Stage of exercise and health-related quality of life among overweight and obese adults

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Aim. This paper reports a study whose main aim was to understand the correlation between stages of exercise and health-related qualities of life among overweight and obese adults in Taiwan.

Background. Regular exercise has been shown to improve health-related quality of life in the general population and among patients with chronic diseases. Nevertheless, systematic investigations of the correlation between exercise stages and the health-related quality of life among overweight and obese adults are lacking in Taiwan.

Method. A cross-section of people from the weight loss clinics of a medical centre in Taipei was recruited to the study. The Chinese version of the Stages of Exercise and the Taiwanese version of Short Form 36 questionnaires were used to collect data from those whose body mass indexes were equal to or >24 kg/m^2. The data were collected in 2003.

Results. In total, 212 overweight and obese adults participated in the study. The majority were in the preparation (38·2%) or contemplation (31·6%) stages of exercise; relatively few were in the action (14·2%) or maintenance (11·3%) stages, and the smallest number (4·7%) were in the precontemplation stage. Although over 70% of respondents were not in the habit of taking regular exercise, their motivations were very high. For the Short Form 36 scales, the highest scores were for physical functioning (84·5 ± 17·3), while the lowest were for general health (55·5 ± 20·9), vitality (59·8 ± 18·1), and mental health (MH) (66·0 ± 17·9). Different stages of exercise showed statistically significant differences within the eight domains of Short Form 36 (Wilks = 0·733, $P = 0·001$); a statistically significant difference was also found for physical functioning ($P \leq 0·001$), general health ($P = 0·003$), and vitality ($P = 0·005$).

Conclusion. Since stages of exercise are correlated with health-related quality of life among overweight and obese adults, healthcare providers need to understand what stages people are at in order to educate them to achieve a better quality of life and to motivate those who are inactive to do more exercise on a regular basis.

Keywords: adults, nursing, obesity, overweight, quality of life, stages of exercise

Introduction

The prevalence of overweight conditions and obesity is continuing to rise at an alarming rate in the industrialized world and developing countries, and raises tremendous public health concerns. According to a World Health Organization (WHO) (2003) report, obesity is one of the serious public health problems worldwide. Indeed, there has been a outbreak of obesity in recent years. It is estimated that about 200 million people were obese worldwide in 1995; however, the number of obese adults had increased to 300 million by 2000. In the United States of America (USA), an estimated 64% of adults are either overweight (33%) or obese (31%) (Centers for Disease Control and Prevention 2004). Moreover, Allison *et al.* (1999) reported that obesity contributes to between 280,000 and 325,000 deaths per year in the USA. This is only second only to smoking as a leading cause of death. Recent research also indicates that the obesity epidemic is not restricted to industrialized societies. More than 115 million people in developing countries suffer from obesity-related problems (World Health Organization 2003). In Taiwan, according to a national survey from 1992 to 1997, the prevalence rate of obesity was about 25% of adults (Kou 1998). The rates of overweight and obese people, using the Body Mass Index (BMI) (weight in kilograms divided by height in metre^2) were 24–26·9 and ≥27 kg/m^2, respectively), and were 22·9% and 10·5% for males, and 20·3% and 13·2% for females, respectively (Lin *et al.* 2003).

The impact of obesity on medical care costs is also huge. In the USA, spending on healthcare costs is about 44% higher for obese people across all ages than for people of a healthy weight (Sturm *et al.* 2004). Moreover, obesity-attributable medical expenditures reached US$75 billion in 2003, according to a 21 January 2004 press release from the Centers for Disease Control and Prevention. Additionally, in a study conducted by the US Navy costs per obesity-related admission increased by age group from US$3328 for 18–24 year olds to US$5746 for 45–64 year olds. Also, the annual avoidable inpatient costs as estimated for the Navy were US$5,842,627 for the top 10 obesity-related diagnosis-related groups, such as including hypertension, type 2 diabetes and renal failure (Bradham *et al.* 2001). In Canada, for example, the total healthcare costs of physical inactivity were about US$5·3 billion, while the cost associated with obesity was $4·3 billion (Katzmarzyk & Janssen 2004). The total economic impact of overweight and obesity has never been quantified in Taiwan; however, it is essential for healthcare providers of all countries to make efforts to improve and to understand ways to reduce healthcare costs for the treatment of obesity.

