Comparing of goal setting strategy with group education method to increase physical activity level: A randomized trial

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Background: Designing an intervention to increase physical activity is important to be based on the health care settings resources and be acceptable by the subject group. This study was designed to assess and compare the effect of the goal setting strategy with a group education method on increasing the physical activity of mothers of children aged 1 to 5. **Materials and Methods:** Mothers who had at least one child of 1-5 years were randomized into two groups. The effect of 1) goal-setting strategy and 2) group education method on increasing physical activity was assessed and compared 1 month and 3 months after the intervention. Also, the weight, height, body mass index (BMI), waist and hip circumference, and well-being were compared between the two groups before and after the intervention. **Results:** Physical activity level increased significantly after the intervention in the goal-setting group and it was significantly different between the two groups after intervention ($P < 0.05$). BMI, waist circumference, hip circumference, and well-being score were significantly different in the goal-setting group after the intervention. In the group education method, only the well-being score improved significantly ($P < 0.05$). **Conclusion:** Our study presented the effects of using the goal-setting strategy to boost physical activity, improving the state of well-being and decreasing BMI, waist, and hip circumference.

Key words: Physical activity, goal setting, exercise, obesity, mothers, waist circumference, well being, health education

INTRODUCTION

It has been considered that physical activity is effective in preventing more than 20 diseases.[1] Previous studies showed that appropriate physical activity reduced 19% of the adults' deaths.[2] Various researches have shown that 31.1% [with confidence interval (CI) 95%: 30/9-31/2] of the adults (older than 15 years) are physically inactive.[3] In Iran, it has been documented that 40% of the adults (31.6% of men and 48.6% of women) have a low level of physical activity and almost 15% of Iranian adults do not have any physical activity.[4]

Previous studies suggest that mothers may have several barriers for their low level of physical activity include: lack of time, guilt, lack of energy, limited access to child care or lack of support from their partner, etc.[5-7] Inactivity, not only has hurtful effects on health and quality of life among mothers, but it may also affect their children's behaviors,[5] as mothers are the primary role models for their children.[6] Also maternal health is an important factor for family and community health progress.[8] So, increasing interventions to promote physical activity among mothers is an important public health priority.[5]

There are several different intervention methods to promote physical activity including social support, goal-setting, and the use of accelerometers or pedometers.[9] With regard to the barriers of mothers' physical activity, we must use an approach that could overcome these obstacles, and in accordance with their conditions, the goal strategy has this potential. Goal-setting is a method that has the potential to be an important

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enabler of behavior change, and it has been established to be effective as a short-term behavior change strategy. In this strategy, health professionals should assess the participants' goals, show interest about their progress by asking them, empathize with any current struggle they have, and foster a positive and encouraging atmosphere.[9] On the basis of this theory, if an aim is determined for everyone, they will be encouraged to achieve the revealed goals. This method is strongly recommended because of its effectiveness in increasing physical activity, with no harm or economic constraints. These kinds of intervention are applicable in different places and populations.[10,11] In Iran, the effect of goal-setting strategy has been investigated in increasing the levels of physical activity in women suffering from diabetes type 2.[12] Since goal-setting strategy is based on the planning by the participants and certainly according to their barriers, it could be a suitable method for increasing physical activity. The purpose of this study was to assess and compare goal-setting strategy with the group education method to promote physical activity among mothers of children aged 1-5 years in Isfahan, Isfahan Province, Iran.

MATERIALS AND METHODS

This study was a multicenter, parallel, randomized field trial to compare the effectiveness of a 4-week intervention program to increase the physical activity levels of mothers with 1-5-year-old children that was conducted from September 2014 to November 2014 in Isfahan, Isfahan Province, Iran. The investigation was approved by the Medical Ethics Committee of Isfahan University of Medical Science.

