Exercise Behavior and Depression among Hakka Adults: A Community-Based Cross-Sectional Study in Hakka, Miaoli County, Taiwan

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Abstract

Depression is a major health problem. Studies have suggested that exercise may serve as a valuable health promotion strategy in reducing the risk of developing depression. This study aims to investigate the predictability of depression in relation to exercise habits among Hakka adults living in Hakka communities in Miaoli County. A cross-sectional design was adopted and structured questionnaires (incorporating demographic variables, an exercise behavior questionnaire and the Taiwanese Depression Questionnaire) were used for data collection. Purposeful sampling was employed and 533 Hakka adults living in Hakka communities in Miaoli County volunteered to participate in this study. Ten trained Hakka interviewers interviewed the subjects individually to collect

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data. The response rate was 100%. The data was analyzed by hierarchical Poisson multiple regression. After controlling for gender, age, religious beliefs, marital status and socioeconomic status, an increase in exercise behavior lowers depression ($\beta = -.041$, Wald $\chi^2 = 14.372$, $p < .001$). It is found that exercise behavior predicted severity of depression in Hakka adults living in Hakka communities in central Taiwan. Thus, exercise behavior can serve as depression preventing or buffering strategy in planning health promotion and health education for Hakka adults in the future.

Key words: adults, depression, exercise behavior, Hakka, Miaoli County

Introduction

Depression is a major health problem. It is considered to be one of the most prevalent and pervasive diseases affecting 350 million people (World Health Organization [WHO], 2015). Depression is also considered to be the leading cause of disability as measured by Years Lived with Disability (YLDs), and is the fourth leading contributor to the global burden of disease. The burden of depression and other mental health conditions is on the rise globally. It has been estimated that by the year 2020, depression will be the second most common cause of Disability Adjusted Life Years (DALY) burden calculated for all ages (Reddy, 2010). The World Health Assembly adopted a resolution in May 2013 for a comprehensive and coordinated response to mental disorders at country level (WHO, 2015).

During 2002, the Health Promotion Administration surveyed over 20,000 Taiwanese people aged 15 and above and found that 8.9% suffered from moderate depression and 5.2% from major depression (Chang, 2009). A longitudinal study in Taiwan revealed that the prevalence of common mental disorders (CMD) more than doubled during the last 20 years (Fu, Lee, Gunnell, Lee, & Cheng, 2013). Another study indicated an increasing trend of people with depressive symptoms visiting outpatient psychiatric clinics in Taiwan (Shang, Liao, & Lee, 2003).

Studies have suggested that leisure time physical activity relieved depressive moods (Chen & Huang, 2014). Reviews of articles have suggested that exercise reduces depressive symptoms among people who have been diagnosed with depression (Cooney et al., 2013; Mead et al., 2008, 2009; Rimer et al., 2012). And promoting physical activity may serve as a valuable health promotion strategy in reducing the risk of developing depression (Mammen & Faulkner, 2013).

Besides of physical activity, there are diversity issues in health promotion and disease prevention influenced by context and based on a number of factors

including, but not limited to, ethnicity, gender, age, religion/spirituality, marital status, or socioeconomic status. Such factors should be included in researches, but some cohorts were often marginalized by researchers especially ethnic minorities (Mann & Kato, 1996). According to Hakka Affairs Council in Taiwan, despite Hakka is the second largest ethnicity in Taiwan, among them, the prevalence and predictor of depression and its' relation with exercise behavior has not been surveyed. Therefore, the study would like to investigate whether or not depressive moods among Hakka community members varied due to exercise behavior. The result of Hakka population projection conducted by Statinc Company, sponsored by Hakka Affair Council, estimated Hakka population in Taiwan was 4,202,000, around 18% of Taiwan population. Hakka people distribute in 69 townships (including township-level cities/districts), the most of these townships (26) are in central Taiwan; secondly, 20 are in northern Taiwan; thirdly, 12 are in southern Taiwan, and 11 are in eastern Taiwan. County wise, the highest Hakka proportion of population in central Taiwan is Miaoli County, 62.2% (Hakka Affair Council, 2013). Thus, the study will recruit sample from Miaoli County in central Taiwan.

Since the methods for predicting depression have yet to be fully explored, this study aims to investigate a possible link between depression and exercise behavior through the use of the Taiwan Depression Questionnaire (TDQ). The results obtained in the study could be used as a reference for future plans in health promoting activities or clinical applications for the Hakka people.

Methods

Conceptual Framework

The study aims to investigate the link between depression and the exercise behavior. Independent variables are demographic variables and exercise behavior,

and the dependent variable is depression.

