2528-9705

Örgütsel Davranış Araştırmaları Dergisi
Journal Of Organizational Behavior Research
Cilt / Vol.: 4, Sayı / Is.: S2, Yıl/Year: 2019, Kod/ID: 91S2543

CHANGES IN PHYSICAL ACTIVITY AND BEHAVIORAL REGULATION OF WOMEN RECEIVING A SDT-BASED MOTIVATIONAL PHYSICAL ACTIVITY INTERVENTION

Mohammadreza GHANEAPUR[1, 2], Hassan EFTEKHAR[1*], Ali MONTAZERI[3], Gholamreza GARMARUDI[1], Mahdi YASERI[4], Elahe SALEH[4], Mohamad EZATI ASAR[2]

[1] Department of Health Education and Health Promotion, School of Public Health, Tehran University of Medical Sciences, Tehran, Iran.
[2]Department of Health Education & Health Promotion, School of Public Health, Semnan University of Medical Sciences, Semnan, Iran.
[3]Population Health Research Group, Health Metrics Research Centre, Iranian Institute for Health Sciences Research, ACECR. Tehran, Iran.
[4]Department of Epidemiology and Biostatistics, School of Public Health, Tehran University of Medical Sciences, Tehran, Iran.

***Corresponding Author:**
Email: eftkhara@sina.tums.ac.ir

ABSTRACT

Background: In spite of frequent recommendations on physical activity, women's participation in physical activity is a matter of concern, highlighting the use of modern methods to increase their physical activity. In this regard, the theory of self-determination (SDT) has offered a new horizon to researchers. Method: A randomized controlled trial of a SDT based intervention in the physical activity was conducted for Iranian women, 2017 to 2018. All 114 eligible ones entered the study. Interventions: The 8-hour SDT-based intervention sessions were used for intervention group and the control group participated in a routine educational intervention. The two groups were evaluated for SDT constructs, behavioral regulation in exercise activity (BreQ-2) and physical activity (pedometer) at baseline and three months later. Results :The participants had an average age of 36.2 ± 0.46 years and a mean weight of 69.8 ± 1.2 kg, with 82.6% married, 46.7% holding academic degrees, and 23.9% employed. The rate of women's physical activity was 4524 ± 214 steps per day and their mean BMI was 27.6 ± 0.46. The results indicated significant effects of SDT-based interventions on physical activity and behavioral regulation of the participants in the intervention group. Discussion: Despite the effects of SDT-based interventions on behavioral regulation changes, the complexity, proximity, and interrelation of motivational levels and their relationships with the SDT theory constructs are all the challenges faced by health systems in replacing innovative methods rather than traditional ways to realize health behaviors.

Keywords: *Physical activity, BREQ-2, SDT, Behavioral Regulation.*

INTRODUCTION

Low mobility is growing in many countries and is now considered to be the fourth leading cause of death worldwide. Increasing prevalence of non-communicable diseases (NCDs) and growing public health problems are among the consequences of low mobility among people around the world (W.H.O, 2009; 2010; Patrick and Williams, 2012) performing physical activity can also improve the quality of life and satisfaction (Feicht et al., 2013). The current

Geliş tarihi/Recieved: 01.12.2018 – Kabul tarihi/Accepted: 02.04.2019 – Yayın tarihi/Published: 21.05.2019

inactivity results from countless factors including urbanization, inactive transport methods, and numerous environmental factors such as violence, heavy traffic, unsuitable weather, pollution, and the lack of recreational and sports facilities (W.H.O., 2013). Despite the bulk of evidence about the importance of physical activity, many adults around the world do not follow the global recommendations for participation in physical activity programs at least 150 minutes a week distributed on weekdays (W.H.O., 2018). In Iran, low mobility is also widespread among adults, with 40% of adults (31.6% of men and 48.6% of women) having the lowest levels of physical activity, and about 15% of adults do not attend specific physical activity programs (Esteghamati et al., 2011). In recent years, the global consensus has been determined at 10% by 2025 (W.H.O., 2013) and 15% by 2030 (W.H.O., 2018). Findings from recent studies suggest that women's mobility has fallen to the extent that 63% are inactive and only 22% have adequate mobility (Ghaneapur et al., 2017), and that low mobility is significantly higher in women than men (Watson et al., 2016). Despite the importance and necessity of addressing the health of women and their maternal role, women's health continues to be neglected, to the extent that it has been emphasized by global assemblies in global strategies such as "the goals of sustainable development until 2030" (Brizuela and Tunçalp, 2017).