Nevertheless, being overweight or obese is a complex chronic condition that is affected by genetic, metabolic, social, behavioural, and cultural factors and that had an important impact on health, psychosocial well-being, longevity, functional capacity, and quality of life for those with weight challenges (National Institute of Health 2000, Kolotkin *et al.* 2001b). Moreover, studies show that overweight individuals not only experience more cardiovascular disease (Silventoinen *et al.* 2003, Devroey *et al.* 2004), more hypertension and higher cholesterol levels than those of healthy weights (Onal *et al.* 2004, Pan *et al.* 2004); but they are also more susceptible to type 2 diabetes (Beebe 2002, Han *et al.* 2002, Chien *et al.* 2004), osteoarthritis, and joint and mobility problems (Felson 2004). Therefore, research on a single aspect of a problem may be inadequate to represent all the effects of obesity on individuals.

The burden of being overweight or obese has a heavy impact on health-related quality of life (HRQL) (Kushner & Foster 2000, Marchesini *et al.* 2000, Kolotkin *et al.* 2001a). It not only affects physical function, including general health (GH) perception (Mathias *et al.* 1997, Le *et al.* 1998, Katz *et al.* 2000), physical pain (Barofsky *et al.* 1997, Fontaine *et al.* 2000), and vitality (Katz *et al.* 2000, Burns *et al.* 2001), but also affects psychological and social well-being (Larsson *et al.* 2002, Friedman & Brownell 2002). Tsai *et al.* (2004) found that the higher the BMI, the poorer the physical functioning (PF) and the more the bodily pain (BP) for both genders; however, role limitation due to physical problems (RP) was found only for women.

Regular exercise, apart from improving physiological and psychological functions, can also improve HRQL (Rejeski *et al.* 2002), which is why understanding the exercise regimens of overweight and obese people is extremely

important. However, research on the subject of exercise among the overweight or obese population has mostly been concerned with whether or not they exercise or how obesity affects HRQL. Few studies have focused on both stage of exercise behaviour and quality of life.

The study

Aim

The aims of this study were to understand the correlation between stages of exercise and HRQL among overweight and obese adults in Taiwan.

Design

The design was cross-sectional, and the data were collected in 2003.

Participants

Those who participated in the study were from the weight loss clinics of a medical centre in Taipei. Recruits had to meet the following criteria, including those newly diagnosed as overweight: BMI $\geq$ 24 kg/m^2, aged over 20 years, with no any illness or disease. The standard for overweight criterion – BMI $\geq$ 24 kg/m^2 – is in line with obesity standards set by Taiwan's Department of Health (2002).

Questionnaires

Two instruments were used in this study. The first was an English version of a stages of exercise questionnaire that was developed by Cardinal (1997). This uses a five-item, ordered-categorical scale from maintenance to precontemplation items and includes items such as:

- I presently exercise on a regular basis and have been doing so for longer than 6 months (maintenance).
- I presently exercise on a regular basis, but I have only begun doing so within the past 6 months (action).
- I presently get some exercise, but not regularly (preparation).
- I presently do not exercise, but I have been thinking about starting to exercise within the next 6 months (contemplation).
- I presently do not exercise and do not plan to start exercising in the next 6 months (precontemplation).

The definition of regular exercise is three times a week, each exercise lasting for 20 minutes or more. Participants were asked to choose a stage that best described their current conditions. This questionnaire has been reported to have high reliability in a 2-week test–retest, $\kappa = 0{\cdot}78$ (Marcus *et al.* 1992).

The English version of the stages of exercise questionnaire was then translated into Chinese. The translation procedures were conducted by Lee (2000) during her doctoral work. The Chinese version of stages of exercise was tested using test–retest reliability, and $\kappa = 0{\cdot}85$.

The second instrument was a standardized Short Form Health Survey (SF-36) of HRQL questionnaire, which is a generic and multidimensional construct that presents a person's overall satisfaction with life. This questionnaire consists of 36 questions, focusing on the following two norm-based composite scales: physical component scale (PCS) and mental component scale (MCS). The PCS includes four subscales: PF, role functioning due to limitations in RP, BP, and GH. The MCS also includes four subscales: vitality (VT), social functioning (SF), role limitations due to emotional problems (RE), and mental health (MH). The subscales are reported as scores that range from 0 to 100. Higher scores indicate more favourable levels of function (Ware & Sherbourne 1992). Because it is extremely simple and highly reliable, there are versions of this for many countries. In this study, the authorized Taiwanese version of SF-36 was used to assess overall satisfaction with life. The Cronbach's alpha of the Taiwanese version of SF-36 was 0·81 in this study.