Population and Sample

The population is the entire Hakka residents in Miaoli County, 3519,000 persons. Purposive sampling was employed, and 533 Hakka adults (20-80 years of age) were recruited from Miaoli County. As the study focuses on Hakka tribes, we have purposively selected Hakka townships. Ten trained Hakka interviewers were recruited to interview the subjects individually to collect data. The study was conducted from August to December 2014.

Instrument

A pre-tested, close-ended questionnaire was used for data collection from the study subjects. Its contents are as follows:

Demographic variables

The demographic variables were gender, age, religious beliefs, marital status and socioeconomic status (SES). SES was classified based on the two factors index of social position (Hollingshead, 1957).

Exercise behavior

This study employed a validated and reliable Exercise Behavior Questionnaire to collect each subject's regular aerobic exercise behavior data (Chen, 2001). The components included exercise frequency, duration and intensity. The 20-item self-reported questionnaire has a 5-point Likert scale rating (1 = never, 2 = rarely, 3 = sometimes, 4 = often, and 5 = always) that gives a total score ranging from 20 to 100. The higher the score, the more frequently the respondents exercise. Its' Cronbach's α coefficient was .88.

TDQ

The TDQ is an 18-item, self-reported index of how often respondents experience various depressive symptoms. The components included depressed mood, loss of appetite, sleep disturbance, psychomotor retardation, feelings of worthlessness, hopelessness and helplessness. It has a 4-point Likert scale rating from 0 to 3 (0 = never or rarely (less than 1 day per week), 1 = sometimes (1-2 days per week), 2 = often (3-4 days per week), and 3 = almost every day (5-7 days per week). The sum of these 18 items gives a total score ranging from 0 to 54, which represents the respondent's depression level. The respondents who scored ≤8 were classified as stable, 9-14 = unstable, 15-18 = marginal, 19-28 = requiring help, and ≥29 requiring treatment. Its' Cronbach's α coefficient (.90), concurrent validity, and the area under the ROC curves (.92) are all quite satisfactory. TDQ had a sensitivity of .89 and a specificity of .92 at the cutoff scores of 19 (Lee, Yang, Lai, Chiou, & Chau, 2000).

Data Collection

Data collection was conducted by 10 trained Hakka interviewers who were selected based on their community exposure. The trained interviewers visited each subject's home to conduct individual interviews.

Statistical Analysis

In order to verify the predictability of the subjects' depression in relation to exercise behavior, frequency, percentage, mean, standard deviation (SD) and hierarchical Poisson multiple regression were employed to analyze data. We set the variance inflation factor (VIF) > 10 and tolerance < .25 to diagnose collinearity of each individual variable, and conditional index (CI) < 30 to diagnose collinearity of the regression model (Tanenbaum & van Steen, 2002). We found VIF between

1.029 and 1.455, tolerance between .687 and .972, and CI between 6.499 and 21.562, indicating that neither the individual variables nor the regression model had collinearity.

Ethical Approval

The study was approved by the Hakka Affairs Council and the Institutional Review Board of National Yang-Ming University (approval number: P960205). All participants gave written consent before beginning the interview.

Results

Distribution of Subjects' Socio-demographic Characteristics, Exercise Behavior and Depression

Table 1 shows the distribution and percentage of subjects' socio-demographic characteristics, depression classification and exercise behavior scores. Of the 533 participating Hakka adults, 208 were male (39.0%) and 325 female (61.0%). 90 participants (16.9%) aged 21-29, 95 participants (17.8%) aged 30-39, 97 participants (18.2%) aged 40-49, 138 participants (25.9%) aged 50-59, 71 participants (13.3%) aged 60-69, 42 participants (7.9%) aged 70-80, and the mean age was 47.3 (SD = 15.0). 289 participants (54.2%) were Buddhists, 83 participants (15.6%) were Christians and 161 participants (30.2%) were not religious. 111 participants (20.8%) were single, 367 participants (68.9%) were married and 55 participants (10.3%) widowed. 10 participants' (1.9%) socioeconomic status were high, 62 participants' (11.6%) socioeconomic status were mid high, 86 participants' (16.1%) socioeconomic status were mid, 217 participants' (40.7%) socioeconomic status were mid low and 158 participants' (29.6%) socioeconomic status were low. Exercise behavior scores of the participants was Min = 20, Max = 100, M =

60.2, *SD* = 15.7, at the moderate level. As to the depression classification of the participants', 356 persons (66.8%) were stable, 95 persons (17.8%) were unstable, 42 persons (7.9%) were marginal, 32 persons (6.0%) need help and 8 persons (1.5%) need treatment. In general, the percentage of depressor was only 7.5 (need help and need treatment classes), and the mean score was 7.1, *SD* was 7.9, at the lower edge of stable level.

