with Physical Disabilities (PASIPD) was used to measure the level of PA (Washburn *et al*, 2002; van den Berg-Emons *et al*, 2011). This scale consists of 13 items: 1 for sedentary activity, 5 for leisure activity, 6 for household activity, and 1 for occupational activity. Respondents identified the frequency of activities performed within the last week and the average time in hours. The Metabolic Equivalent Task (MET) hour-per-day was calculated by multiplying the average hour-per-day with weighted values in each item. The summation scores of Items 2-13 described the intensity of PA. The maximum score was 199 MET-hour-per-day, and high scores represented high PA. The PASIPD was translated from English to Thai and content was validated by the agreement of two consultants. Good reliability (Cronbach  $\alpha$  coefficient = 0.89) was found (Jalayondeja and Jalayondeja, 2013).

QOL was measured by the WHO-QOL\_BREF Thai version (WHO, 2012). The WHOQOL\_BREF questionnaire contains 26 items representing four domains: physical health, psychological health, social relationships, and environmental factors. The scores denote an overall perception of QOL in each domain. As described in the standardized protocol, the QOL total scores were classified into 26-60 points for poor, 61-95 points for fair, and 96-130 points for good (Rosenberg *et al*, 1989; Mahatnirundkul *et al* 1998; Schmitt and Allik, 2005).

The questionnaires including the WHOQOL\_BREF, PASIPD, BI, PSS and RSES were distributed by the Vocational School's teachers and secretariat who had been informed about the research protocol by the investigators. The respondents returned the questionnaire to the box in front of the school's office within 2 weeks.

The qualitative investigation verified and expanded on the results of the quantitative analysis. The respondents were first classified into poor, fair and good QOL according to the WHOQOL\_BREF's scores. Ten persons from each group were asked to volunteer for the interview conducted by the school's secretariat. Two questions were asked concerning overall life satisfaction and QOL related to their disability. They were asked to express their feeling relation to physical disability and life satisfaction and QOL. Each participant was interviewed for approximately 30 minutes in the private interview room. Research assistants who were blinded to the QOL scores recorded the interviews.

#### **Data analysis**

For the quantitative analysis, the relationships between demographic, psychological and PA factors, and QOL were analyzed using SPSS® (version 19.0; IBM, Armonk, NY). Multiple linear regression analysis was used for determining the relationships between QOL and the variables for the intensity of PA, ADL, stress, and self-esteem.

To further examine the factors related to the QOL perspectives in PWPd the content analysis was adopted using a general inductive approach. Qualitative data were input to the Microsoft Excel 2013® (version 15; Microsoft, Redmond, WA) for text analysis. Word similarities were drawn and summarized for the qualitative result.

#### **Ethical considerations**

The Mahidol University Institutional Review Board (MUIRB COA N° 2012/087.1605; 2012 May 16) approved this study. PWPd were invited for participation by the vocational school's teachers and secretariat who had been informed about the research protocol by the inves-

tigators. They were informed about their rights to reject participation or withdraw at any time and these are not effect to their study or graduation.

## **RESULTS**

Of 215 PWPd who study in the vocational school, 160 returned the questionnaire, including 146 (91%) completed for WHOQOL\_BREF (Table 1). Most respondents were young males who had a disability for over 10 years and lived outside of Bangkok. About half of the respondents had cerebral palsy or polio. Other types of physical disability included hemiplegia, paraplegia and quadriplegia, upper and lower extremity amputation, and arthritis. Forty-seven percent reported high school or higher levels of education.

The intensity of each item of leisure, household, and work-related activities as measured by the PASIPD was delineated for each type of physical disability (Table 2). Each PA was classified by intensity level from low to high. For leisure activities, the PA intensity ranged from 2.02-10.73 METs hour/day for walking and wheel push outside; for light, moderate, and strenuous sports and recreation, PA intensity ranged from 0.33-8.10 METs hour/day; and for exercise to increase strength, PA intensity ranged from 1.38-5.24 METs hour/day. For household activities, PA intensity ranged from 0.38-3.97 METs hour/day for light to heavy housework, 1.49-5.83 METs hour/day for home repair, 0.79-3.44 METs hour/day for lawn work and yard care, 1.91-2.50 METs hour/day for outdoor garden work, and 0.40-1.27 METs hour/day for caring for another person. The intensity of work for pay or volunteering was 1.5-5.09 METs hour/day.