Sampling was conducted in multiple stages. The first one included a list containing all health centers in Isfahan Province that was prepared by the Isfahan Province health center; then within the sampling frame of the urban health centers, four health centers were selected by simple random sampling. To prevent contamination, the groups were selected from different health centers; the health centers were classified into four groups based on randomized allocation (two centers as group education group and two centers as the goal-setting group). Participants in the project were selected by the health center staff from the available list of all the mothers under the care who had inclusion criteria. The staff explained the study to the mothers over the phone and asked them to participate in the project. In case of agreement to participate, participants were informed about the date and place of the session. Written consent was obtained from all the participants. At the start of the program, all participants were screened for factors such as age, weight, height, body mass index (BMI), waist and hip circumference, number of children, children's age, level of education, occupation, physical activity, well-being status, and economic and nutrition states. A 1-h training session

(with receiving a training booklet) was held for both groups to create awareness in the field of the importance of physical activity, and to establish the sensitivity and motivation. This was followed by intervention programs on the goal-setting group by trained staff during 4 weeks. This program included a 1-h training class in the field of introduction to the goal-setting strategy and encouragement in for applying for it. Participants in the goal-setting group returned to the health center every week for a 1-month follow-up period in order to ensure the correct application of goal-setting strategy. The second assessment in both groups was performed 4 weeks after the start of the project and the third assessment was after 3 months of the program.

Inclusion criteria
Participants in the project were selected by the health center staff from the available list of mothers who had at least one child of 1-5 years of age. Not being pregnant, having no limitation for exercise, and being a resident of the same area until the end of the program were the criteria for inclusion in the program.

Exclusion criteria
Limitations for physical activity (such as pregnancy or illness) during the program, unwillingness to continue participation in the study, and lack of regular attendance in the classes were the exclusion criteria.

Randomization
We selected our centers randomly among urban health centers and randomly chose two centers as the control group (education group) and two centers as the intervention group (goal-setting group). Participants in the control group received the standard education that is now being disseminated in health care centers while the intervention group received additional education about goal-setting strategy.

To prevent contamination, we selected the two groups from separate health centers.

Sample size and power
The sample size of the trial was estimated 172 participants (86/group) after consideration of 10% attrition rate to increase the power of the study (power = 80% with type I error = 0.05), effect size = 126.7.

Blinding
After randomization, groups were coded (codes 1 and 2) and our statistical analyzer was not aware of the group education and the goal-setting group.

Primary assessment
Measurements were conducted by trained staff. Participants were weighed without shoes and heavy clothing. Height

was measured without shoes. BMI was calculated from the measured weight and height as kg/m², and waist and hip circumference were measured with a tape meter. The waist circumstance was measured from the midway between the inferior margin of the last rib and the crest of the ileum. The hip circumference was measured from the maximum extension of the buttocks.

Questionnaires

The participants filled several questionnaires including:
1. International Physical Activity Questionnaire (IPAQ).
2. General Health Questionnaire (GHQ)-12 questionnaire (evaluating well-being).
3. Questionnaire of Assessment for Satisfaction of Program.

IPAQ is designed in both short and long forms. In this study, the short form was used, which was answered directly by the participant. This questionnaire assesses the physical activity in the last 7 days and the physical activity level is categorized in three levels: Low, moderate, and vigorous.

The short form of the questionnaire evaluates physical activity evaluation and is based on a total of the two factors of the amount of (minute) and the frequency of physical activity (day) in three forms — low, moderate to severe, and severe to strong. The physical activity is measured in metabolic equivalent (MET) (min/weeks).

MET is used to estimate the energy expenditure for physical activity. One MET is defined as the energy cost of sitting quietly. All the physical activities can be measured by multiples of 1 MET. In this questionnaire, walking is considered to be 3.3 METs, medium physical activity 4 METs, and vigorous physical activity 8 METs.

To measure the whole physical activity in 1 week, three numbers should be summed:
1. Amount of walking (MET × min × days).
2. Total of medium physical activity (MET × min × days).
3. Total of vigorous physical activity (MET × min × days).