Table 1

Subjects' Personal Data and Depression Classification

Variable	Categories	*N*	%
Gender	Male	208	39
	Female	325	61
Age	21-29	90	16.9
	30-39	95	17.8
	40-49	97	18.2
	50-59	138	25.9
	60-69	71	13.3
	70-80	42	7.9
	M	47.3	
	SD	15.0	
Religion beliefs	Buddhist	289	54.2
	Christian	83	15.6
	None	161	30.2
Marital status	Single	111	20.8
	Married	367	68.9
	Widowed	55	10.3
Socioeconomic status	High	10	1.9
	Mid high	62	11.6
	Mid	86	16.1
	Mid low	217	40.7

(continued)

Table 1   (continued)

Variable	Categories	N	%
Depression classification	Low	158	29.6
	Stable	356	66.8
	Unstable	95	17.8
	Marginal	42	7.9
	Need help	32	6.0
	Need treatment	8	1.5
Depression score	Min	0	
	Max	54	
	M	7.1	
	SD	7.9	
Exercise behavior	Min	20	
	Max	100	
	M	60.2	
	SD	15.7	

Predictors of the Subjects' Depression

Since the percentage of depressors was only 7.5, the scores of depressive symptoms are probably positive skewed instead of normal distribution. Thus, performing Poisson multiple regression is one of the appropriate ways to test the predictor of depression (Davydow et al, 2011; Dlugaj et al., 2015; Huang et al., 2012; Jin, Wu, Vidyanti, Di Capua, & Wu, 2015). In order to perform hierarchical Poisson multiple regression, nominal variables were converted to dummy variables and dependent variable depression was converted to dichotomous variable, depression (need help and need treatment classes) and non-depression (stable, unstable and marginal classes).

Model 1: In Model 1 we used gender, age, religious beliefs, marital status, and socioeconomic status as predictors of dependent variable depression. As shown in

Table 2, Model 1 (Likelihood $\chi^2(8) = 17.289$, $p < .05$), and Buddhist of religious belief ($\beta = -.852$, Wald $\chi^2 = 4.943$, $p < .05$) had significant impact on depression.

Table 2

Predictability of Exercise Habit as Predictor of Depression Based on Two Models Hierarchical Poisson Regression

Variables	Model 1			Model 2		
	β	Se	Wald χ^2	β	Se	Wald χ^2
Gender (Ref: Female)	−.516	.371	1.933	−.647	.374	2.999
1. Age	−.021	.013	2.661	−.024	.013	3.298
2. Religious belief (Ref: None)						
Buddhist	−.852	.383	4.943*	−.727	.386	3.547
Christian	.162	.389	0.172	−.022	.391	0.003
3. Marital status (Ref: Married)						
Single	−.198	.429	0.212	−.240	.417	0.330
Widowed	.379	.523	0.526	.195	.530	0.136
4. Socioeconomic status (Ref: Low)						
High	−.171	.552	0.100	.249	.559	0.198
Middle	.576	.391	2.174	.777	.400	3.773
5. Exercise behavior				−.041	.011	14.372***
Omnibus Test	Likelihood $\chi^2(8) = 17.289$*			Likelihood $\chi^2(9) = 31.905$***		

Note. Dependent variable was depression (normal vs. depression; reference: normal) predictors of Model 1 were gender, age, religious belief, marital status, and socioeconomic status; one additional predictor, exercise habit, is included for Model 2.
*$p < .05$. ***$p < .001$.

　　Model 2: Controls for the variables gender, age, religious beliefs, marital status, and socioeconomic status, as well as an additional variable, "exercise behavior," were included in Model 2 to test the predictability of depression in relation to exercise behavior. It was found that Model 2 (Likelihood $\chi^2(9) = 31.905$, $p < .001$) and exercise behavior ($\beta = -.041$, Wald $\chi^2 = 14.372$, $p < .001$)

had significant impact on depression. The result indicated an increase in exercise behavior lowers depression.

Discussion

Exercise behavior was a significant predictor to control depression in Hakka adults living in Hakka communities in Miaoli County, as regular aerobic exercise may intentionally or unintentionally improve the exerciser's mood. The findings of this study are also consistent with the effects on depression of previous exercise interventions where involvement in structured exercise has shown promise in alleviating symptoms of clinical depression. Since the early 1900s, researchers have been interested in the association between exercise and depression. Early case studies concluded that, at least for some, moderate-intensity exercise should be beneficial for depression and result in a happier mood (Craft & Pema, 2004). A relationship exists between physical work capacity (PWC) and depression (Martinsen, Medhus, & Sandvik, 1985; Martinsen, Strand, Paulsson, & Kaggestad, 1989; Morgan, 1968, 1969). The directional nature of this relationship could not be addressed via case- and cross-sectional studies. However, researchers have remained interested in the antidepressant effects of exercise and more recently have utilized experimental designs to study this association. Several review articles suggested that exercise reduces depressive symptoms in people with a diagnosis of depression (Blake, Mo, Malik, & Thomas, 2009; Cooney et al., 2013; Mead et al., 2008, 2009; Rimer et al., 2012). And promoting physical activity may serve as a valuable health promotion strategy in reducing the risk of developing depression (Mammen & Faulkner, 2013). The current study supports those findings. Exercise behavior seems to be effective in reducing depression and hence in the promotion of mental health in Hakka people. Despite the fact that most people understand the benefits of exercise behavior, few exercise on a regular basis. The mechanism of