#### **Predicting model of quality of life**

Age, the BI, the PSS, and the Rosen-

Table 1  
Characteristics of 146 people with physical disability.

Characteristics	<i>n</i> (%)	Mean±SD (range)
Age (years)	146 (100.0)	25.2±6.0 (18-48)
<20	36 (24.6)	
20-30	82 (56.2)	
>30	28 (19.2)	
Male	108 (74.0)	
Duration of physical disability by type		
Hemiplegia	20 (13.7)	12.40±8.72 (3-32)
Paraplegia and quadriplegia	33 (22.6)	10.09±6.59 (2-25)
Cerebral palsy and poliomyelitis	72 (49.3)	16.54±8.87 (1-44)
Upper amputation	9 (6.2)	12.50±8.11 (3-27)
Lower amputation	11 (7.5)	9.64±8.12 (2-22)
Joint arthritis <sup>a</sup>	1 (0.7)	
Registered residence		
Bangkok	12 (8.5)	
Other provinces	133 (91.5)	
Education level		
High school and higher level	67 (47)	
Secondary school	42 (30)	
Primary school	15 (11)	
Not at all	17 (12)	
Mobility measured by Barthel Index <sup>b</sup>		
Independent walking	79 (62.7)	
Walking with one assistant	4 (3.2)	
Independent wheelchair	32 (25.4)	
Dependent	11 (8.7)	

<sup>a</sup>One respondent had been affected for 28 years. <sup>b</sup>Only 126 people with physical disability responded about transportation.

berg self-esteem were significantly associated with the QOL by univariate analysis (Table 3). All variables including PA were entered to develop the QOL model prediction by multiple linear regression. The QOL was explained by self-esteem and ADL (adjusted  $R^2$  0.347,  $p < 0.001$ ) after adjusted by age, stress, and PA.

#### In-depth interview of quality of life perspectives

PWPD were classified into QOL levels as measured by the WHOQOL\_BREF into poor-to-fair ( $n=114$ ) and good ( $n=30$ ).

Twenty PWPD participated in the in-depth interviews of their life satisfaction and physical disability according to their QOL classification. Table 4 presents the characteristics of the ten persons in each group. Each group consisted of persons with all types of physical disability including hemiplegia, paraplegia, cerebral palsy, upper extremity amputation, and arthritis. A general inductive approach of interview data provided three themes: perspective on disability, physical activity level, and self-esteem.

In general, persons with poor-to-fair

Table 2  
Intensity of each physical activity for all types of disability.

Items	Physical activity measured by PASIPD, mean±SD (MET hour/day)					
	Hemiplegia	Paraplegia and quadriplegia	Cerebral palsy and poliomyelitis	Amputation		Joint arthritis
				Upper	Lower	
Leisure time activity (Items 2-6)						
Walk and wheel push outside (not for exercise)	4.25±3.68	6.28±4.08	3.69±3.96	2.02±2.16	2.95±3.78	10.73±0.00
Light sport and recreation	2.83±3.27	2.01±2.40	2.08±2.69	1.12±0.88	1.64±1.17	0.33±0.00
Moderate sport and recreation	2.37±2.69	3.66±4.12	2.56±2.92	1.59±1.22	2.57±0.61	0.44±0.00
Strenuous sport and recreation	4.06±2.64	4.34±7.83	6.38±7.44	2.41±1.73	8.10±10.20	-
Exercise to increase strength	4.31±6.51	5.24±5.17	3.73±4.79	1.38±1.42	2.97±1.28	-
Household activity (Items 7-12)						
Light house work	1.50±1.00	1.40±1.19	1.53±1.55	1.21±0.72	1.09±1.14	0.38±0.00
Heavy house work	3.97±4.46	1.99±1.91	2.85±3.28	1.82±0.94	1.84±1.71	-
Home repair	4.13±3.63	1.49±1.72	1.64±3.18	1.81±1.03	5.83±6.72	-
Lawn work and yard care	3.44±3.62	1.65±2.81	2.74±3.28	2.98±3.54	0.79±0.56	-
Outdoor garden work	2.50±2.10	2.24±2.87	1.91±3.00	2.15±2.35	2.39±2.63	-
Care for another person	0.69±0.59	0.40±0.67	0.60±1.05	1.27±1.67	0.86±0.94	-
Work related activity (Item 13)						
Work for pay/volunteer	2.95±2.60	2.25±2.82	1.50±1.96	3.41±4.57	5.09±1.89	-
Total score	25.48±17.98	24.18±22.05	22.59±22.89	16.73±8.14	23.82±19.18	11.87±0.00

Table 3  
Multiple linear regression with the quality of life measured by the WHOQOL\_BREF.

