

# Theory-based lifestyle educational intervention through intensive community leaders' affects healthy lifestyles adoption of middle-aged Nekemte populations

## A quasi-experimental control study

Alemu Adeba, MSc<sup>a,\*</sup> , Tamiru Dessalegn, PhD<sup>b</sup>, Belachew Tefera, PhD<sup>b</sup>

### Abstract

The intensive participation of community leaders in teamwork is essential for healthy lifestyle adoption and lifestyle disease prevention. Adult-centered lifestyle education intervention is a simple method and requires less power. However, the effect of community leaders' engagement in education on the effectiveness of intervention, adults' team performance, and satisfaction was not noticed in west Ethiopia. Therefore, this study aims to evaluate the effect of theory-based education intervention through intensive community leaders on the intervention mapping approach to healthy lifestyle adoption of middle-aged Nekemte dwellers. A pretest-post-assessment quasi-experimental control study was conducted from January to July 2019 and post-data was collected in August 2019. Out of 266 apparently healthy, 253 middle-aged final analyzed. After 3 months of intensive education for the intervention group, weekly 1 session of 30 to 50 minutes was given for the other 3 months and the team was led by community leaders. With SPSS version 24 data analyzed for descriptive statistics, difference-in-differences the mean difference, independent *t* test, and the correlation between variables were analyzed using Spearman, and significance was considered at *P* value < .05. At baseline there was no significant difference among the 2 groups. While healthy lifestyle adoption improved, anthropometric measures showed a reduction among the intervention group compared to the control group. This study showed that among the middle-aged in the intervention group compared with the control group, preceding behaviors (*P* < 0.001), self-efficacy (*P* < 0.001), affects related behavior (*P* < .001), interpersonal influences (*P* < 0.001), perceived benefits (*P* = 0.001), barriers (*P* = 0.003) and commitment to action of a plan (*P* < 0.001) were significantly changed at the end line. The role of the team leader's effort was 92.19% for successful competition of the intervention and the average scaling rate of team effectiveness is 73.19% and significantly associated with effectiveness (*R* = 0.82, *P* < .01), leaders effort (*R* = 0.73, *P* < .01), and satisfaction (*R* = 0.84, *P* < .01). A community-based team leader has a positive correlation with effectiveness and implementations of lifestyle education intervention. The study revealed that theory-based educational intervention through intensive community leaders is effective in participants' retention, healthy lifestyle adoption, anthropometric measure reduction, improving adults' team performance & satisfaction, and rapid implementation of intervention at the community level. Hereby theory-based educational intervention through intensive community leaders is a prominent educational tool to implement lifestyle education, health lifestyle adoption, and prevent chronic diseases. The findings imply the need for targeting the middle-aged in designing healthy lifestyle education interventions.

**Abbreviations:** HPM = Health Promotion Model, NCD = non-communicable diseases.

**Keywords:** community leaders, healthy lifestyle education, HPM, intervention mapping, middle-age

### 1. Introduction

Nowadays, lifestyle diseases are emerging public health problems in developed and developing countries.<sup>[1]</sup> For this case,

World Health Organization's recommendation encourages all policy-makers should develop cost-effective approaches to prevent non-communicable diseases (NCD).<sup>[2]</sup> To halt this problem, different theories like teamwork, leadership, change

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<sup>a</sup> Department of Food and Nutritional Sciences, Wollega University, Nekemte, Ethiopia, <sup>b</sup> Department of Nutrition and Dietetics, Institute of Health, Jimma University, Jimma, Ethiopia.

\* Correspondence: Alemu Adeba Department of Food and Nutritional Sciences, Wollega University, Nekemte, Ethiopia (e-mail: alemuadeba2017@gmail.com).

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communication behavior, cognitive, community engagement, and others were postulated to inculcate knowledge, skill, and attitude.

