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HEALTH PSYCHOLOGY | RESEARCH ARTICLE

High sedentary behaviour and low physical activity are associated with lower health related quality of life in Myanmar and Vietnam

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Abstract: The study aimed to estimate independent and combined associations of sedentary behaviour and physical activity with health related quality of life (HRQoL) in Myanmar and Vietnam. The cross-sectional sample included 3201 chronic disease patients (median age 51 years, Interquartile Range 25) systematically recruited from primary care facilities. Sedentary time and physical activity were assessed with the General Physical Activity Questionnaire (GPAQ). Overall, the study population engaged <4 hours (51.3%), 4 ≤ 8 hours (31.2%), and 8 or more hours a day (17.5%) sedentary time a day; 30.7% engaged in low physical activity 50% moderate and 23.6% high physical activity. In the final linear regression model, adjusted for relevant confounders, higher sedentary time (≥8 h) decreased summative HRQoL, HRQoL-Psychological, HRQoL-Physical and HRQoL-social, and moderate and/or high physical activity were associated with better summative HRQoL, HRQoL-Psychological, HRQoL-Physical, HRQoL-social, and better HRQol-environment. Combined regression analysis found that participants with both less than eight hour of sedentary time and moderate or

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PUBLIC INTEREST STATEMENT

People living with one or more chronic health condition are more likely to engage in sedentary behaviour and low physical activity and may have a lower health-related quality of life than in the general population. This paper reports findings from a study that assessed the independent and combined associations of sedentary behaviour and physical activity with health-related quality of life among chronic disease patients in Myanmar and Vietnam. This study highlights that independent and combined association between moderate or high physical activity and low sedentary time with health-related quality of life among chronic disease patients in Myanmar and Vietnam.

high physical activity had a significantly higher summative HRQoL, HRQoL-Physical, HRQoL-Psychological, HRQoL-social, and HRQol-environment. Findings suggest an independent and combined association between moderate or high physical activity and low sedentary time with HRQoL among chronic disease patients in Myanmar and Vietnam.

Subjects: Health Psychology; General Psychology; Mental Health

Keywords: sedentary behaviour; physical activity; health related quality of life; chronic diseases; adults; Myanmar; Vietnam

1. Introduction

Chronic disease patients may more likely engage in sedentary behaviour and physical inactivity and have a lower heath-related quality of life (HRQoL) than in the general population (Milton, Macniven, & Bauman, 2014; Peltzer & Pengpid, 2015; Pengpid & Peltzer, 2016, 2018). Therefore it would be important to assess the impact of sedentary behaviour and physical activity on HRQoL in chronic disease patients. "Sedentary behavior refers to certain activities in a reclining, seated, or lying position requiring very low energy expenditure. It has been suggested to be distinct from physical inactivity and an independent predictor of metabolic risk even if an individual meets current physical activity guidelines." (Panahi & Tremblay, 2018, p.258). In a systematic review "strong evidence of a relationship between sedentary behaviour and all-cause mortality, fatal and non-fatal cardiovascular disease, type 2 diabetes and metabolic syndrome" was found (De Rezende, Rodrigues Lopes, Rey-López, Matsudo, & Luiz Odo, 2014). Physical activity has benefits for physical health and HRQoL (Bize, Johnson & Plotnikoff, 2007).

In a recent systematic review, Boberska et al. (2018) found an association between "lower levels of sedentary behaviours with higher physical HRQoL." Most studies reviewed, evaluated the impact of sedentary behaviour on HRQoL in patients with specific chronic conditions and most studies were conducted in high-income countries. In a systematic review among children and adolescents "higher levels of physical activity were associated with better health-related quality of life and increased time of sedentary behavior was linked to lower health-related quality of life among children and adolescents." (Wu et al., 2017). In a systematic review among older adults, "physical activity was positively and consistently associated with some QoL domains" (Vagetti et al., 2014). In a review of the general adult population, "cross-sectional studies showed a consistently positive association between self-reported physical activity and health-related quality of life." (Bize, Johnson & Plotnikoff, 2007).

