# Exercise Program on Reducing Anxiety and Improving Metabolic Indicators for Patients With Anxiety Disorders

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## Purpose

To evaluate the effect of home-based exercise program on reducing anxiety levels and improving metabolic indicators for patients with anxiety disorders.

## Methods

A randomized experimental design with convenient sampling was used to recruit 86 subjects from a psychiatric clinic. Three measures were a pre-test before exercise program, a post-test at one week and a follow-up test at 3 months after receiving exercise program. Four self-report scales and biological physical assessments were used for measuring personal data, lifestyle behaviors, anxiety and metabolic control functions in this study.

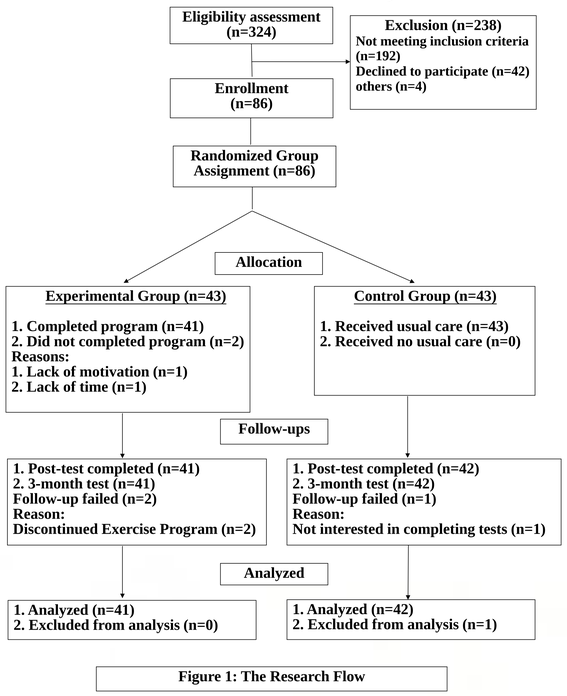


Figure 1: The Research Flow

## Results

The average of state and trait anxiety levels were 50.85 (*SD*=8.97) and 56.18 (*SD*= 10.02) indicating moderate anxiety levels were reported by study subjects. Details are in Table1.

The prevalence of metabolic symptoms was reduced for subjects in experimental group from 39.02% (*n*=16) to 26.82% (*n*=11). Differences are in Table 2.

The results revealed significant reduces in BMI (*F*=4.52, *p*=.013), state anxiety (*F*=9.35, *p=.000*) and trait anxiety (*F*=6.18, *p=.003*) between two groups from pre-test to 3-month follow-up. Meanwhile, the significant increases in HDL values (*F*=4.60, *p*=.012), moderate exercise levels (*F*=37.15, *p*=.000) and quality of life scores (*F*=9.45, *p*=.000) were found between groups from pretest to 3-month follow-up. Table 3 and Figure 2.

**Table 1. Differences in major study variables between groups in pre-test analysis**

| Variable | Experimental Group (n=41) | | Control Group (n=42) | | t-test | *p* |
|---|---|---|---|---|---|---|
| | Mean | S.D. | Mean | S.D. | | |
| **Personal Data** | | | | | | |
| Age | 39.76 | 11.09 | 40.45 | 11.25 | .28 | .778 |
| Education (year) | 13.29 | 2.80 | 12.69 | 3.46 | -.87 | .386 |
| **Anxiety** | | | | | | |
| State Anxiety | 52.17 | 8.59 | 49.57 | 9.25 | -1.33 | .189 |
| Trait Anxiety | 57.61 | 9.59 | 54.79 | 10.34 | -1.29 | .201 |
| **Exercise Behavior** | | | | | | |
| Moderate exercise | 85.93 | 78.03 | 116.38 | 67.71 | 1.90 | .061 |
| **Health Promoting Lifestyle** | | | | | | |
| Self-actualization | 8.80 | 3.21 | 9.26 | 3.12 | .66 | .513 |
| Interpersonal support | 9.29 | 2.74 | 10.36 | 2.80 | 1.75 | .084 |
| Stress Management | 8.56 | 2.55 | 9.10 | 2.13 | 1.04 | .303 |
| Health Responsibility | 7.80 | 2.99 | 8.07 | 2.50 | .44 | .661 |
| Nutrition | 9.66 | 3.01 | 9.24 | 2.45 | -.70 | .487 |
| Exercise | 7.32 | 2.82 | 7.12 | 1.99 | -.37 | .714 |
| Lifestyle Total | 51.44 | 14.83 | 53.14 | 9.71 | .62 | .539 |
| **Metabolic Indicator** | | | | | | |
| Body Mass Index | 23.18 | 3.61 | 23.57 | 5.16 | .40 | .693 |
| Waist Circumference | 79.77 | 8.56 | 81.91 | 12.74 | .90 | .370 |
| Systolic Blood Pressure | 121.61 | 13.69 | 127.26 | 21.97 | 1.41 | .163 |
| Diastolic Blood Pressure | 78.88 | 10.37 | 81.48 | 15.58 | .90 | .373 |
| High-density Lipoprotein Cholesterol | 36.83 | 17.48 | 41.40 | 16.20 | 1.24 | .220 |
| Triglycerides | 104.5 | 82.07 | 120.40 | 76.18 | .92 | .363 |
| Fasting Plasma Glucose | 96.68 | 16.97 | 98.98 | 29.68 | .43 | .668 |

**PS: No significant differences can be found in t-test results.**

**Table 2. Differences in MetS Prevalence between Groups**

| Measures | | Total | Experimental | Control | $\chi^2$ | *p* |
|---|---|---|---|---|---|---|
| Pre-test | n | 35 | 16 | 19 | .33 | .566 |
| | % | 42.17 | 39.02 | 45.24 | | |
| Post-test | n | 26 | 12 | 14 | .16 | .814 |
| | % | 31.33 | 29.27 | 33.33 | | |
| Follow-up | n | 31 | 11 | 20 | 3.88 | .049 |
| | % | 37.35 | 26.83 | 47.62 | | |