The overall score is estimated in both quantitative and classification variables.[13] This questionnaire has been designed by the World Health Organization (WHO) and the reliability and validity of the Iranian version has been accepted.[14]

GHQ-12 questionnaire measures the level of well-being. The validity and reliability of the Iranian version have been accepted and its Cronbach's alpha coefficient is 0.87. This questionnaire is in the forms of 12, 20, 28, 30, and 60 questions. In this project, a 12-question model has been used. Each question has four options and has been scored

according to Likert scoring; the options A, B, C, and D correspond to 0, 1, 2, and 3. A score between 0 and 3 is assigned for each question and the total score is between 0 to 36. The score of 11–12 is normal, more than 15 is sign of distress, and more than 20 indicates a psychological distress and severe problem.[15,16] The Nutritional State Checklist has 13 yes/no questions to evaluate the participant's nutritional state. Scores are defined in three groups:
- From 10 to 13 (good state).
- From 6 to 10 (nearly good state).
- Less than 6 (bad state).

This checklist is now being used in health care centers.

The Program Satisfaction State Questionnaire was filled out by participants at the end of the program. This checklist is currently used in health care centers. It consists of 7 topics and 35 questions. Six of the topics are: Place, time, the procedure, learning content, costs, and overall satisfaction of the program, and 18 questions out of this were well appropriate for this program. A "yes" to a "yes/no" question is given 1 point while a "no" answer is given 0 point. At the end, if 80% of the checklist's overall score is from "yes" answers the program is considered to be desirable and if 80% of participants give a "yes" answer to an item, that item is also be considered as desirable.

Content of the intervention program

The intervention program was based on a group training session in health care center settings and included providing two training booklets for the participants. The training session was aimed to develop an intelligent self-care in participants involving a clearer understanding of the importance of physical activity and physical inactivity-related illnesses. The first booklet was a guiding manual about physical activity in middle-aged persons, which was given to both groups and taught the participants the stages and types of physical activities. This booklet now routinely taught at health care centers. Regarding the second booklet, we had created an easily understandable educational booklet that was a guide to adults' physical activity through the goal-setting method, and was designed only for this group. In this manual, the goal-setting method was taught in order to gain the skill of incorporating physical activity as part of their daily routine. The program included sessions held over 4 weeks. The health staff was trained about the packages by the researcher and then, they handled the classes. The first session was about 2 h. Because of ethical considerations in this study, obtaining the participants' consent was necessary. In this session, the training classes were held and two booklets were distributed among the participants according to the mentioned methods; the participants' demographic information was recorded and the measurements of height, weight, BMI, and waist and

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hip circumferences were performed by one of the trained personnel.

GHQ-12 and IPAQ questionnaires were filled out by the participants.

At the end of the first session, the goal-setting forms were given to participants in this group and they were explained about how to complete the forms. The goal-setting forms were filled by the participant group in the following week and were presented in the second session. Only the goal-setting group participated in the second meeting. In this session, the participants spoke about the barriers in achieving the recommended physical activity goals and the ways for overcoming these barriers. The completed goal-setting forms were assessed and blank forms were given to the participants. The third and fourth sessions were held 1 and 2 weeks after the second meeting; they were similar to the second session. In the fifth session (1 month after the start of the project), the goal-setting forms were assessed and then the measurements were performed as in the first session. The measurements included height, weight, BMI, waist and hip circumferences, level of physical activity, and the well-being of both the groups. Three months after the start of the project, evaluation and measurements were repeated in both the groups. Moreover, the program satisfaction forms were completed by the participants.

Statistical analysis

Analysis was performed to estimate the effect of the intervention on the levels of physical activity, BMI, well-being, and waist and hip circumferences. Statistical comparison of the quantitative variables (i.e., physical activity, BMI, waist and hip circumferences, well-being score, and program satisfaction score) in each group was carried out before intervention and in the follow-up period by repeated measure analysis of variance (ANOVA).