The team leadership model creates an environment in which members are accountable not just to the coach, but to the team as a whole.<sup>[3,4]</sup> A team leader is a person who provides guidance, instruction, direction, and leadership to a group of teams or individuals for the purpose of achieving a key result or group of aligned results.<sup>[5]</sup> A team leader's ability to motivate, inspire, guide, and coach their teams can impact everything from employee engagement and development to retention and productivity. What's more, research shows that a team leader has the most direct and significant impact on the experience of the people on the team.<sup>[6]</sup>

Work team research has seen tremendous advancements in the past few decades, with the majority of work being conducted in the context of multilevel designs and analyses.<sup>[7,8]</sup> This multilevel approach views teams in context and composed of different members, enabling the modeling of upward, downward, and team-level relations.<sup>[9,10]</sup> Moreover, constructs in team research are typically categorized according to their position in a research model.<sup>[7,11]</sup>

Effective team working is an essential factor for organizational success, frequently cited in the gray literature.<sup>[12-14]</sup> Recent evidence has suggested that lifestyle interventions can be conducted in diverse community settings.<sup>[15]</sup> Effective team performance derives from several fundamental characteristics.<sup>[16,17]</sup> A central responsibility of team leaders is to raise the collective efficacy of the team.<sup>[16]</sup>

Community leaders believed that leadership is a multidimensional and inclusive process.<sup>[18]</sup> Effective community leadership contributes to youth engagement and health promotion.<sup>[19,20]</sup> In any direction of thinking, significant impact is achieved only when programming targets local community members.<sup>[21]</sup>

Group-based healthy lifestyle intervention delivered in rural and underserved communities is acceptable; improves the retention of participants and the effectiveness of the program.<sup>[22]</sup> To evaluate the effectiveness and sustainability of healthy lifestyle interventions, we need to understand which specific components of the intervention determine behavior change,<sup>[23]</sup> and which scopes of interventions are implemented in real-world settings.<sup>[24]</sup>

A community-based lifestyle intervention was recommended.<sup>[25]</sup> However, for these interventions to be effective, they must be rigorously designed, incorporating practical and theoretical elements.<sup>[26]</sup> Intervention mapping is a planning approach that is based on using theory and evidence as foundations for taking an ecological approach to assess and intervene in health problems and engendering community participation. The keywords in intervention mapping are planning, research, and theory.<sup>[27]</sup>

In this decade, different studies have been conducted to evaluate lifestyle modification programs' effect on adult populations.<sup>[28-31]</sup> Nevertheless, each region has cultural demographics and individual characteristics which have an impact on interventions.<sup>[32,33]</sup> This is a barrier or an opportunity, so to easily adapt to the culture and adopt a healthy lifestyle, an intensive community leader is an exact tool for educational intervention and team control.

There are several theories and models that support the practice of health promotion and disease prevention. Accordingly, behavior modification theories and models can be highly helpful in the design and evaluation of comprehensive educational programs.<sup>[34]</sup> The theory of planned behavior is one of the behavior change theories that are widely used in health education. According to this theory, an individual's intention can be predicted by 3 determinants, namely attitude towards the behavior, beliefs about the motivation to comply with other expectations (subjective norms), and beliefs about the perceived level of

control over factors that can either facilitate or hinder behavior performance (perceived behavioral control).<sup>[35]</sup> Pender Health Promotion Model (HPM) model is derived from the social cognitive theory with 9 potential constructs; this is a theoretical framework for evaluating the determinant that contributes to the promotion of healthy lifestyle behaviors and individuals' commitment to healthy behaviors.<sup>[27]</sup>

Intervention mapping provides guidelines and tools to ensure health promotion program is based on empirical evidence and sound theories. Intervention mapping is also used for the planning and development of implementation strategies for program adoption, implementation, and maintenance.<sup>[27]</sup> Human behavior is affected by several factors; one of the effective theoretical models used for the successful change of undesirable behavior into healthy behavior is the theory of planned behavior.<sup>[47,48]</sup> Having leadership skills was a key factor in delivering effective interventions.<sup>[37]</sup>