Data collection

Participants who met the criteria for inclusion completed the questionnaires while waiting to be seen at the loss weight clinics. Questionnaires were returned to researcher at the same place. For the few participants who needed assistance, one of the researchers helped with questionnaire completion. Total questionnaire completion time was about 10–15 minutes.

Ethical considerations

Approval for the study was obtained from the review board of Taipei Medical University. Those who met the criteria for inclusion then received a formal letter containing information on the study's purposes, procedures, and data management. They participants were also informed about their right to withdraw from the project at any time. Written consent was obtained. All questionnaires were completed anonymously. After completing the questionnaires, participants received a small gift as a reward.

Data analysis

All data were analysed using SPSS 11.0 in the English version. Descriptive statistics were used to examine the demographics. The χ^2-test was used to compare the differences between gender and stage of exercise. The Pearson correlation test was used to examine the relationship between age, BMI level, and HRQL. A *t*-test was used to analyse the differences between the HRQL scores and gender and marital status. One-way ANOVA and Scheffe's *post hoc* test were used to analyse the differences between HRQL scores and level of education. A multivariate analysis of variance (MANOVA) was used to analyse variations in the different stages of exercise according to overall SF-36, and one-way analysis of variance (ANOVA) and Tukey's Honestly Significant Difference (HSD) were used to analyse variations on the HRQL scores for the different stages of exercise. As we simultaneously compared eight subscales across stages of exercise, the Bonferoni adjustment for multiple comparisons was performed, and a significant level of $P = 0{\cdot}006$ was used. However, for the comparison of PCS and MCS, the adjusted significance level of $P = 0{\cdot}025$ was used.

Results

Description of participants

During initial screening, 262 overweight and obese adults met the criteria for inclusion from January to June of 2003. However, only 212 agreed to participate in the study. More of these were women ($n = 148$, 69·8%), married ($n = 117$, 55·5%), and educated to level university or above ($n = 84$, 40%) (Table 1). Mean age was 37·33 years, with a range from 20 to 70 years. BMI ranged from 24·02 to 45·48 kg/m^2, with an average of 29·93 kg/m^2.

Stages of exercise

Of the 212 participants, 4·7% ($n = 10$) reported no intention to engage consistently in exercise during the next 6 months (precontemplation stage), 31·6% ($n = 67$) intended to begin in the next 6 months (contemplation stage), 38·2% ($n = 81$) reported that they currently did exercise, but not regularly (preparation stage), 14·2% ($n = 30$) reported consistent regular exercise for <6 months (action stage), and 11·3% ($n = 24$) declared that they had consistently engaged in regular exercise for >6 months (maintenance stage). From the information above, we know that about 74·5% did no regular exercise (Table 2). However, no statistically significant difference was found between males and females ($P = 0{\cdot}61$).

Table 1 Characteristics of participants ($n = 212$)

Variables	*n* (%)
Gender	
Male	64 (30·2)
Female	148 (69·8)
Age (in years)	
20–29	66 (31·1)
30–39	59 (27·8)
40–49	50 (23·6)
50 or above	37 (17·5)
Martial status	
Single	88 (41·7)
Married	117 (55·5)
Divorced	6 (2·8)
Level of education	
University level or above	84 (40·0)
Junior College level	52 (24·8)
High School level	58 (27·6)
Less than High School level	16 (7·6)
Body Mass Index (kg/m^2)	
24–26·99	70 (33·0)
27–29·99	60 (28·3)
30–34·99	53 (25·0)
≥35	29 (13·7)

Table 2 Descriptive statistics for exercise stage ($n = 212$)

Stage of exercise	*n* (%)
Precontemplation	10 (4·7)
Contemplation	67 (31·6)
Preparation	81 (38·2)
Action	30 (14·2)
Maintenance	24 (11·3)

Health-related quality of life

As far as HRQL was concerned, PF had the highest average score, while GH, VT, and MH gained the lower average scores (Table 3). However, RP and RE showed statistically significant ceiling effects (59·4% and 63·2%, respectively), that is, they had a high percentage of respondents who scored at the highest end of the range. For PF, BP and SF, maximum readings all had low to intermediate ceiling effects (24–27%).