Few studies have evaluated the combined effects of sedentary behaviour and physical activity on health-related quality of life (HRQoL) (Loprinzi, 2015). In combined sedentary behaviour and physical activity analysis among adults in the US, persons with low sedentary behaviour/moderate-to-vigorous physical activity and moderate sedentary behaviour/moderate-to-vigorous physical activity had higher odds of better HRQoL (Kim, Im, & Choi, 2017). Loprinzi (2015) found in a US sample that moderate-to-vigorous physical activity was associated with better HRQoL among participants whose sedentary behaviour was 487.5 min/day or more.

Higher sedentary time and inadequate physical activity may have more deleteriously effects on persons with metabolic risk factors and other chronic conditions (Chu & Moy, 2013). It was hypophesized that higher sedentary time and low physical inactivity negatively impact independently and combined on HRQoL. The study aimed to assess the independent and combined

associations of sedentary behaviour and physical activity with HRQoL among chronic disease patients in Myanmar and Vietnam.

2. Methods

2.1. Sample and procedure

A cross-sectional survey was conducted with out-patients with chronic diseases in rural and urban primary health facilities in Myanmar and Vietnam. "Every eligible patient (18 years and older treated for a chronic disease in the past 12 months) was selected from the health facility, using a convenient sampling procedure (consecutively selecting every out-patient visiting the health facility)." (Pengpid & Peltzer, 2018, p.1308). Patients provided informed consent prior to an interview-administered questionnaire. The study protocol was approved by the ethics committees of all participating institutions (Pengpid & Peltzer, 2018).

2.2. Measures

2.2.1. Exposure variables

Sedentary behaviour was assessed with the "General Physical Activity Questionnaire (GPAQ)" (World Health Organisation (WHO), 2009). Starting with an explanatory statement: "The following question is about sitting or reclining at work, at home, getting to and from places, or with friends, including time spent [sitting at a desk, sitting with friends, travelling in car, bus, train, reading, playing cards or watching television], but do not include time spent sleeping" and the question was: "How much time do you usually spend sitting or reclining on a typical day?"(WHO, 2009). Sedentary time was categorized into <4 hours, 4 ≤ 8 hours, 8 or more hours a day (Ekelund et al., 2016).

   Physical activity was assessed with the GPAQ (Armstrong & Bull, 2006; WHO, 2009). Using GPAQ guidelines (WHO, 2009), results were classified into low, moderate and high physical activity.

2.2.2. Outcome variables

HRQol was assessed with the "World Health Organization Quality of Life (WHOQol)-8" (Schmidt, Mühlan, & Power, 2006). The 8-item scale "consists of two items from each domain of the original WHOQOL BREF (physical, psychological, environmental, and social)" (Da Rocha, Power, Bushnell, & Fleck, 2012). "Results from the 2-items sub-scales and the 8-items were summed to get sub-scale and overall WHOQoL scores which was then transformed to a 0–100 scale."(Pengpid & Peltzer, 2018) The Cronbach alpha for the WHOQol-8 was 0.86 in this sample.

2.2.3. Confounding variables

Sociodemographic variables included age, sex, country, formal education, and residential status (Pengpid & Peltzer, 2018).

   Current tobacco use was assessed with two questions, (1) "Do you currently use one or more of the following tobacco products (cigarettes, snuff, chewing tobacco, cigars, etc.)?" and (2) "Do you currently use any smokeless tobacco, such as snuff, chewing tobacco, betel?" Response options were "yes" or "no" (World Health Organization (WHO), 1998). Current tobacco use was defined as any tobacco use.

   Problem drinking was assessed by the "Alcohol Use Disorder Identification Test (AUDIT)-C" (Bush, Kivlahan, McDonell, Fihn, & Bradley, 1998). Cronbach alpha for the AUDIT-C was 0.82 in this study.