Several methods have been used to increase physical activity, including raising awareness (Friedman and Kern, 2014), providing environmental awareness, and changing lifestyle (van Stralen et al., 2010), each of which may lead to short-term success. However, the main problem following these methods is the discontinuity of people's athletic behaviors in the long run (Kaminski, 2010; Westen and Morrison, 2001). Therefore, a better life and increased longevity from a change in lifestyle will be achieved only in the event of facilitating and developing practical interventions with long-term effects (Patrick and Williams, 2012). The results of numerous research on physical activity (PA) demonstrate that when individuals are self-dependently encouraged to do exercise, they will be more likely to do this activity. Motivations may be intrinsic or extrinsic, of which the latter (especially physical) is the dominant motive in the early stages of adaptation to sports activity, but intrinsic motivations (especially pleasure gain) are important for the development and preservation of real behaviors (Ingledew, Markland and Medley, 1998). A number of studies have emphasized the superiority of motivational interventions on traditional approaches in behavior change (Burke, Arkowitz and Menchola, 2003).

Self-determination theory

A variety of models and methods have been proposed for changing and modifying human behavior. Of these, the Self-Determination Theory (SDT), introduced in the 70s is the only theory that is based on one's essential psychological needs, including communication autonomy, and competence (Deci and Ryan, 2002). SDT researches define motivation as a psychological energy that directs a person toward a specific goal. The majority of human behavior theories accounts for behavior guiding, but fail to justify how behaviors gain energy (Deci and Ryan, 1985). This theory focuses in particular the importance of individual autonomy, evaluation methods, and the role of intrinsic motivation plan on the behaviors of individuals. It believes that individuals are inclined, motivated, and are interested in success based on their tendency to learning and activity, considers "intrinsic motivation" as the highest level of motivation, and claims that one's intentional behavior should be of interest and

attractive to the individual. When society supports one's autonomy and independency, people are motivated to "internalize" their important activities (Deci and Ryan, 2002). The process of increasing autonomy and competence is called "internalization" (Williams et al., 2006). Accordingly, achieving the highest level of motivation depends on the satiation of these three psychological needs, including sense of competence, independence, and dependence on others (Muller and Khoo, 2014). Exercise is one of the most important activities that can lead to the permanent physiological and psychological outcomes in the event of "internalization". The internalization of physical activity will have positive consequences on the individual's efforts and encourages independent performance and persistency in the future (Kaminski, 2010). Several studies conducted on SDT and its measurement tools and various domains argue that SDT can be considered to predict such behaviors as fitness and one's tendency to PA and exercise in the future (Carron, Hausenblas and Estabrooks, 2003).

In SDT literature, several methods and tools have been developed to measure PA motivation and its changes, including Sport Motivational Scale (SMS) (Pelletier et al., 1995) that measures three types of intrinsic motivation, the 31-item Exercise Motivation Scale (EMS) (Li, 1999), Behavioral Regulation in Sport Questionnaire (BRSQ) (Lonsdale, Hodge and Rose, 2008) consist of intrinsic motivation, extrinsic motivation, and Amotivation, Behavioral Regulation in Exercise Questionnaire (BREQ) (Mullan, Markland and Ingledew, 1997) that has been used extensively in exercise and sport psychology and is consistent with SDT to measure external, introjected, identified, and intrinsic regulation, and BREQ-2 (Markland and Tobin, 2004) that includes a subscale of the "Amotivation" in the new version and in numerous countries, including Iran (Farmanbar et al., 2011) all of which have been tested for reliability and validity. In spite of the valuable records on SDT-based motivational interventions, comprehensive and adequate information on how to motivate a person to eliminate many health risks in many regions, including Iran, are not available or have reported limited results (Adams, 2009) and there are no comprehensive evidence and documentations in health-related areas (Navidian et al., 2010). Therefore, the present study aimed to investigate the effects of SDT-based motivational interventions on physical activity and behavioral regulation of women in exercise.

METHODS

The complete protocol of current SDT-based study and its dependent strategies for behavior change is detailed elsewhere (un published), and a synopsis is only presented in here.

Study design

The current study is a randomized controlled trial parallel design approved by the ethics committee of vice-chancellor of technology research in the Tehran University of Medical Sciences (Code of ethics: IR.TUMS.REC.1394.1020) and its protocol was approved by the Iranian Registry of Clinical Trials (IRCT2016020223072N1).