The older the respondents, the lower were the PF scores ($r = -0{\cdot}21$, $P = 0{\cdot}002$), and the higher were the GH ($r = 0{\cdot}15$, $P = 0{\cdot}03$), SF ($r = 0{\cdot}19$, $P = 0{\cdot}005$) and MH ($r = 0{\cdot}14$, $P = 0{\cdot}05$) scores. Additionally, no relationship was found between age and RP, BP, VT, and RE. However, it was found that PF, RP and GH clearly declined as BMI increased. Men had higher scores for MH than women ($t = 2{\cdot}05$, $P = 0{\cdot}04$), and those who were married had higher scores for GH ($t = -2{\cdot}33$, $P = 0{\cdot}02$) and MH ($t = -2{\cdot}05$,

Table 3 Descriptive statistics for the Short-Form 36 scales ($n = 212$)

Scales	Mean ± SD	Floor (%)	Ceiling (%)
Physical functioning (PF)	84·5 ± 17·3	0·9	24·5
Role-physical (RP)	72·9 ± 37·8	13·2	59·4
Bodily pain (BP)	75·5 ± 20·3	0·5	27·4
General health (GH)	55·5 ± 20·9	1·4	2·8
Vitality (VT)	59·8 ± 18·1	0·5	1·4
Social functioning (SF)	79·0 ± 19·1	0·9	25·5
Role-emotional (RE)	72·0 ± 40·5	19·3	63·2
Mental health (MH)	66·0 ± 17·9	0·5	2·4

Floor means lowest possible score; ceiling indicates highest possible score.

$P = 0·04$) than those who were unmarried. Junior college graduates had higher PF scores than those educated only to high school level or lower ($F = 3·58$, $P = 0·014$) (Table 4).

Comparison between health-related quality of life and stages of exercise

Overall, the differences in the stages of exercise of adults showed statistically significant differences in relation to the eight SF-36 subscales (Wilks $\lambda = 0·733$, d.f. = 32, $P = 0·001$). A statistically significant difference was also found between PCS and stages of exercise, and between MCS and stages of exercise (Wilks $\lambda = 0·806$, d.f. = 16, $P = 0·000$, Wilks $\lambda = 0·870$, d.f. = 16, $P = 0·026$, respectively).

Further analyses using one-way ANOVA and Tukey HSD revealed that different stages of exercise also showed statistically significant differences in PF, GH, VT, and PCS. Those who were in the maintenance, action, preparation, and contemplation stages had higher PF than those in the precontemplation stage. The GH of those in the maintenance stage was better than that of those in the contemplation stage, and those in the action stage had better GH and VT than those in the preparation and contemplation stages. PCS in the action stage was better than that of those in the precontemplation stage (Table 5).

Discussion

On the basis of the available data in Asia, a WHO expert has concluded that Asians generally have a higher percentage of body fat than Caucasians of the same age, gender, and BMI (WHO Expert Consultation 2004). The proportion of Asian people with risk factors for type 2 diabetes and cardiovascular disease is also substantial, even below the existing WHO BMI cut-off point of 25 kg/m^2. As a result, the report for Asia by the WHO's Steering Committee (2000) for the Asia Pacific Area suggests that people with a BMI of over 23 kg/m^2 should be classified as overweight and those with a BMI of over 25 kg/m^2 should be classified as obese. Taiwan's Department of Health announced definitions relating to obesity in 2002 under which those with a BMI of over 24 kg/m^2 were to be classified as overweight, a standard which was clearly higher than that for the rest of Asia. Although the nation's highest health policy-making body has solicited the views of health experts and scholars, it has not followed the course of the rest of the world. On the basis of this study, a revision of the nation's definition of overweight is needed so that services can be made available to more overweight and obese people. The earlier diagnoses are made, the earlier people can be cured or prevented from further damaging their health by obesity.

Approximately 38·2% overweight and obese adults in this study did not exercise regularly, and 36·3% did no exercise at

Table 4 Average Short Form 36 scores in relation to participant characteristics

	Gender			Marriage			Education				
SF-36	Male	Female	*P* value	Single	Married	*P* value	① ≥U	② JC	③ H	④ <H	*P* value
PF	84·9	84·3	0·82	85·7	83·5	0·37	86·3	88·6	82·1	78·0	0·014
RP	72·3	73·1	0·88	71·8	73·5	0·88	75·0	75·4	65·5	75·0	0·14
BP	77·6	74·6	0·33	77·1	74·1	0·23	77·4	75·9	73·1	74·9	0·12
GH	55·7	55·4	0·90	51·7	58·4	0·02	53·4	54·4	55·7	60·5	0·70
VT	61·7	58·9	0·30	57·6	61·6	0·08	58·5	57·5	60·3	64·5	0·36
SF	80·7	78·2	0·39	76·7	80·8	0·08	75·3	78·6	80·4	71·3	0·50
RE	77·6	69·5	0·18	66·9	75·8	0·09	66·3	74·6	71·3	79·3	0·09
MH	69·8	64·4	0·04	63·2	68·2	0·04	63·5	66·1	65·8	70·5	0·56

PF, physical functioning; RP, role-physical; BP, bodily pain; GH, general health; VT, vitality; SF, social functioning; RE, role emotional; MH, mental health.