Statistical analysis between the intervention group and control group was performed by independent *t*-test. All analyses were performed using Statistical Package for the Social Sciences (SPSS) version 20. The details of the design of the study are described elsewhere.[18]

RESULT

A total of 197 participants enrolled in the study after being selected according to the inclusion criteria but 172 subjects (86 persons in each group) completed the study. Twenty-five subjects were excluded due to move ($n = 9$), pregnancy ($n = 9$), prohibition to exercise ($n = 2$), and unclear reasons ($n = 5$). Eighty-six subjects in the goal-setting group and 86 subjects in the group education group attended our study and completed the questionnaire at the start of the program and also 4 weeks and 3 months after the intervention was conducted. The response rate was 87.3% [Figure 1].
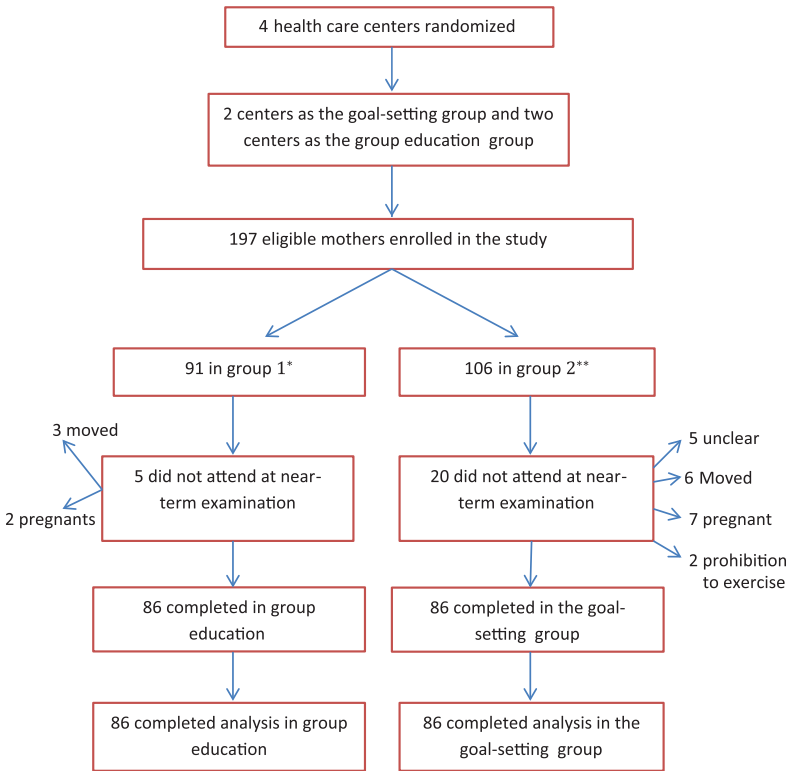

Figure 1: A total of 172 mothers completed the study protocol
Group 1* = Group education, Group 2** = Goal-setting group

Tables 1 a and b show the baseline characteristics of the participants. There was no significant difference in the mean age, number of children, number of children <5 years, waist and hip circumferences, physical activity score, well-being score, BMI, job, economic status, nutrition status, and educational status between the two groups ($P > 0.05$).

The mean changes of IPAQ score, BMI, and waist circumference from the baseline to after the intervention and 3 months after the start of the program for the two groups have been presented in Table 2.

The mean changes of BMI, waist and hip circumference, physical activity score from baseline to after the intervention and after 3 months of follow up was not significantly different in the group education group.

There was a significant difference in the well-being score from the baseline to after the intervention and after 3 months of follow-up for the group education group ($P < 0.05$).

In the goal-setting group the baseline mean of BMI, waist and hip circumferences, physical activity score and well-being score were significantly lower than after the intervention and after 3 months of follow-up ($P < 0.05$). After 4 weeks, the mean physical activity level increased from 673.9 (standard deviation (SD) = 825.1] to 1796.7 (SD = 1865.4) and after 3 months it reached 1232.4 [SD = 1077. 1) in the goal-setting group ($P < 0.000$).

After 4 weeks, there was a significant difference in the mean physical activity level in the two groups ($P = 0.002$) and after 3 months, the difference between them was significant ($P = 0.01$) [Figure 2].