Setting/Participants

A comprehensive health services center in the northern regions of Iran was the unit of randomization. Women were invited to participate in this project by sending letters and phone calls. They were enrolled and provided with information about the investigation, including details of the intervention, controlling conditions, and the chance of being in each of the

intervention and control groups, followed by eligibility assessment. The eligibility criteria included women aged 30-45 years, BMI ≤ 35, non-pregnant, no history of regular physical activity, and no medical ban on walking and exercise. All participants could leave the study at any time. The number of sample size needed is 86, but considering the possible loss during the study, we have made 1.33 times the number of samples (n=114), entered the study.(Participants' flow in the study is shown in Figure 1).

Study interventions

All participants received educational materials and related equipment (pedometer, brochures, and instructions on how to use and protect from pedometer, and training exercise instructions in accordance with the Iran's Ministry of Health). Since the basis of activity in the intervention group was an SDT-based motivational intervention, participants in this group attended SDT-based PA sessions for 8 hours and had access to the related texts and messages. The principles and concepts of motivational interviews including evaluating individual perceptions in particular through reflective listening, announcing acceptance and approval, extracting and selecting self-motivating phrases from the literature about one's problems and concerns, people's goals

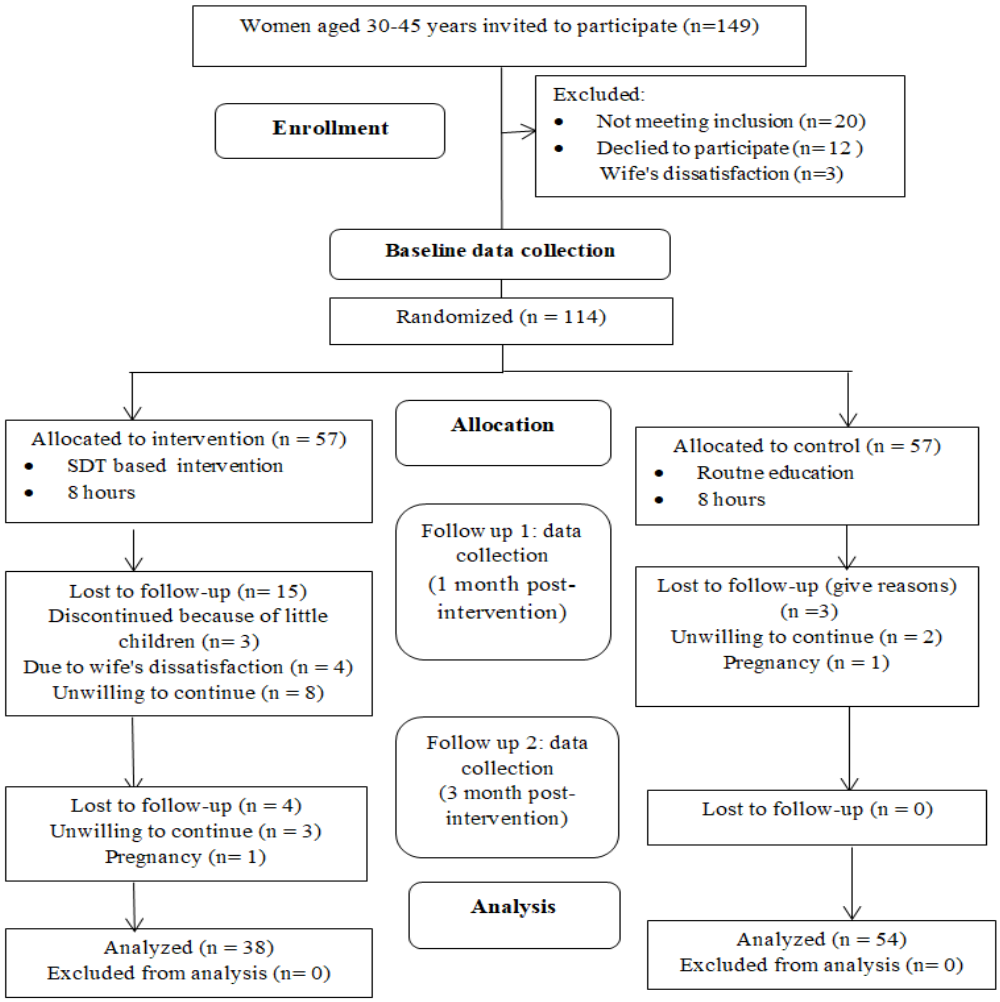

Figure1. Participants' flow in the study

for change and changeability, monitoring the level of readiness for change, and ensuring progress before reaching a strength not leading to resistance, emphasizing one's selection of freedom have always been considered and used in the sessions (Rollnick and Miller, 1995). Participants in the control group also participated in a routine PA training session for 8 hours and had access to the educational content similar to that of the other group. Levels of PA and behavioral regulation on exercise in the two groups as the main point of study, as well as mean scores and components studied between the intervention and control groups will be reviewed and compared at the time of admission and 3 months after the intervention.