Chronic conditions were assessed by self-reported health care provided diagnosed chronic conditions treated in the past 12 months for any of 21 chronic conditions, such as diabetes and chronic obstructive pulmonary disease (Pengpid & Peltzer, 2018).

2.3. Data analysis

The data were analysed with IBM SPSS Statistics for Windows (Version 25.0. Armonk, NY: IBM Corp.). Parametric and non-parametric tests were used to calculate differences in proportions and medians. Multivariable linear regression was used to calculate beta coefficients and confidence intervals of the independent associations of sedentary behaviour and physical activity with HRQoL and its four domains. Moreover, we used multivariable linear regression to estimate the combined relationship between sedentary behaviour and physical activity with HRQoL and its four domains. Multivariable models were adjusted for relevant confounders, including age, sex, country, education, residence, tobacco use, problem drinking, and number of chronic conditions. For the combined regression analysis, the sample was sub-divided based on sedentary and physical activity levels into four groups: (1) high sedentary time (≥ 8 hours) plus low physical activity group (reference category), (2) high sedentary time (≥ 8 hours) plus moderate or high physical activity group, (3) low or moderate sedentary time (< 8 hours) plus low physical activity group, and (4) low or moderate sedentary time (< 8 hours) plus moderate or high physical activity group. A $p < 0.05$ was considered significant.

3. Results

3.1. Sample characteristics

The total sample included 3201 adults, 1600 from Myanmar and 1601 from Vietnam, the median age was 51 years (interquartile range = 25 years), and 65.1% were female. Overall, the study population engaged <4 hours (51.3%), 4 ≤ 8 hours (31.2%), and 8 or more hours a day (17.5%) sedentary time a day. The physical activity levels of the respondents were, 26.4% low, 50.0 moderate and 23.6% high physical activity. The summative HRQoL score was 56.7, and its four domains: psychological 55.5, physical 54.8, social 59.6 and environment 56.7 (see Table 1).

3.2. Associations between sedentary behaviour and HRQoL

In the final linear regression model, adjusted for relevant confounders, higher sedentary time (≥8 h) decreased summative HRQoL, HRQoL-Psychological, HRQoL-Physical and HRQoL-social. Further, 4-< 8 hours sedentary time increased HRQol-environment (see Table 2).

3.3. Associations between physical activity and HRQoL

In the final linear regression model, adjusted for relevant confounders, moderate and/or high physical activity were associated with better summative HRQoL,

HRQoL-Psychological, HRQoL-Physical, HRQoL-social, and better HRQol-environment (see Table 3).

3.4. Combined effects of sedentary behaviour and physical activity on HRQoL

Dividing study participants into four sub-groups based on the levels of sedentary time and physical activity found that those reported less than eight hours of sedentary time and engaged in moderate or high physical activity had a significantly higher summative HRQoL, HRQoL-Physical, HRQoL-Psychological, HRQoL-Social and HRQoL-Environment compared to participants with high sedentary time (≥8hours) and low physical activity, after adjusting for age,