After 4 wks, the mean well being score decreased from 11.5 (SD = 5.5) to 9.1(SD = 4.8), and after 3 mon reached to 9.29 (SD = 5.5) in the goal setting group ($P = 0.000$). After 4 wks, the mean hip circumference decreased from 103.2 cm (SD

Table 1a: The baseline characteristics of the participants

Variable studied	Group education: Mean (SD†)	Goal-setting strategy: Mean (SD)	P value
Age (years)	31.13 (±5.37)	32.10 (±4.9)	0.21
No of children	1.63 (±0.63)	1.59 (±0.64)	0.72
No of children <5 years	1.13 (±0.33)	1.13 (±0.33)	1
Waist circumference (cm)	83.60 (±11.23)	82.04 (±10.07)	0.34
Hip circumference (cm)	103.52 (±9.58)	103.27 (±9.44)	0.86
Physical activity level (Mets)	900.90 (±1045.70)	673.90 (±825.10)	0.11
Well-being score*	11.76 (±5.37)	11.49 (±5.55)	0.75
BMI‡ (kg/m²)	25.75 (±4.54)	25.61 (±5.60)	0.76
Nutrition status**	8.49 (±1.88)	8.92 (±1.81)	0.12

*The score of 11-12 is normal, more than 15 is a sign of distress, and more than 20 indicates physiological distress; **The score of 10-13 is a good state, 6-10 is a nearly good state, and less than 6 is a bad state; ‡BMI: Body mass index; †SD: Standard deviation
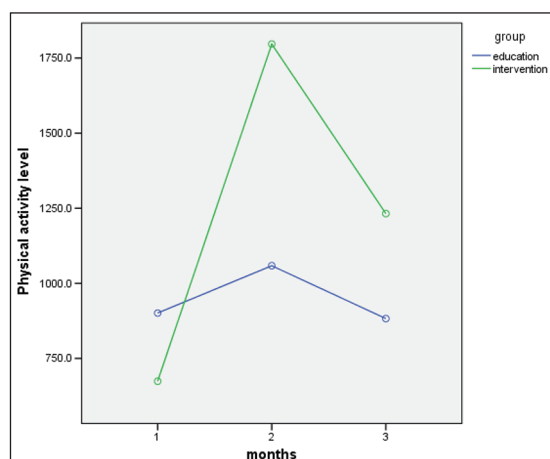
Table 1b: The baseline characteristics of the participants

Studied variable		Group education % (N)	Goal-setting strategy % (N)	P value
Education	Illiterate or primary (<6 years)	17.4 (15)	8.1 (7)	0.069
	(□6 years)	82.6 (71)	91.9 (79)	
Job	Housekeeper	88.4 (76)	77.9 (67)	0.068
	Worker	11.6 (10)	22.1 (19)	
Economic status (self-discussed)	Low	12.8 (11)	9.3 (8)	0.14
	Average	80.2 (69)	76.7 (66)	
	Good	7 (6)	14 (12)	

Table 2: The physical activity level, BMI, waist and hip circumferences, well-being score before and after the intervention

		Baseline Mean (SD†)	After 1 month Mean (SD)	After 3 months Mean (SD)	P value¹
Physical activity score (mets)	Group 1*	900.9 (±104.5)	1058.6 (±106.0)	882.6 (±81.9)	0.35
	Group 2**	673.9 (±82.5.1)	1796.7 (±186.5)	1232.1 (±107.7)	0.000
P value²		0.11	0.002	0.018	
BMI‡ (kg/m²)	Group 1	25.7 (±4.5)	25.7 (±4.2)	25.8 (±4.1)	0.68
	Group 2	25.5 (±5.5)	25 (±5.3)	25.3 (±5.3)	0.000
P value²		0.76	0.32	0.52	
Waist circumference (cm)	Group 1	83.6 (±11.2)	82.5 (±9.4)	83.6 (±9.5)	0.09
	Group 2	82 (±10)	80.6 (±9.4)	80.9 (±9.4)	0.000
P value²		0.34	0.19	0.06	
Hip circumference (cm)	Group 1	103.5 (±9.4)	103.6 (±9.2)	104.0 (±8.7)	0.27
	Group 2	103.2 (±9.4)	101.4 (±9.1)	102.1 (±9.2)	0.000
P value²		0.86	0.12	0.17	
Well-being score*	Group 1	11.5 (±5.0)	9.6 (±4.6)	10.0 (±5.1)	0.001
	Group 2	11.4 (±5.5)	9.1 (±4.8)	9.2 (±5.5)	0.000
P value²		0.74	0.47	0.34	