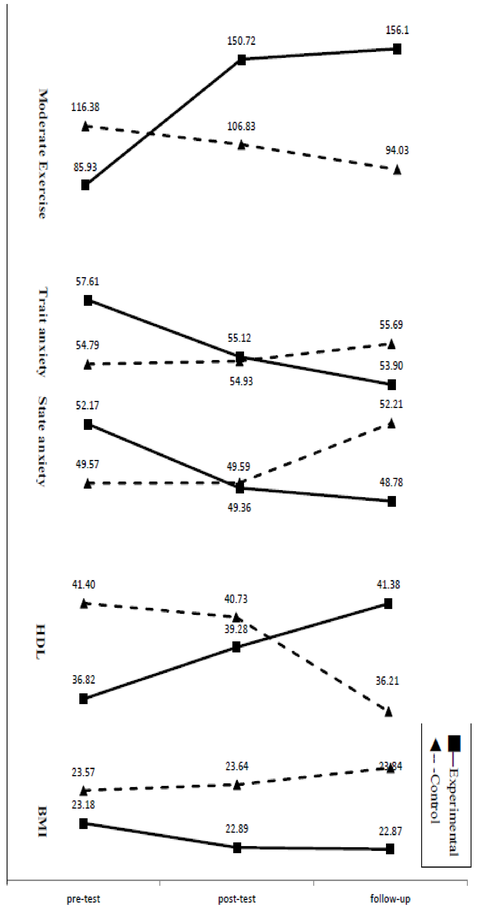


Figure 2. Significant variables by GEE mixed model analysis

## Conclusion

The home-based exercise program intervention have stronger evidence in reducing anxiety levels but have an efficient short time effects on metabolic indicators improvement for Taiwanese adults with anxiety disorders.

**Table 3 Effects of program on anxiety, BMI, HDL and exercise by Mixed Model Analysis**

| Variables | Coefficient *β* | *SE* | *t* | *p* value |
|---|---|---|---|---|
| **Effect on State Anxiety** | | | | |
| Intercept | 49.57 | 1.38 | 35.99 | .000 |
| Group (Exp) | 2.60 | 1.96 | 1.33 | .188 |
| Time (Post) | .02 | .94 | .03 | .980 |
| Time (F/U) | 2.64 | .98 | 2.70 | .008 |
| Interactions | | | | |
| Group x Time (Post) | -2.83 | 1.33 | -2.13 | .035 |
| Group x Time (F/U) | -6.03 | 1.40 | -4.33 | .000 |
| **Effect on Trait Anxiety** | | | | |
| Intercept | 54.79 | 1.56 | 35.12 | .000 |
| Group (Exp) | 2.82 | 2.22 | 1.27 | .207 |
| Time (Post) | .14 | .93 | .15 | .878 |
| Time (F/U) | .90 | .92 | .98 | .328 |
| Interactions | | | | |
| Group x Time (Post) | -2.63 | 1.32 | -2.00 | .048 |
| Group x Time (F/U) | -4.61 | 1.31 | -3.52 | .001 |
| **Effect on BMI** | | | | |
| Intercept | 23.57 | .69 | 34.18 | .000 |
| Group (Exp) | -.39 | .98 | -.39 | .694 |
| Time (Post) | .07 | .13 | .57 | .572 |
| Time (F/U) | .27 | .14 | 1.97 | .051 |
| Interactions | | | | |
| Group x Time (Post) | -.36 | .18 | -2.02 | .045 |
| Group x Time (F/U) | -.58 | .20 | -2.97 | .004 |
| **Effect on HDL** | | | | |
| Intercept | 41.40 | 2.66 | 15.59 | .000 |
| Group (Exp) | -4.58 | 3.78 | -1.21 | .230 |
| Time (Post) | -.67 | 2.35 | -.28 | .777 |
| Time (F/U) | -5.19 | 2.31 | -2.25 | .026 |
| Interactions | | | | |
| Group x Time (Post) | 3.13 | 3.34 | .94 | .351 |
| Group x Time (F/U) | 9.75 | 3.29 | 2.97 | .004 |
| **Effect on Moderate Exercise** | | | | |
| Intercept | 116.38 | 11.09 | 10.49 | .000 |
| Group (Exp) | -30.45 | 15.78 | -1.93 | .057 |
| Time (Post) | -9.55 | 9.45 | -1.01 | .314 |
| Time (F/U) | -22.35 | 7.83 | -2.85 | .005 |
| Interactions | | | | |
| Group x Time (Post) | 74.34 | 13.45 | 5.53 | .000 |
| Group x Time (F/U) | 92.52 | 11.14 | 8.31 | .000 |

Exp= experimental; Post= post-test; F/U=follow-up.
**Equations:**
State anxiety=49.57+2.6*EXP+0.02*Post+2.64*F/U -2.83*Post*F/U-6.03*F/U*EXP
Trait anxiety=54.79+2.82*Exp+0.14*Post+0.9*F/U-2.63*Post*Exp-4.61*F/U*Exp
BMI=23.57 -0.39*Exp +0.07*Post +0.27*F/U -0.36*Post*Exp -0.58*F/U*Exp
HDL=41.4 -4.58*Exp -0.67*Post -5.19*F/U +3.13*Exp*Post +9.75*F/U*Exp
Exercise=116.38-30.45*Exp-9.55*Post-22.35*F/U+74.34*Post*Exp+92.52*F/U*Exp