



## Effects of telephone-based motivational interviewing in lifestyle modification program on reducing metabolic risks in middle-aged and older women with metabolic syndrome: A randomized controlled trial



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### ABSTRACT

**Background:** Lifestyle modification is often difficult for middle-aged and older women living in the community who are at high risk of physical inactivity and metabolic syndrome.

**Objectives:** To examine the effects of telephone-based motivational interviewing in a 12-week lifestyle modification program on physical activity, MetS, metabolic risks (fasting plasma glucose, blood pressure, triglyceride, high-density lipoprotein, and central obesity), and the number of metabolic risks in community-living middle-aged and older women diagnosed with metabolic syndrome.

**Research design and method:** A randomized controlled trial was conducted. Recruited were 328 middle-aged and older women from a community health center in Taiwan. Eligible women medically diagnosed with metabolic syndrome ( $n = 115$ ) were randomly assigned to one of three groups: The experimental group received an individualized telephone delivered lifestyle modification program that included motivational interviewing delivered by an experienced nurse. The brief group received a single brief lifestyle modification counseling session with a brochure. The usual care group received standard care. Physical activity was assessed with the International Physical Activity Questionnaire and metabolic risks were determined by serum markers and anthropometric measures at pre- and post-intervention. One hundred women completed the study and an intention-to-treat analysis was performed. Generalized estimating equations were used to examine the intervention effects.

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**Results:** Women in the experimental group increased physical activity from 1609 to 1892 MET-min/week ( $\beta = 846, p = .01$ ), reduced the percentage of diagnosed with metabolic syndrome to 81.6% ( $\beta = -0.17, p = .003$ ), and decreased the number of metabolic risks from 4.0 to 3.6 ( $\beta = -0.50, p < .001$ ), compared to the usual care group (4.4–4.6). There was not a reduction in the percentage of diagnosed with metabolic syndrome in the brief group, but they had fewer metabolic risks after 12 weeks (mean = 4.0 vs. 4.6,  $\beta = -0.2, p = .02$ ) compared to the usual care group.

**Conclusions:** Motivational interviewing as a component of an individualized physical activity and lifestyle modification program has positive benefit in reducing metabolic risks in middle-aged and older women.

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## What is already known about the topic?

- Middle-aged and older women are at higher risk of physical inactivity and metabolic syndrome (MetS).
- Lifestyle modification and moderate physical activity protect against MetS.
- Lifestyle modification combined with promoting physical activity through motivational interviewing increases physical activity, but there is limited evidence to show its effects on MetS risks, particularly in middle-aged and older women living in community.

## What this paper adds

- For community-living middle-aged and older women with MetS, the individualized lifestyle modification program by telephone-based motivational interviewing can increase the amount of their physical activity.
- The individualized lifestyle modification by telephone-based motivational interviewing is an effective intervention model for reducing prevalence of MetS and MetS risks for middle-aged and older women.

## 1. Introduction

Metabolic syndrome (MetS), a constellation of hypertension, dyslipidemia, and diabetes risk factors, is associated with an increased risk of all-cause mortality (Dai et al., 2010; Gami et al., 2007; W.S. Wang et al., 2012). It has become a widespread health problem affecting women in many countries including Taiwan. Overall, the prevalence of MetS is higher in women as compared to men (36.3% in men compared to 56.8% in women). In those countries studied, including Taiwan, this gender difference emerges in midlife (Hwang et al., 2006; Lin et al., 2014; Mozumdar and Liguori, 2011; Park and Kim, 2015).

Compared to men, women also tend to have lower cardiorespiratory fitness, which is another risk factor for MetS. In women physical activity declines with age (American College of Sports Medicine, 2013; Bauman et al., 2009; Carroll et al., 2000). This puts middle-aged and older women at increased risk of developing MetS. When reduced physical activity is combined with postmenopausal status, the risk of developing MetS increases (Frugé et al., 2015; Kwaśniewska et al., 2010; Laaksonen

et al., 2002; Park et al., 2003). Despite this increased risk it is challenging for many women to modify their physical activity to reduce MetS risk. Thus, testing health promotion strategies that target physical activity for middle-aged and older women living in community is an important focus for women's health research.

Currently medication and lifestyle modifications, e.g., diet and physical activity, are recommended to reduce MetS risk (Chu et al., 2016; Esposito et al., 2013; Grundy et al., 2005). Among the lifestyle modifications, physical activity is considered the most economical and efficient (Bassi et al., 2014; Yamaoka and Tango, 2012) in reversing the disease trajectory of MetS (Boulé et al., 2001; Grundy et al., 2005). The positive effect of increasing the amount of physical activity on MetS risks occurs even without dietary modification (Chen et al., 2006; Touati et al., 2011). In Taiwan where middle aged and older women have a high prevalence of MetS (43.3%), low levels of physical activity are also found (Bauman et al., 2009; Lin et al., 2015). Therefore, in this intervention study we targeted middle-aged and older Taiwanese women because of both their risk for MetS and their reduced physical activity. Our purpose was to test the effectiveness of an individualized lifestyle modification program including motivational interviewing on physical activity and MetS risks.

## 2. Literature review

### 2.1. MetS in middle-aged and older women

MetS is defined as having three or more of the following five risk factors according to the National Cholesterol Education Program Adult Treatment Panel III (NCEP-ATP III): (1) elevated fasting plasma glucose: 100 mg/dl or use of antidiabetic medicines; (2) elevated blood pressure:  $\geq 130/85$  mmHg or use of antihypertensive medicines; (3) elevated triglyceride:  $\geq 150$  mg/dl; (4) reduced high-density lipoprotein cholesterol:  $< 50$  mg/dl; and (5) central obesity: waist circumference  $\geq 80$  cm (Grundy et al., 2005).

Middle-aged and older women are less likely to participate in physical activity for health promotion purposes (Im et al., 2012; Steeves et al., 2015; World Health Organization, 2015), leading to a high risk of developing MetS (Hwang et al., 2006; Lin et al., 2014; Mozumdar and Liguori, 2011; Park and Kim, 2015). The

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