Group 1 = Group education group; Group 2 = Goal-setting group; 1 = Indicates the difference between the baseline and after 1 month and 3 months after intervention, analyzed by repeated measure ANOVA; 2 = Indicates the difference between the two groups, analyzed by the independent *t*-test; *The score of 11-12 is normal, more than 15 is a sign of distress, and more than 20 indicates physiological distress; ‡BMI: Body mass index; †SD: Standard deviation

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Figure 2: Mean physical activity level at the baseline and time of follow-up

= 9.4) to 101.4 cm (SD = 9.1), and after 3 months it reached to 102.1 cm (SD = 9.2) in the goal setting group (P = 0.000). The hip circumference and well being level score were not significantly different after 4 weeks and 3 months follow up between the two groups (respectivly P = 0.12, 0.17, 0.47, 0.34). The program satisfaction score in 94.2% of individuals in the group education group and 98.8% of individuals in the goal setting group was more than 80%.

DISCUSSION

The study showed goal setting strategy to promote physical activity among mothers of children aged 1 to 5 years further of group education method. Previous studies showed that the global average of physical activity level is low (less than 2.5 h a week).[17] The results of our study also showed physical activity levels in most mothers who have children aged 1-5 years is not appropriate. (At baseline, 59/8% of the goal setting group reported low level (<600mts) of physical activity). This intervention program is designed to fill the gaps that currently exist for primary health care settings in providing appropriate guidance for health workers and mothers of small children for achieving suitable physical activity levels. Because of the certain of role regular physical activity on health, it is necessary to set more effort in educating people about this.[17] Previous studies showed that planning and goal-setting strategy are effective in increasing physical activity levels.[2,12] The primary aim of this study was to evaluate the effectiveness of the goal-setting strategy in increasing the physical activity level in this group. According to our study, the use of goal-setting strategy achieved positive effects on physical activity level and other health factors. After 4 weeks of intervention, the participants reported prominent changes in their physical activity level and also other related health factors (BMI, waist and hip circumferences, and well-being). Participants in the goal-setting group lost weight, had decreased BMI, waist and hip circumferences,

improved state of well-being, and increased physical activity level after 4 weeks of intervention and 3 months of follow-up. Although these values gradually increased from 4 weeks after the intervention to 3 months follow-up and we had a decreased physical activity level during this period, the situation was better than the baseline, and this indicates the behavior endurance in participants and the program efficacy. Probably the reason for a reduction in the educational impact was "forgetting" over the course of the time. At the baseline, 59/8% of the participants in the goal-setting group reported low levels of (<600 mts) of physical activity but after 4 weeks of intervention and 3 months of follow-up, this reached 27/1% and 49/4%, respectively. In this intervention program, participants were trained for physical activity that was suitable to the conditions of their life. Therefore, this strategy can overcome the barriers to appropriate physical activity. Also, in this intervention program, individuals learn to record their activities and so they can track their progress; this increases the motivation to continue in the program. So, the method is practical, simple, useful and cost-effective, and is applicable at the national level.[10,11] Our study implicated some limitations that should be considered. This study had a small sample size, which reduced the statistical power. In the present study, it was not possible to concretely observe all the participants; therefore, during the research their performances were identified and compared according to self-reported questionnaires. It was not possible to blind the participants and observers. Designing and implementing programs to increase physical activity and the use of health education specialists and experts in physical activity education will be an important step in improving the health of individuals in health centers.

CONCLUSION

These findings document that goal-setting strategy can be effective in increasing physical activity, improving the state of well-being, decreasing BMI and waist and hip circumferences among mothers who have 1-5 year-old children. So, the implementation and continuity of goal-setting strategy are recommended in health centers.

Conflicts of interest
There are no conflicts of interest.

AUTHOR'S CONTRIBUTION

NJ was the main investigator and contributed in the conception of the work, conducting the study, data analysis, and writing the manuscript, and revising the draft. ZDS contributed in the conception of the work, writing the manuscript, revising the draft. AHZ contributed in the conception of the work, writing the manuscript, revising the draft. RT contributed in data analysis and revising the paper, all the authors agreed on all aspects of the study.

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