During the middle age of the human life cycle stage, adults begin to experience the first outward signs of aging. Wrinkles begin to appear, joints ache after a highly active day, and body fat accumulates. There is also a loss of muscle tone and elasticity in the connective tissue.<sup>[49]</sup> The early period of middle age is very different from the end. For example, during the early years of middle age, many women experience pregnancy, childbirth, and lactation. In the latter part of this life stage, women face perimenopause, which is a transition period that leads up to menopause or the end of menstruation. A number of physical changes take place in the middle-aged years, including the loss of bone mass in women due to dropping levels of estrogen during menopause.<sup>[49,50]</sup> In both men and women, visual acuity declines, and by age forty there can be a decreased ability to see objects at a close distance, a condition known as presbyopia.<sup>[49]</sup>

Healthy lifestyle adoption is an exact tool to prevent metabolic syndrome and its complications.<sup>[38-41]</sup> Nevertheless, team leaders could lead to higher levels of healthy lifestyle adoption, team leader effort, and adult satisfaction, the role of community leaders in the team cannot be evaluated. However, leaders' effect on the implementation of healthy lifestyle educational intervention targeting middle age to prevent NCDs was not addressed well in Ethiopia. Particularly in the western part of the country community-based healthy lifestyle was not given and its effectiveness was not yet reported.

Interventions on healthy lifestyle behaviors in middle age are an important period in the life cycle because metabolic physiologic changes most probably occur after midlife times. Therefore, this study aimed to evaluate the effect of the intervention mapping approach on healthy lifestyle adoption through intensive team-based community leadership in Nekemte middle-aged populations.

## 2. Methods

### 2.1. Setting

The study was conducted in Nekemte city, located in western Oromia and 328 km far from Addis Ababa, Ethiopia.

### 2.2. Study design and period

A quasi-experimental control study with pretest-posttest was conducted from January to July 30, 2019, to evaluate the effectiveness of the community leaders-based educational intervention on the intervention mapping approach to implementation of healthy lifestyle adoption in Nekemte middle-aged populations.

### 2.3. Target participants

Study populations were selected randomly from all middle-aged (41-64 years) Nekemte populations.

## 2.4. Sample size determination and procedure

We determined the sample size using single proportion formula taking the prevalence of the dependent variable among healthy Ethiopian adults. According to,<sup>[42]</sup> the most common component of metabolic syndrome is abdominal obesity with a 19.6% prevalence. So, with a margin of error of 5%, a confidence level of 95%, a 10% gnawing away, and a minimum sample of 266 participants.

From 6 kebeles (small sub-city or communes) of Nekemte, 2 communes having no adjacent natural boundary but homogeneous in terms of socioeconomic and geographical were selected. Accordingly, 1 commune was randomly selected using the lottery method, and the other was purposively allocated with buffering zone through a natural geographical boundary to reduce bias.

## 2.5. Eligibility

All selected healthy individuals aged 41 to 64 years who were eligible to participate in the study and asked to undergo personal anthropometric measurements, and respond to questionnaires and biomarkers were included. While individuals receiving medication for NCDs; who have taken part in any behavioral change program; pregnant/current lactating women; serious mental conditions; bariatric surgery; use weight-impacting medication, and physically disabled were excluded.

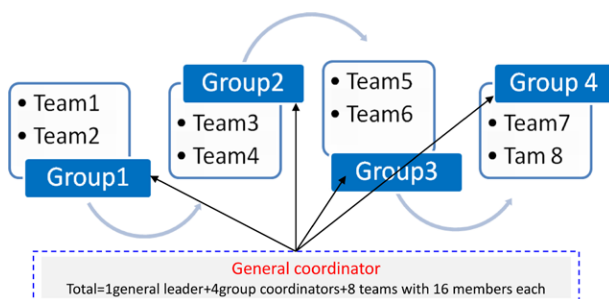
## 2.6. Study groups

**2.6.1. Intervention group.** The study participants in the intervention group engaged in an intensive lifestyle modification program for a period of 6 months through community-based engine leaders. The intervention was including behavioral changes such as healthy lifestyle adoption, teamwork, and association of metabolic syndrome with health-related quality of life.

**2.6.2. Control group.** Participants in the control group had not received any additional information rather than routine health information and mass media communication.