changing their motivation should be clarified in future studies.

A previous study investigated long-term relations between religiosity, spirituality, depression, and physical health. The results showed that religiosity buffered depression associated with poor physical health, with the highest levels of depression observed in the low-religiousness poor-physical-health group (Wink, Dillon, & Larsen, 2005). Divorce usually generates a great deal of negative emotions and forces people to face new challenges, which might explain why divorced people have a greater risk of depression than people who remain with their spouse. This requires further clarification in future studies.

Women are found to be at a higher risk of depression. Piccinelli and Wilkinson (2000) carried out a critical review of the literature, dealing separately with artefactual and genuine determinants of gender differences in depressive disorders. Gender differences in depressive disorders are proven in literatures (Salguero, Extremera, & Fernández-Berrocal, 2012; Salguero, Palomera, & Fernández-Berrocal, 2012). Previous studies also find that older people suffered a higher risk of depression, as age-related macular degeneration (AMD) is the most frequent cause of severe vision loss in older people and is associated with high rates of disability and depression (Rovner & Casten, 2002). A meta-analysis study found age and gender differences, but no socioeconomic variance on depression (Twenge & Nolen-Hoeksema, 2002). Another meta-analysis study found that low socioeconomic status (SES) is generally associated with higher psychiatric morbidity, more disability, and poorer access to health care (Lorant et al., 2003).

The study recruited ten trained Hakka interviewers to interview Hakka participants individually in their homes. Thus the results are more reliable than those of a self-reported survey. However, the process was time and resource consuming. The results are applicable to the study population but need further validation in the national population before being applied to the entire Hakka population of Taiwan. A difficult task of this study was to recruit effective

interviewers, because interviewers' experiences, attitudes, personality traits and inter-personal skills affect survey co-operation. This difficulty is common to all face-to-face interview surveys. Although, evidence is mounting for the positive effects of exercise behavior and exercise training on depression, their establishment for clinical use in psychotherapy or pharmacotherapy is still in its infant stage. Further studies on the clinical effects of exercise, such as interaction with standard treatment approaches, details on the optimal type, intensity, frequency and duration of exercise etc., may encourage clinical application.

Conclusions

The results of the study found the predictability of depression among Hakka adults in relation to exercise behavior was significant, it meant an increase in exercise behavior lowers their depression. It is suggested that exercise behavior could be served as a valuable health promotion strategy for Hakka people in reducing the risk of developing depression. However, further validation is needed to determine if there are ethnic, regional, or cultural variations in the predictions.

Limitation

This study didn't assess the comorbidity and activities of daily living which is needed to be investigated in future studies.

individuals who provided the necessary data. The views expressed herein are the authors' own.

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● 87

客家成年人的運動行為與憂鬱情形：
苗栗縣客家民族的橫斷式社區研究

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摘要

　　憂鬱是一項主要的健康議題，過去的研究發現運動是降低罹患憂鬱風險且有價值的健康促進策略。本研究旨在調查居住於苗栗縣客家社區客家成年人的運動行為對於其憂鬱情形的預測力。本研究採橫斷式研究，以結構式問卷（包含社會人口學變項、運動行為問卷及臺灣人量表）蒐集資料。立意取樣533名居住於苗栗縣客家社區中的客家成年人為研究對象，由10名受過訓的訪員對研究對象進行個別訪談以蒐集資料，問卷回收率為100%。回收的資料以卜瓦松迴歸進行分析。本研究於控制性別、年齡、宗教信仰、婚姻狀況與社經地位後，發現運動行為的得分愈高，憂鬱的得分就愈低 ($\beta = -.041$, Wald $\chi^2 = 14.372$, $p < .001$)。研究結果發現居住於苗栗縣客家社區中的客家成年研究對象的運動行為可以預測其憂鬱情形，因此，未來規劃客家成年人的健康促進與臨床衛生教育時，運動行為可作為憂鬱的預防或緩衝策略。

關鍵詞：成年人、憂鬱、運動行為、客家、苗栗縣

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