Instruments

Measuring physical activity

The findings of the present research on the effects of PA on various health-related aspects of individuals have emphasized the accurate measurement of PA (Kohl, Fulton and Caspersen, 2000). However, PA measurements in most cases have been examined as person-based and self-reported in other studies (Silva et al., 2010; Duda et al., 2014; DeLong, 2006; Khazaee-pool et al., 2015), which with respectable and valuable results; raise the probability of some degrees of error. To solve this defect, this research employed a relatively inexpensive and simple pedometer equipped with mechanical and electronic sensors to calculate the number of footsteps. The accuracy and quality of pedometers can have a considerable impact on the number of measured footsteps. It is, therefore, very important for pedometers to record accurate and actual results (Schneider et al., 2003). Precision, validity, and reliability of pedometers, HJ series of Omron pedometers (151 or 720 ITC) have been proven for physical activity measurements (Holbrook, Barreira and Kang, 2009), some types of which can save relevant data for 42 days. Even though, due to the impossibility of preparation and the need to measure the participants' physical activity during 7 days, the Style Pro 2.0 (HJ-322U-E) Omron pedometer was used, which is similar in all the mechanical and technical characteristics (except that it has a 22-day memory).

Measuring behavioral regulation in exercise

In addition to questionnaires for measuring biographical and background data, all the participants in the intervention and control groups were asked to complete an adjusted Behavioral Regulation in Exercise Questionnaire-2 (BREQ-2) (Markland and Tobin, 2004), a 19-item questionnaire to measure five subscales of physical activity motivations include: Amotivation, External Regulation, Introjected Regulation, Identified Regulation, and Intrinsic Regulation. The reliability of the Iranian version of BREQ-2 was determined by calculating the internal consistency (Cronbach-'s alpha and a reliability coefficient of 0.70) and test-retest stability (Farmanbar et al., 2011).

Randomization

After the initial enrollment of participants, they were assessed based on the inclusion and exclusion criteria. Because of the same settings, it was difficult to collect data in the blinded way and to allocate the participants completely. All the women were asked to complete the informed consent form for the trial and post-intervention evaluation. They were allocated to SDT based and control groups via permuted block randomized design (computer generated allocation) by an independent member of the RCT collaboration, who was blind to the subjects' identities.

Rationale

One of the strengths of this study is the specific gender group (women), who accounts for half of the human societies and the context of the community under study. Since such an approach has been neglected in various studies, the present research can mitigate the burden of various diseases rooted in such risk factors as inactivity and obesity through dealing with high-risk groups. Factors such as the industrialization, epidemiological transition of diseases, and changes in the status of women in the family and their employment call for increasing attention to this demographic group. By addressing women in the context of sustainable development goals (SDGs), Millennium Development Goals (MDGs), justice in the health system and universal health coverage (UHC), the present study provides policy makers and health system managers with good evidence for planning and interventions to reduce the burden of non-communicable diseases (Assembly, 2015; Vandemoortele, 2002; Yates, 2010). Studies in developing countries have shown that the health of mothers should be of particular concern to maintain the health of family members, and that increased maternal health improves the health of other family members. Accordingly, paying attention to this demographic group can reduce costs and promote the effectiveness of the health system (Goodwin, Garrett and Galal, 2005).

Data analysis

Descriptive and analytic data analysis was done by SPSS 22 software. Data were examined for normality, and homogeneity of the intervention and control groups in terms of quantitative demographic data was evaluated with Mann-Whitney test or independent t-test. Also, the homogeneity of the intervention and control groups in terms of qualitative basic information was verified using Chi-square or Fisher's exact tests. The participants' behavioral regulation data for physical activities of the intervention and control groups were collected by BREQ-2 questionnaire (before and three months after the intervention). Each group was compared before and after the intervention using paired t-test. For post-intervention comparisons, the preconditions of covariance analysis were first examined to eliminate the confounding effect of pre-intervention values. After confirming the preconditions, the covariance analysis was used except for two dimensions of external regulation and Amotivation. For these two dimensions, the classification method was used because of the repetition of zero scores before the intervention. Then, the two groups were evaluated for the values of these two components after the intervention, once in zero class and then in initial values above zero class. The two groups in each layer were compared with independent t-test or Mann-Whitney test. The Pearson correlation test was used to measure the relationship between physical activity and BREQ-2 components.