U, University; JC, Junior College; H, High school.

*Education: PF Scheffe's *post hoc* test ② > ③ and ② > ④.

Table 5 Analysis of the Short Form 36 mean and standard deviation in relation to each stage of exercise ($n = 212$)

	Stages of exercise						
SF-36 measures	M ($n = 24$)	A ($n = 30$)	P ($n = 81$)	C ($n = 67$)	PC ($n = 10$)	Tukey HSD*	*P* value
Physical functioning (PF)	86·0 (13·0)	88·3 (12·3)	85·1 (16·3)	85·1 (15·5)	60·5 (35·2)	M > PC, A > PC P > PC, C > PC	0·000
Role-physical (RP)	77·1 (32·1)	85·8 (33·3)	73·2 (37·9)	68·3 (39·1)	52·5 (46·3)	ns	0·10
Bodily pain (BP)	74·3 (19·7)	81·5 (19·8)	73·7 (19·8)	75·8 (20·4)	73·3 (26·6)	ns	0·45
General health (GH)	62·8 (19·9)	65·3 (17·3)	55·0 (18·5)	49·3 (23·2)	53·9 (24·0)	M > C, A > C	0·003
Vitality (VT)	66·9 (14·7)	68·5 (16·3)	57·5 (18·5)	56·9 (18·5)	54·5 (14·4)	A > P, A > C	0·005
Social functioning (SF)	85·4 (14·1)	83·9 (15·7)	76·9 (18·8)	76·1 (22·0)	83·8 (16·7)	ns	0·10
Role-emotional (RE)	72·2 (40·1)	75·6 (36·0)	74·0 (38·6)	68·7 (44·5)	70·0 (48·3)	ns	0·94
Mental health (MH)	68·2 (15·5)	69·5 (16·2)	63·2 (18·6)	65·7 (18·7)	71·6 (15·7)	ns	0·42
PCS	75·0 (16·7)	80·2 (15·9)	71·0 (16·9)	70·0 (19·2)	60·1 (21·6)	A > PC	0·01
MCS	73·2 (16·2)	74·4 (17·5)	67·5 (18·3)	67·5 (21·1)	60·0 (18·4)	ns	0·35

*Statistically significant at adjusted 0·05 level.
ns, not statistically significant; M, maintenance; A, action; P, preparation; C, contemplation; PC, precontemplation; PCS, Physical Component Scale; MCS, Mental Component Scale.

all. A markedly high percentage (74·5%), therefore, was not in the habit of exercising regularly. This shows, when compared with other studies using similar measuring devices (Cardinal 1997, Kearney *et al.* 1999, Laforge *et al.* 1999), that the habits of overweight people as regards regular exercise are no different from those of normal weight people. However, the finding was a little different from that of the Sarkin *et al.* (2001) survey. This reported that about 60·2% of obese people in the United States of America (USA) did not exercise regularly, but having a fairly strong intention to exercise (31·6% were in the contemplation stage – having an intention to start to exercise within the next 6 months) was what made the overweight and obese different from the majority of people who currently do not exercise. The results of this study emphasize that the really important thing is the initial motivation to exercise. Therefore, it is essential to focus on how to provide appropriate guidance to overweight and obese adults who are motivated to exercise, so that they gain health benefits from so doing and, further, develop the habit of exercising regularly so that they actually lose weight.

The definition of regular exercise in our study was three times a week for at least 20 minutes. We did not, however, give examples or state particular degrees of intensity. Therefore, this was open to the subjective interpretation of participants. Reed *et al.* (1997) pointed out that if one defines regular exercise more precisely, then more people would be in the early stages (precontemplation and contemplation); in contrast, if the definition of exercise is less precise, then more people are placed in the later stages (preparation, action, or maintenance). This shows that there is a substantial grey area in definitions of exercise; how one defines it really depends on the purpose of one's research.