## 2.7. Leadership strategies during interventions

The effectiveness of the program was based on the strengthening of the leaders. This work might explore the interplay between leadership, and implementation outcomes of the healthy lifestyle education intervention. To accomplish the tasks, the intervention groups were grouped into manageable teams. For 2 groups 1 leader was assigned, a total of 4 group leaders and 1 general leader led the overall activities during the intervention period. At the end of the week, the general leader collected the activities by phone from the 4 leaders and recorded the event (Fig. 1).



**Figure 1.** A schematic representation of how the community leader leads and controls intensively the group leaders and each teams during the lifestyle educational intervention in Nekemte (n = 133), 2019.

## 2.8. Multi-setting intervention

Face-to-face education & counseling, community mobilization through community leaders, written materials, nutrition education, and the promotion of health policies to facilitate healthy lifestyles among the intervention group were strategies used in the community setting.

## 2.9. Analysis

Data were checked, cleaned, coded, and entered into Epidata 3.1 version and then it was exported to Statistical Package for Social Science (version 24) for further analysis. Conceptual analyses were conducted with a different model to evaluate the effectiveness. Using Statistical Package for Social Science version 24, the baseline difference in findings from statistics values between the 2 groups and the mean difference in implementation of healthy lifestyle educational intervention between the intervention and control groups was examined. The correlation between variables was analyzed considering team leadership as an independent variable.

## 2.10. Ethical review

The study was conducted following the Declaration of Helsinki on medical research involving Human Subjects.<sup>[43]</sup> Consecutively, the study was approved by Jimma University Health Institute on January 1, 2019. Written consent was obtained from all study participants. The risk from the intervention to the participants is anticipated to be negligible as the intervention involves only lifestyle modification and no pharmacological drugs and/or dietary food.

## 3. Results

### 3.1. Retention of participants

Figure 2 shows participant flow through the healthy lifestyle educational intervention. A total of 266 were selected and recruited at baseline. Two hundred fifty-three (95.12%) participants completed end-line assessments. Of this high dropouts were seen among the control group as compared to the intervention. A total of 133 people accepted the healthy lifestyle education and received the intervention.

### 3.2. Effectiveness of theory-based lifestyle education intervention

**3.2.1. Statistical assessment of lifestyle behavioral changes.** The healthy lifestyle education showed behavioral change after 6 months of intervention. The number of current smokers in the intervention group reduced from 3.8% to 2.3%. Similarly, current alcohol drinker withdraws by 9.4% from 11.3% and chat chewer declined from 1.5% to 0.8%. Besides the 4 major modifiable lifestyle factors, the prevalence of inadequate sleeping patterns decreased by 19.5% among the intervention group during the post-test. By using 12 food groups, a poor/healthy dietary score was calculated. Accordingly, healthy lifestyle practices because of intervention showed an increment of 25.2% among the intervention group as compared to the control group (6.5%) (Table 1).

**3.2.2. Change in anthropometric measure.** Post-intervention data indicated the anthropometric measures of central obesity and hip circumference in the intervention group showed a statistically significant decline than the control group. At 6 months after the initiation of the team-based healthy lifestyle educational intervention, the intervention group accomplished