Variables	Univariate analysis <sup>a</sup>			Multivariate analysis <sup>a,b</sup>		
	$\beta$	SE	<i>p</i> -value	$\beta$	SE	<i>p</i> -value
Age (years)	-0.21	0.16	0.009	-0.10	0.15	0.180
Activity Daily Living, by the Barthel Index	0.33	0.06	<0.001	0.21	0.06	0.008
Stress, by the perceived stress scale	-0.18	0.24	0.030	-0.03	0.23	0.630
Self-Esteem, by the Rosenberg Self-Esteem	0.53	0.29	<0.001	0.49	0.33	<0.001
Physical Activity, by the PASIPD (MET hour/day)	0.13	0.49	0.119	-0.01	0.05	0.862

<sup>a</sup> $p < 0.05$ ; <sup>b</sup>Adjusted  $R^2 = 0.347$ .

PASIPD, Physical Activity Scale for Individuals with Physical Disabilities.

QOL reported more anxiety about their disability, less ability to cope, and more irritation with the outside world. Person with good QOL could perform activities like ordinary person and were satisfied with their disabilities and images. Both groups felt pain and difficulty to perform activities in classroom but expressed pride to study in the vocational school.

## DISCUSSION

The results suggested that there were relationships between self-report QOL and each factor, including age, activity in daily living (ADL), stress, and self-esteem in PWPD. However, PA was not significantly associated with QOL in PWPD. After adjusting for age, stress, and PA, self-esteem and ADL could explain QOL in 34.7% of PWPD. Those who perceived good QOL reported satisfaction with their disabilities, some difficulty for activity performances, and less irritation to their life.

We compared our results with previous studies of QOL and related factors (Manns and Chad, 1999; Crawford *et al*,

2008; Stevens *et al*, 2008). Manns and Chad (1999) reported that QOL was not correlated with PA as measured by leisure activity questionnaire in people with spinal cord injury. They proposed that PA may have an important influence on QOL, and all aspects of PA, not just leisure, should be measured.

Our study also found that QOL was not related to the amount of PA as measured by the PASIPD. The PASIPD was developed to measure a wide variety of PA particularly for PWPD (Washburn *et al*, 2002). Contrasting with the study of Crawford *et al* (2008), they found that the performance of high physical activity affects the probability to return to as normal community life as possible in PWPD. Highly active PWPD participated more in recreational and social activities compared to inactive people. The possible relationships among good QOL and self-esteem, life satisfaction, and PA suggest that promoting PA in PWPD is needed and further research should be encouraged. They suggested developing future studies on this issue.

Table 4  
 Characteristics of twenty people with physical disability and their in-depth interview.

	QOL group classified by WHO criteria	
	Poor to fair (n=10)	Good (n=10)
Age (years)	28.3±4.76	26.3±6.16
Male/Female	7/3	6/4
Physical disability <sup>a</sup>	1/3/5/1	1/2/6/1
Question1: How do you think on your disability? Can you explain about your life and disability?		
Disability perspective	Unaccepted their disabilities at the beginning, lost self-confidence to perform their own activities and worried of their future's life. Only two can cope with their disability and encourage themselves to perform activities.	Can cope with their disabilities and satisfied with their images and abilities. Encourage themselves to do all activities like able-body person. Two regret and shame at the beginning but feeling better after walking.
Physical activity	Pain and difficulty to perform routine activities such as walking, stair climbing and grasping.	Pain and difficulty to perform routine activities such as sitting, standing, walking and getting on the bus or motorcycle.
Self-esteem	Proud to study at the vocational school and hope to get a job after graduation.	Proud to study at the vocational school and hope to get job and high degree of examination.
Question 2: Do you have irritation in your life? Please explain		
Disability perspective	Three feel nothing irritate their life. Anxiety with physical health, school examination and friends relationship. Two was irritated by pain (phantom upper limb and leg).	Seven are happy and do not have anything irritating their life. Three worried about the school's project, playing sport and relationship with friends.
Physical activity	Physical impairments affected to class participation and learning such as inability to do the assignment or homework and poor communication.	Sometime they could not do the assignment and examination because of their disabilities.
Self-esteem	Irritated by friend or caregiver's behaviors such as blaming, selfish, unwilling and moody.	Teacher supported and advised them for the continuing study or job application after graduation.