FINDINGS

In the current randomized trial, although the sample size was 86 people (43 subjects per group), all 114 eligible participants from the 149 registered primary subjects were included considering likely drop of samples. Data of only 92 participating subjects were analyzed at the end of research. Table 1 summarizes the characteristics of 92 women aged 30-45 years covered by one of the selected health centers in Damghan, Semnan province, Iran. Mean age and weight of women were 36.4 (± 0.45) years and 69.8 kg (± 1.2), with 82.6% married

women each of which had an average of 1.8 children. Academic degrees were recorded in 46.7% of the participants, and employed women comprised only 23.9% of the subjects. Women's average physical activity rate was 4524 (± 211) steps per day. A mean BMI of 27.6 (± 0.46) was detected among the participants. The intervention and control groups were not significantly different in terms of demographic, background, and physical activity characteristics ($p > 0.05$).

Table 1: Baseline characteristics

Variables	Intervention	Control	P-value
Age	36.25 ± 0.7	36.54 ± 0.6	.708
Steps/Day	4601 ± 376	4466 ± 240	.949
Distance traveled per day	2998 ± 288	2803 ± 174	.933
The number of aerobic steps per day	1449 ± 363	738 ± 152	.481
Weight	70.44 ± 1.91	69.4 ± 1.61	.666
BMI	28.02 ± 0.73	27.24 ± 0.6	.403
Married	92	83	.345
With more than two children	63.5	66.7	.751
University education	52	44	.490
Employed	29	24	.317

Data are given as means ± SD or %.

Based on the current randomized trial, SDT-based interventions led to statistically significant effects ($p \leq 0.001$) on all motivational levels and physical activity regulation of participants in the intervention group, except for Amotivation. The control group was also significantly influenced by routine educational interventions in all motivational levels and regulation of participants' physical behavior ($p \leq 0.001$). The results of intergroup comparisons revealed that the two groups were not significant different in all areas of behavioral regulation for physical activity (Table 2).

Table 2. Inter-group and intra-group comparisons of control and intervention subjects based on BREQ-2

BREQ-2	Intervention		Control		P_VALUE (Between)
	Baseline means ± SD	3 months later means ± SD	Baseline means ± SD	3 months later means ± SD	
AMO[1]	2.17(0.63)	1.64(0.52)	1.47(0.35)	1.51(0.36)	0.319 Above zero
	0.138		<0.001		0.296 Zero
ER[2]	2.08(0.64)	1.25(0.49)	1.54(0.32)	1.68(0.37)	0.33 Above zero
	0.001		<0.001		0.570 Zero
INJR[3]	7.59(0.74)	8.37(0.75)	8.08(0.60)	9.23(0.62)	0.231

	0.001		<0.001		
IDR[4]	3.611(0.48)	3.89(0.45)	3.19(0.4)	4.31(0.46)	0.259
	0.001		<0.001		
IR[5]	9.32(0.85)	9.86(0.66)	8.69(0.66)	9.52(0.66)	0.939
	<0.001		<0.001		

1. Amotivation, 2.External regulation, 3.Introjected regulation, 4. Identified regulation, 5. Intrinsic regulation

In this study, the correlation between each of behavioral motivational components determined by BREQ-2 was evaluated in the intervention group by Pearson correlation test. As shown in Table 3, significant and direct relationships ($p \leq 0.01$) were found between Amotivation and the other two behavioral regulation components, viz. ER ($r = 0.693$) and INJR ($r = 0.738$). There were also significant and direct relationships ($p \leq 0.01$) between ER and INJR ($r = 0.593$), intrinsic regulation and IR ($r = 0.543$) ($p \leq 0.01$), and introjected regulation and IDR ($r = 0.346$) ($p \leq 0.05$).