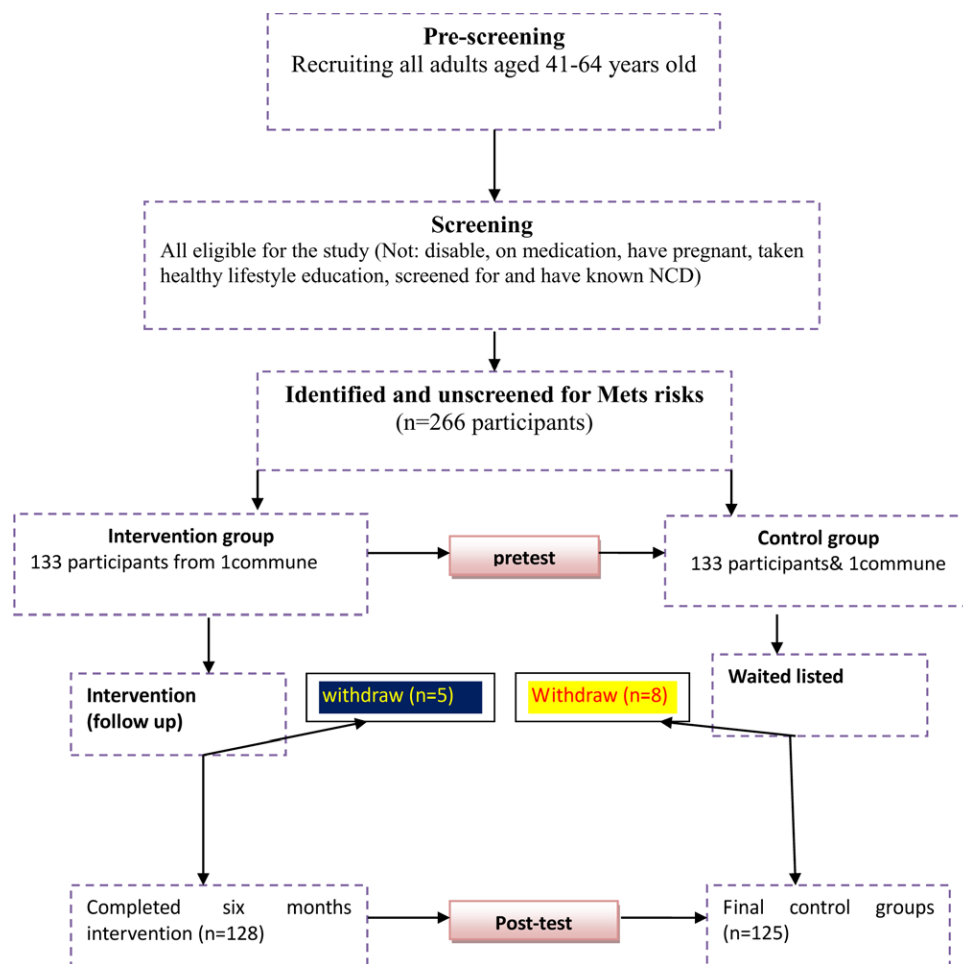


Figure 2. Shows participant flow diagram through the intervention, Nekemte, 2019.

Table 1

Behavioral change differences between groups through team leadership, Nekemte, 2019.

Variable	Categories	Intervention group (%)			Control group (%)		
		Pretest	Posttest	Difference	Baseline	Posttest	Difference
Diet	Unhealthy	127 (95.5)	90 (70.3)	-25.2	130 (97.7)	114 (91.2)	-6.5
	Healthy	6 (4.5)	38 (29.7)	25.2	3 (2.3)	11 (8.8)	6.5
Tobacco use	Current	5 (3.8)	1 (0.8)	-3	1 (0.8)	1 (0.8)	0
	Quit	12 (9)	9 (6.8)	-2.2	9 (6.8)	6 (4.8)	-2
Physical activity	Low	120 (90.2)	66 (51.6)	-38.6	122 (91.7)	103 (82.4)	-9.3
	High	8 (9.8)	62 (48.4)	38.6	11 (8.3)	22 (9.6)	1.3
Risk alcohol	Currently	15 (11.3)	11 (8.3)	-3	11 (8.3)	9 (7.2)	-1.1
	Quit	28 (21.1)	12 (9)	-12.1	12 (9)	11 (8.8)	-0.2
Khat/chat	Currently	2 (1.5)	1 (0.8)	-0.7	1 (0.8)	0	-0.8
	Quit	13 (9.8)	5 (3.8)	-6	5 (3.8)	6 (4)	0.2
Sleep	<6h/d	81 (60.9)	53 (41.4)	-19.5	119 (89.5)	102 (81.6)	-7.9
	6-9h/d	52 (39.1)	75 (58.6)	19.5	14 (10.5)	23 (18.4)	7.9

greater central obesity loss of mean and standard deviation ( $1.4 \pm -1.1$ ) than the control group. The average mean hip circumference showed a significant reduction ( $-2.26 \pm 2.43$ ) among the intervention group (Table 2).