Our 212 subjects, using the same SF-36 scales (Ware 1993, Sullivan *et al.* 1995), scored slightly higher than Europeans and Americans of normal weight only on BP. The scores were very similar (not exceeding a margin of 5%) for PF, but lower than those of Europeans and Americans of normal weight on all other domains (RP, GH, VT, SF, RE and MH). Like those of other studies with overweight and obese people, we showed that these people have a relatively poor HRQL (Katz *et al.* 2000, Burns *et al.* 2001, Larsson *et al.* 2002). We also discovered that the quality of life and body weight were negatively related in such a way that the greater the body weight, the lower the PF, RP and GH. Like the investigation carried out by Burns *et al.* (2001) with overweight adults (BMI > 25 kg/m^2), we found that for those between the ages of 20 and 59 years, the greater the body weight, the markedly poorer the GH and PF. As a result, losing weight for overweight and obese adults is necessary to gain higher HRQL, and to improve GH, physical function, and role functioning.

We found that there were statistically significant differences in overall HRQL for each stage of exercise for overweight and obese adults. Similarly, Laforge *et al.* (1999) found that the exercise stage is positively associated with self-perceived quality of life. On close analysis of the data, it was also discovered that there is a correlation between the exercise stage and PF, GH and VT scales of the SF-36. The PF of those in the precontemplation stage was statistically significantly lower than that of those in the contemplation, preparation, action, and maintenance stages. Moreover, Fontaine and Barofsky (2001) found the similar result that obesity-associated deficits in HRQL tend to be more evident in PF. It is known that weight gain may affect PF. However, it is uncertain whether PF affected by obesity

What is already known about this topic

- Stage of exercise is commonly used to understand a person's intention and attitude toward physical activities and exercise.
- Health-related quality of life is considered to be the most appropriate variant of quality of life for investigating and measuring an individual's overall satisfaction with life.
- There is growing evidence that obesity and poor health-related quality of life are associated, and that exercise can improve health-related quality of life.

What this paper adds

- The majority of overweight and obese adults were not in the habit of exercising regularly, but showed high motivation to exercise.
- Overweight and obese adults who were inactive (precontemplation stage) had relatively low scores of health-related quality of life.
- Healthcare providers need to understand what stages people are at in order to educate them to achieve better quality of life.

has a short-term or long-term effect. Therefore, further research is needed to evaluate the effects of obesity on PF.

We also found that the GH of those in the maintenance stage was better than the GH of those in the contemplation stage, and the GH and VT of those in the action stage were better than those in the preparation and contemplation stages. Consequently, raising the stage of preparedness for exercise of obese people may help to improve their quality of life. Fontaine and Barofsky (2001) also indicated that a gradual increase in physical activity should be encouraged in order to increase energy and overall wellbeing. Additionally, Ellingson and Conn (2000) indicated that the benefits of exercise, such as increased mobility and energy, could contribute to enhancing perceived quality of life. Therefore, increasing exercise and maintaining physical activity regularly for overweight and obese people not only should be encouraged, but it should also be implemented in every possible social setting to improve people's well-being and reduce healthcare expenditures in the future.

Study limitations

Several limitations should be mentioned. The focus of this study was on participants in weight loss clinics, and its results may have been affected by this, because many overweight and obese people do not seek medical treatment, and because some gravitate toward commercial weight loss clinics. Therefore, the study findings should be treated with caution, and they can be generalized only to people who have visited the weight loss clinics.

Secondly, this research was a cross-sectional study. A mere understanding of the stage of exercise and HRQL of participants does not prove a causal relationship between the stages of exercise and HRQL. Therefore, we suggest that exercise intervention programmes should be carried out in order to gain more understanding of the impact on HRQL of raising the stage of exercise.

Lastly, because certain data, such as the number of years of being overweight and obese, were not obtained, we cannot know how this information may affect how individuals' self-perceptions of HRQL. As a result, we suggest that future research should focus on this issue to see how the years of having an obese or overweight condition might influence people's HRQL and to find out what factors may encourage them to seek medical help or exercise regularly.

Conclusion

Since stages of exercise are correlated with HRQL among overweight and obese adults, healthcare providers need to understand what stages people are at in order to educate them to achieve a better quality of life and to motivate those who are inactive to do more exercise on a regular basis. Healthcare providers should encourage overweight and obese adults to work hard to attain higher stages of exercise, because only by doing so will they attain a higher HRQL. Moreover, clinical nurses need to develop effective strategies to help overweight and obese people to improve their motivation and to achieve better clinical outcomes.

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Author contributions

All listed authors contributed directly to this study. PHL contributed to design and data collection, analysis and

manuscript preparative. WYC contributed to design and preparation of this manuscript. THL contributed to data collection. PCC contributed to the data collection.

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