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Table 1. Basic sample characteristics				
Variable	Total (n = 3201)	Male (= 1115)	Female (n = 2084)	P-value
Age in years, Median (Interquartile range)	51 (25)	52 (25.5)	51 (25)	0.096
Country				
Myanmar	1600 (50.0)	44.2	53.9	<0.001
Vietnam	1601 (50.0)	55.8	46.1	
Education				
Grade 0–5	620 (19.4)	14.0	22.4	<0.001
Grade 6–11	1635 (51.2)	50.0	51.9	
Grade 12 or more	941 (29.4)	35.9	26.7	
Residence				
Rural	1640 (51.3)	49.5	52.2	0.152
Urban	1561 (48.8)	50.5	47.8	
Current tobacco use	761 (24.6)	46.0	13.5	<0.001
Problem drinking	387 (12.2)	28.8	3.5	<0.001
Chronic conditions				
One	1987 (62.1)	65.8	60.0	<0.001
Two	838 (26.2)	25.3	26.9	
Three or more	376 (11.7)	8.8	13.1	
Sedentary behaviour				
<4 hours	1643 (51.3)	52.8	50.1	0.019
4- <8 hours	998 (31.2)	32.2	30.8	
≥8 hours	560 (17.5)	15.0	19.1	
Physical activity				
Low	844 (26.4)	30.7	23.9	<0.001
Moderate	1602 (50.0)	37.3	56.7	
High	755 (23.6)	31.9	19.3	
	M (SD)	M (SD)	M (SD)	
HRQoL-total	56.7 (12.2)	57.2 (12.8)	56.3 (11.8)	0.042
HRQoL-Psychological	55.5 (14.3)	55.9 (14.9)	55.3 (14.2)	0.247
HRQoL-Physical	54.8 (15.7)	55.5 (15.7)	54.3 (15.2)	0.041
HRQoL-Social	59.6 (14.2)	59.8 (14.2)	59.3 (13.9)	0.383
HRQoL-Environment	56.7 (15.3)	57.3 (15.5)	56.2 (15.2)	0.057

HRQoL = Health related quality of life.

sex, country, education, residence, tobacco use, problem drinking, and number of chronic conditions (see Table 4).

4. Discussion

The study aimed to assess independent and combined associations of sedentary behaviour and physical activity with HRQoL among chronic disease patients in Myanmar and Vietnam. Consistent with previous reviews (Bize et al., 2007; Boberska et al., 2018; Vagetti et al., 2014; Wu et al., 2017), the study found that higher sedentary time (≥8 h) decreased summative HRQoL and three of four of its domains, and moderate and/or high physical activity increased summative HRQoL and all of its four domains, after adjusting for relevant confounders. Among the different HRQoL domains and sedentary behaviour, the

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Table 2. Odds ratios for overall HQoL and four HQoL domains according to levels of sedentary behaviour		
Variable	**Unadjusted coefficient estimates: Beta (95% CI)**	**Adjusted coefficient Estimates[1]: Beta (95% CI)**
Total HRQoL		
Sedentary time a day		
<4 hours	Reference	Reference
4- <8 hours	−0.24 (−1.20 to 0.72)	0.18 (−0.81 to 1.18)
≥8 hours	−3.73 (−4.91 to −2.55)***	−2.66 (−3.89 to −1.44)***
HRQoL-Psychological		
Sedentary time a day		
<4 hours	Reference	Reference
4- <8 hours	−0.53 (−1.66 to 0.60)	−0.23 (−1.40 to 0.94)
≥8 hours	−5.27 (6.66 to −3.89)***	−3.85 (−5.29 to −2.41)***
HRQoL-Physical		
Sedentary time a day		
<4 hours	Reference	Reference
4- <8 hours	−2.13 (−3.30 to −0.91)***	−1.47 (−2.73 to −0.18)*
≥8 hours	−6.03 (−7.54 to −4.53)***	−4.72 (−6.29 to −3.15)***
HRQoL-Social		
Sedentary time a day		
<4 hours	Reference	Reference
4- <8 hours	0.67 (−0.45 to 1.79)	1.01 (−0.17, 2.19)
≥8 hours	−2.69 (−4.06 to −1.32)***	−1.72 (−3.17 to −0.27)*
HRQoL-Environment		
Sedentary time a day		
<4 hours	Reference	Reference
4- <8 hours	0.88 (−0.32 to 2.09)	1.29 (0.03 to 2.55)*
≥8 hours	−1.05 (−2.53 to 0.42)	−0.47 (−2.02, 1.08)

CI = Confidence Interval; [1]Adjusted for age, sex, education, residence, tobacco use, problem drinking, and number of chronic conditions; ***P < 0.001; **P < 0.01; *P < 0.05; HRQoL = Health related quality of life.

strongest negative relationship was found between higher sedentary time (≥8 h) and HRQoL-Physical (Beta:-4.72, CI: −6.29 to −3.15), which is consistent with the previous review (Boberska et al., 2018).