<sup>a</sup>Type of physical disability was consisted of hemiplegia/paraplegia and quadriplegia/cerebral palsy and poliomyelitis/and upper extremity amputation for poor to fair QOL and arthritis for good QOL.

For the studies in Thailand, more education and employment, and sufficient income (Rukwong *et al*, 2007; Dajpratham and Kongkasuwan, 2011; Dajpratham *et al*, 2011) were the factors that explained the

likelihood of a good QOL in PWP. Dajpratham and Kongkasuwan (2011) and Dajpratham *et al* (2011) measured QOL using WHOQOL\_BREF in PWP focusing on those with lower extremity amputation

and spinal cord injury. The respondents who reported good QOL were 2.27 to 3.20 times more likely to have graduated from higher-level education compared to those who had graduated primary school.

We found, conversely, that education was not significantly correlated with QOL ( $p=0.21$ ). The differences in results may be due to the fact that the respondents in our study were all receiving educational and occupational training. However, respondents who reported good QOL described being satisfied with receiving education and professional training that matched their ability and interest for future careers. They reported that the education and professional training enhanced the opportunity and possible employment fairness similar to people without disability.

During the qualitative assessment, respondents in both fair and good QOL groups reported that they were proud to study at the vocational school, because they could plan for a future job and life. Those who perceived good QOL reported being encouraged by teachers, friends, and family; friends and caregivers irritated those who perceived poor-to-fair QOL. These respondents reported that they could not cope with their disabilities and loss of self-confidence to perform activities in daily living.

Viemero and Krause (1998) suggested that poor QOL is related to an inability to cope with the disability, no matter the duration of the condition. They proposed that life satisfaction could be explained by meaningful job engagement, social integration, and sense of life's meaning. In addition, other people's attitudes to their disability can influence life satisfaction and QOL. Inability to perform activities like the able-body people could generate feelings of inferiority in persons with dis-

ability. The feelings of uncertainty or lack of self-worth may negatively influence self-esteem, self-confidence, and life satisfaction (Schmitt and Allik, 2005; Moritz *et al*, 2006). However, in the studies of PA in PWPDP that have been conducted over the past 10 years, the relationship between the amount of PA and QOL is still not conclusive. Future studies of PA influence on QOL in PWPDP are needed.

Although PA did not significantly explain QOL in this present study, the amount of PA did influence life satisfaction and self-esteem. High intensity PA was shown in the respondents who perceived good QOL ( $28.4\pm 30.2$  METs hour/day) compared to those who perceived fair and poor QOL ( $21.70\pm 17.75$  vs  $17.94\pm 22.06$  METs hour/day).

There were some limitations in this study. First, the PA could not be precisely measured by laboratory equipment. We estimated PA by self-report questionnaire (PASIPD), which might have been above or below the true value. Estimates may have been influenced the findings, particularly the relation between PA and QOL. However, the PASIPD is a questionnaire that reflects a wide range of PA, including leisure, sport, household, and work-related tasks, particularly in people with physical disability. The PASIPD was found to have good reliability and validity in particular with PWPDP (Washburn *et al*, 2002; van den Berg-Emons *et al*, 2011). Second, there were 69 PWPDP (32%) who did not participated in this study (55 for non-respondents and 14 for incomplete questionnaires). However, the number of returns (146 respondents) was higher than the sample size calculation and included all types of physical disability. Third, only three people reported poor QOL. Differentiating persons with poor, fair, and good

QOL and relating possible factors could not be determined as we expected.

Self-esteem was the primary factor that explained QOL (34.7%) in PWPDP. Although the PA did not explain QOL, higher PA was found in those who perceived good QOL compared to those who reported poor-to-fair QOL. The qualitative findings suggested that one's perspective on disability and reports of self-esteem were greatly associated with high levels of PA. Good QOL was reported in those who coped with their disability, were proud to accomplish the school's projects and examinations, and who did not have feelings of inferiority.

Education was not significantly correlated with QOL, possibly because all respondents were receiving education and professional training at the school. They all had the opportunity to plan for their future life and career.

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