**3.2.3. Statistical approach for assessment of interaction intervention effects.** This synchronous regression analysis showed significant interaction effects seen between time and groups. The results of this study showed that among the middle-aged in the intervention group compared with the control

group, preceding behaviors ( $P < .001$ ), self-efficacy ( $P < .001$ ), affects related behavior ( $P < .001$ ), interpersonal influences ( $P < .001$ ), perceived benefits ( $P = .001$ ), and barriers ( $P = .003$ ) and commitment to action of a plan ( $P < .001$ ) were significantly changed across time during baseline through follow-up to end line (Table 3).

**3.2.4. Effect of community-based team leadership on adults' perceptions and performance.** An effective leader should motivate and empower others to be their best. In addition

**Table 2****Differences between baseline and end line anthropometric measurement between intervention and control groups (n = 266).**

Variables	Intervention group (mean ± SD)			Control group			Difference in mean difference
	Pretest	Posttest	Difference	Pretest	Posttest	Difference	
BMI	23.06 ± 3.59	23.28 ± 2.96	0.22 ± -0.63	22.65 ± 3.76	22.72 ± 3.79	0.07 ± 0.03	0.15 ± -0.66
WC	85.59 ± 7.77	84.19 ± 6.67	-1.4 ± -1.1	85.19 ± 8.96	85.60 ± 8.92	0.41 ± -0.04	-1.81 ± -1.06
HC	93.32 ± 8.73	91.06 ± 11.16	-2.26 ± 2.43	93.66 ± 9.38	93.93 ± 9.40	0.27 ± 0.02	-2.28 ± 2.41

BMI = body mass index, SD = standard deviation.

**Table 3****Interaction of intervention with time period for each Health Promotion Model (HPM) constructs.**

HPM constructs*	Estimated parameter	SE	95% CI	P value
Preceding behaviors	0.74	0.18	0.31, 0.98	.001
Perceived self-efficacy	0.54	0.13	0.27, 0.71	.001
Affects related behavior	0.51	0.17	0.29, 0.76	.001
Perceived benefits	0.78	0.21	0.19, 0.75	.001
Perceived barriers	0.59	0.11	0.22, 0.91	.003
Commitment to action	0.62	0.12	0.30, 0.86	.001
Interpersonal influences	0.74	0.23	0.27, 0.91	.001
Situational influences	0.54	0.33	0.17, 0.47	.09
Behavior outcomes	0.56	0.13	0.37, 0.85	.001

CI = confidence interval, HPM = health promotion model, SE = standard error.

\*Adjusted for number of adults and other socio-demographic.

to the above results to assess the role of team leaders in the implementation of healthy lifestyle educational intervention; the participants were asked to think team leadership effect to adopt a healthy lifestyle. Do you perceive team leaders improve your healthy lifestyle practices (yes = score 1, or no = score 0)? Team members were asked to give their own feelings of effectiveness, extra efforts, and satisfaction on leadership outcomes measure.

Of 128 participants who completed the lifestyle educational intervention, 105 (82.03%) were satisfied with the program. In comparison among sex, males were more satisfied with healthy lifestyle educational interventions compared to females. Regarding the role of team leaders, 118 (92.19%) had a testimony for the initiation to morally complete the intervention was the effort of the team leaders. The average scaling rate of team effectiveness is 73.19% (Table 4).

#### 4. Discussion and conclusion

This study was designed to evaluate participants' adoption, retention, and effectiveness of team-based lead healthy lifestyle educational intervention given targeting middle-aged Nekemte populations. The overall findings were positive. The program

adoption rate was high amongst the intervention group. Post-intervention assessments showed improvements in most behavioral and anthropometric parameters measured. Our finding revealed that team leaders-based healthy lifestyle educational intervention could effectively increase the percentage of the overall healthy lifestyle practices of middle age. This intervention had a significant reduction in adulthood's central obesity and hip circumference, whereas no significant reduction in adults' body mass index.