Finally, the study confirms previous evidence with adult samples in the US (Kim et al., 2017; Loprinzi, 2015) suggesting that there is a combined effect between physical activity and sedentary behaviour on HRQoL total and its domains among chronic disease patients in Southeast Asia. Further, longitudinal studies are needed to confirm the found inverse relationship between sedentary behaviour and HRQoL. It is possible that poor HRQoL results in sedentary behaviour and low physical activity and that possible reciprocal relations of causality exist in that participants who perceive their HRQoL as poor may respond by spending their time in sedentary pursuits just as much as those who have a sedentary lifestyle will perceive their HRQoL as poor.

5. Study limitations
The investigation was cross-sectional in nature and no causal conclusions can be drawn. Further, the exposure variables, sedentary behaviour and physical activity were assessed by

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Table 3. Odds ratios for overall HQoL and four HQoL domains according to levels of physical activity		
Variable	**Unadjusted coefficient estimates: Beta (95% CI)**	**Adjusted coefficient estimates[1]: Beta (95% CI)**
Total HRQoL		
Physical activity		
Low	Reference	Reference
Moderate	1.48 (0.46 to 2.51)**	1.86 (0.79 to 2.93)***
High	3.41 (2.21 to 4.62)***	3.73 (2.47 to 4.99)***
HRQoL-Psychological		
Physical activity		
Low	Reference	Reference
Moderate	0.56 (−0.66 to 1.77)	0.91 (−0.36 to 2.18)
High	2.91 (1.48 to 4.33)***	2.88 (1.39 to 4.37)***
HRQoL-Physical		
Physical activity		
Low	1 (Reference)	1 (Reference)
Moderate	2.11 (0.80 to 3.93)**	2.33 (0.95 ro 3.70)***
High	3.91 (2.36 to 5.46)***	3.83 (2.21 to 5.45)***
HRQoL-Social		
Physical activity		
Low	Reference	Reference
Moderate	2.06 (0.88 to 3.25)***	2.50 (1.24 to 3.76)***
High	4.48 (3.08 to 5.88)***	5.07 (3.59 to 6.56)***
HRQoL-Environment		
Physical activity		
Low	Reference	Reference
Moderate	1.21 (−0.07 to 2.49)	1.75 (0.39 to 3.10)*
High	2.12 (0.61 to 3.63)**	2.95 (1.36 to 4.55)***

CI = Confidence Interval; [1]Adjusted for age, sex, country, education, residence, tobacco use, problem drinking, and number of chronic conditions; ***P < 0.001; **P < 0.01; *P < 0.05; HRQoL = Health related quality of life

self-report and future studies should include objective measures as well. Some variables, such as body mass index, were not assessed in this investigation and should be included in future studies.

6. Conclusion

Our findings not only add to the current results demonstrating a beneficial independent effect of low sedentary time and moderate or high physical activity on HRQoL, but also extending findings from a few studies showing combined effects of low or moderate sedentary time and moderate or high physical activity on HRQoL. Health promotion strategies among chronic disease patients may include reducing sedentary behaviour and increasing physical activity in order to improve HRQoL.

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Table 4. Combined effects of sedentary behaviour and physical activity on HQoL and its four domains

Variable	n	M (SD)	Unadjusted coefficient estimates: Beta (95% CI)	Adjusted coefficient Estimates[1]: Beta (95% CI)
Total HRQoL				
High SB & low PA	239	52.7 (13.7)	Reference	Reference
High SB & moderate or high PA	308	54.4 (10.9)	1.72 (−0.32 to 3.77)	2.91 (0.82 to 5.00)**
Low or moderate SB & low PA	578	56.1 (12.8)	3.42 (1.60 to 5.28)***	2.93 (1.05 to 4.82)**
Low or moderate SB & moderate or high PA	2010	57.6 (11.9)	4.95 (3.32 to 6.57)***	4.71 (3.06 to 6.36)***
HRQoL–Psychological				
High SB & low PA	240	51.5 (14.9)	Reference	Reference
High SB & moderate or high PA	311	51.2 (12.7)	−0.31 (−2.72 to 2.11)	1.03 (−1.43 to 3.49)
Low or moderate SB & low PA	583	55.8 (15.4)	4.30 (2.15 to 6.45)***	4.51 (2.29 to 6.73)***
Low low or modetae SB & moderate or high PA	2025	56.6 (14.2)	5.07 (3.15 to 6.99)***	4.80 (2.86 to 6.75)***
HRQoL–Physical				
High SB & low PA	239	49.2 (19.4)	Reference	Reference
High SB & moderate or high PA	308	51.4 (14.8)	2.21 (−0.42 to 4.83)	2.88 (0.21 to 5.56)*
Low or moderate SB & low PA	585	54.3 (16.4)	5.04 (2.70 to 7.37)***	3.11 (0.70 to 5.51)*
Low or moderate SB & moderate or high PA	2015	56.6 (14.2)	6.88 (4.80 to 8.96)***	5.87 (3.76 to 7.95)***
HRQoL–Social				
High SB & low PA	240	55.2 (18.2)	Reference	Reference
High SB & moderate or high PA	311	58.6 (13.1)	3.43 (1.05 to 5.81)**	4.75 (2.29 to 7.22)***
Low or moderate SB & low PA	587	58.4 (13.8)	3.20 (1.08 to 5.33)**	2.79 (0.57 to 5.02)*
Low or moderate SB & moderate or high PA	2024	60.6 (14.2)	5.36 (3.47 to 7.26)***	5.31 (3.36 to 7.26)***
HRQoL–Environment				
High SB & low PA	240	54.7 (16.6)	Reference	Reference
High SB & moderate or high PA	311	56.1 (15.4)	1.46 (−1.11 to 4.03)	2.82 (0.18 to 5.47)*
Low or moderate SB & low PA	589	56.0 (15.4)	1.21 (−1.08 to 3.50)	1.38 (−1.01 to 3.76)
Low or moderate SB & moderate or high PA	2031	57.2 (15.0)	2.50 (0.46 to 4.54)*	2.87 (0.78 to 4.97)**

CI = Confidence Interval; SB = Sedentary behaviour; PA = Physical activity; [1]Adjusted for age, sex, country, education, residence, tobacco use, problem drinking, and number of chronic conditions;
***P < 0.001; **P < 0.01; *P < 0.05; HRQoL = Health related quality of life

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References
Armstrong, T., & Bull, F. (2006). Development of the World Health Organization Global Physical Activity Questionnaire (GPAQ). *Journal of Public Health, 14*, 66–70.

Bize, R., Johnson, J. A., & Plotnikoff, R. C. (2007). Physical activity level and health-related quality of life in the general adult population: A systematic review. *Preventive Medicine, 45*(6), 401–415. doi:10.1016/j.ypmed.2007.07.017

Boberska, M., Szczuka, Z., Kruk, M., Knoll, N., Keller., J., Hohl, D. H., & Luszczynska, A. (2018). Sedentary behaviours and health-related quality of life. A systematic review and meta-analysis. *Health Psychology Review, 12*(2), 195–210. doi:10.1080/17437199.2017.1396191

Bush, K., Kivlahan, D. R., McDonell, M. B., Fihn, S. D., & Bradley, K. A. (1998). The audit alcohol consumption questions (AUDIT-C), an effective brief screening test for problem drinking. *Archives of Internal Medicine, 158*(16), 1789–1795.