In this study adoption and retention of participants were high because of the community team leader's effort. Similar to our study, group-based healthy lifestyle intervention delivered in rural and underserved communities is acceptable; improves the retention of participants and the effectiveness of the program.<sup>[22]</sup>

Regarding recommended physical activity level; self-reported physical activity increased by 38.6%, representing a very significant change compared to both baseline and the control group and clinically meaningful increase. It is important to acknowledge that these are self-reported changes, which are susceptible to social-desirability bias.<sup>[44]</sup>

The effectiveness of the educational intervention was evaluated using all constructs of Pender HPM on the adoption of a healthy lifestyle among the middle-aged Nekemte population. At 6 months of follow-up intervention, all of the positive effects of the HPM intervention were sustained particularly on self-efficacy, affects related behavior, perceived benefits, perceived barriers, and interpersonal influences. This success of the HPM intervention may be related to useful theoretical mediator constructs and intensive community leaders or it may be due to specific behavior change techniques. Similarly, Van Sluijs et al found positive effects of the HPM intervention on successful behavior changes at a 6-month follow-up.<sup>[45,46]</sup>

A correlation analysis was conducted considering team leadership as an independent variable. While dependent variables include: the effectiveness of the intervention, the effort of leaders, and the satisfaction of participants. Results reveal high correlations between team leadership and performance measures. Team leadership is significantly associated with effectiveness ( $R = 0.82, P < .01$ ), effort ( $R = 0.73, P < .01$ ), and satisfaction ( $R = 0.84, P < .01$ ). All the team leadership subscales have positive, statistically significant ( $P < .01$ ), correlations with effectiveness, leaders effort, and satisfaction.

**Table 4****The effect of team leadership on change in adult's perceptions and performance, 2019.**

Variables	Categories	Yes (%)	No (%)
Are you satisfied with theory-based lifestyle educational intervention?	Female (n = 90)	73 (81.11)	17 (18.89)
	Male (38)	32 (84.21)	6 (15.79)
Do you believe healthy lifestyle practices performed by team leadership?	Female	83 (92.22)	7 (7.78)
	Male	35 (92.11)	3 (7.89)
Does leader initiate you to complete the intervention?	Female	87 (96.67)	3 (3.33)
	Male	31 (81.58)	7 (18.42)
How effective would you rate your team? (Scale, 0–100 %?)	Below average	Medium	High
	47.53%	78.25%	93.79%

N = 128, female = 90, male = 38.

Regarding the interaction of the intervention group with the time period, significant interaction showed among the middle-aged in the intervention group compared with the control group.

In conclusion, to the extent of our knowledge, this is the first research to evaluate the effectiveness of the theory-based educational intervention on the intervention mapping approach on healthy lifestyle adoption through intensive community leaders' involvement in a community setting in west Ethiopia. This study improved healthy lifestyle adoption and reduced anthropometric measures among the intervention group compared to the control one. In addition, leading the intervention through community leaders improved the implantation of education, team leader effort, and adult satisfaction. The finding implies theory-based educational intervention through intensive community-based team leadership could have a more positive effect on the implementation of educational intervention, healthy lifestyle adoption, team performance, and satisfaction.

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### Author contributions

**Conceptualization:** Alemu Adeba, Tamiru Dessalegn, Belachew Tefera.

**Data curation:** Alemu Adeba, Tamiru Dessalegn, Belachew Tefera.

**Formal analysis:** Alemu Adeba, Tamiru Dessalegn, Belachew Tefera.

**Funding acquisition:** Alemu Adeba, Tamiru Dessalegn, Belachew Tefera.

**Investigation:** Alemu Adeba, Tamiru Dessalegn, Belachew Tefera.

**Methodology:** Alemu Adeba, Tamiru Dessalegn, Belachew Tefera.

**Project administration:** Alemu Adeba, Tamiru Dessalegn, Belachew Tefera.

**Resources:** Alemu Adeba, Tamiru Dessalegn, Belachew Tefera.

**Software:** Alemu Adeba, Tamiru Dessalegn, Belachew Tefera.

**Supervision:** Alemu Adeba, Tamiru Dessalegn, Belachew Tefera.

**Validation:** Alemu Adeba, Tamiru Dessalegn, Belachew Tefera.

**Visualization:** Alemu Adeba, Tamiru Dessalegn, Belachew Tefera.

**Writing – original draft:** Alemu Adeba, Tamiru Dessalegn, Belachew Tefera.

**Writing – review & editing:** Alemu Adeba, Tamiru Dessalegn, Belachew Tefera.

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