Chu, A. H., & Moy, F. M. (2013). Joint association of sitting time and physical activity with metabolic risk factors among middle-aged Malays in a developing country: A cross-sectional study. *PloS one, 8*(4), e61723. doi:10.1371/journal.pone.0061723

Da Rocha, N. S., Power, M. J., Bushnell, D. M., & Fleck, M. P. (2012). The EUROHIS-QOL 8-item index: Comparative psychometric properties to its parent WHOQOL-BREF. *Value in Health : the Journal of the International Society for Pharmacoeconomics and Outcomes Research, 15*(3), 449–457. doi:10.1016/j.jval.2011.11.035

De Rezende, L. F., Rodrigues Lopes, M., Rey-López, J. P., Matsudo, V. K., & Luiz Odo, C. (2014). Sedentary behavior and health outcomes: An overview of systematic reviews. *PloS one, 9*(8), e105620. doi:10.1371/journal.pone.0105620.eCollection2014

Ekelund, U., Steene-Johannessen, J., Brown, W. J., Fagerland, M. W., Owen, N., & Powell, K. E.; Lancet Sedentary Behaviour Working Group. (2016). Does physical activity attenuate, or even eliminate, the detrimental association of sitting time with mortality? A harmonised meta-analysis of data from more than 1 million men and women. *Lancet, 388*(10051), 1302–1310.

Kim, J., Im, J.-S., & Choi, Y.-H. (2017). Objectively measurd sedentary behvior and moderate-to-vigorous physical activity on the health-related quality of life inUS adults: The national health and nutriton examination survey 2003–2006. *Quality of Life Research, 26*, 1315–1326. 10.1007s11136-016-1451-y

Loprinzi, P. D. (2015). Joint associations of objectively-measured sedentary behavior and physical activity with health-related quality of life. *Preventive Medicine Reports, 2*, 959–961. doi:10.1016/j.pmedr.2015.11.004.eCollection2015

Milton, K., Macniven, R., & Bauman, A. (2014). Review of the epidemiological evidence for physical activity and health from low- and middle-income countries. *Global Public Health, 9*(4), 369–381. doi:10.1080/17441692.2014.894548

Panahi, S., & Tremblay, A. (2018). Sedentariness and health: Is sedentary behavior more than just physical inactivity? *Frontiers in Public Health, 6*, 258. doi:10.3389/fpubh.2018.00258.eCollection2018

Peltzer, K., & Pengpid, S. (2015). Sitting time and associated factors among chronic disease patients in Cambodia, Myanmar and Vietnam. *African Journal for Physical, Health Education, Recreation and Dance, 21* (3: 2), 930–940.

Pengpid, S., & Peltzer, K. (2016). Physical inactivity and associated factors in chronic disease patients in Cambodia, Myanmar and Vietnam. *African Journal for Physical Activity and Health Sciences, 22*(3:1), 701–710.

Pengpid, S., & Peltzer, K. (2018). The impact of chronic diseases on the quality of life of primary care patients in Cambodia, Myanmar and Vietnam. *Iranian Journal of Public Health, 47*(9), 1308–1316.

Schmidt, S., Mühlan, H., & Power, M. (2006). The EU-ROHIS-QOL 8-item index: Psychometric results of a cross-cultural field study. *European Journal of Public Health, 16*(4), 420–428. doi:10.1093/eurpub/cki155

Vagetti, G. C., Barbosa Filho, V. C., Moreira, N. B., Oliveira, V. D., Mazzardo, O., & Campos, W. D. (2014). Association between physical activity and quality of life in the elderly: A systematic review, 2000–2012. *Brazilian Journal of Psychiatry, 36*(1), 76–88. doi:10.1590/1516-4446-2012-0895

World Health Organisation (WHO). (2009). Global physical activity surveillance. Retrieved from http://www.who.int/chp/steps/GPAQ/en/index.html

World Health Organization (WHO). (1998). *Guidelines for controlling and monitoring the tobacco epidemic.* Geneva, Switzerland: WHO.

Wu, X. Y., Han, L. H., Zhang, J. H., Luo, S., Hu, J. W., & Sun, K. (2017). The influence of physical activity, sedentary behavior on health-related quality of life among the general population of children and adolescents: A systematic review. *PloS one, 12*(11), e0187668. doi:10.1371/journal.pone.0187668.eCollection2017