Table 3. Pearson correlation coefficients between BREQ-2 components in intervention group

BREQ-2	Amo	ER	INJR	IDR	IR
AMO[1]	1	.693**	.738**	.039	-.012
ER[2]		1	.593**	-.047	-.248
INJR[3]			1	.346*	.262
IDR[4]				1	.543**
IR[5]					1

**. Correlation is significant at 0.01 level (2-tailed).
*. Correlation is significant at 0.05 level (2-tailed).

1. Amotivation, 2.External regulation, 3.Introjected regulation, 4. Identified regulation, 5. Intrinsic regulation

The results of correlation analysis between motivational components of behavior adjustment in the control group by Pearson correlation test (Table 4) revealed a significant and direct relationship ($p \leq 0.01$) between amotivation and ER ($r = 0.476$). There were also significant and direct relationships ($p \leq 0.01$) between INJR and the other two behavioral regulation components, viz. IDR ($r = 0.447$) and IR ($r = 0.526$), as well as between IR and identified regulation ($r = 0.346$) ($p \leq 0.05$).

Table 4. Pearson correlation coefficient between BREQ-2 components in control group

	AMO	ER	INJR	IDR	IR
AMO[1]	1	.476**	-.088	-.044	.147
ER[2]		1	.113	-.127	.102
INJR[3]			1	.447**	.526**
IDR[4]				1	.713**
IR[5]					1

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

1. Amotivation, 2.External regulation, 3.Introjected regulation, 4. Identified regulation, 5. Intrinsic regulation

DISCUSSION AND CONCLUSION

This study aimed to investigate the effects of SDT-based interventions on physical activity and behavioral regulation of the participants in the study. The findings of the present study are largely consistent with those of Hassel et al. concerning the motivation for physical activity. They reported significant correlations between all five levels of motivation and physical activity ($P < 0.5$) and a relative relationship between amotivation and physical activity intensity, which poorly supported the hypothesis that individuals motivated extrinsicly participate in physical activities more than others (Hassel, Milroy and Orsini, 2015). The present findings on the impacts of SDT interventions on physical activity support all motivational levels and behavioral regulation ($p \leq 0.001$) of the participants, except for Amotivation, which emphasizes the findings of Delong et al. (2006) in this respect (Table 2); however, indicated no significant differences in all areas of behavioral regulation of physical activity between the intervention and control groups. Although a large sample size was used in the study of Hassel et al., the differences can be explained by the age range of participants in their study (early-year university students), which leads to multiple personal and social components such as age, marriage, employment, pregnancy period, the number of children, an so on. Other explanations could be their study method (experimental approach), no use of a control group, and lacking examples generalizable to the community.

In a randomized trial by Silva et al. (2010), a significant difference in physical activity after SDT-based interventions was emphasized in the intervention group in comparison with control subjects. As presented in Table 2, despite significant differences of the results in the intervention group (at the study onset and 3 months later), the two groups were not significantly different. This difference between the two studies may be partially justified by the long duration of intervention, provision of a supportive environment, and some other factors in the mentioned study. Silva et al. reported a significant difference in BMI between the case and control groups, which was not statistically significant in the present study. Unlike the research hypothesis, SDT-based intervention had no significant impacts on various anthropometric items. The results of this study are in line with those of Adam et al. (2009), but contradicted the studies by Duda (2014), Silva (2010) and Kaminski (2010).

Motivational and SDT-based interventions can result in behavioral regulation changes and consequently alterations in health-related behaviors, such as physical activity, weight loss, BMI, and the associated problems. Even so, the complexity, proximity, and interrelation of motivational levels and their relationships with the SDT theory constructs, as well as the need to create supportive environments, are all the challenges faced by health systems in replacing innovative and motivational methods rather than traditional ways to realize and achieve sustainable health behaviors. In addition to studies of this type, qualitative exploratory studies are also needed to examine more precisely the causes and factors of inactivity and reasons for lack of motivation to participate in programs for increasing physical activity.

Limitations

Because of the similar settings, it was not possible to completely collect data in the blinded way. Also, the employment status of some women, having minor children at home, a limited number of pedometers, and insufficient incentives were some limitations of the present study. Despite the accuracy applied in this study, the administrative space of the health centers made it impossible to create a desirable supportive environment.

The present article is part of findings obtained in a research project funded by the Vice-Chancellor of Research at Tehran University of Medical Sciences, Iran.

References

Adams, M.A., A pedometer-based intervention to increase physical activity: Applying frequent, adaptive goals and a percentile schedule of reinforcement. 2009.

Assembly, G., sustainable Development goals. SDGs), Transforming our world: the, 2015. 2030.

Brizuela, V. and Ö. Tunçalp, Global initiatives in maternal and newborn health. Obstetric Medicine, 2017. 10(1): p. 21-25.

Burke, B.L., H. Arkowitz, and M. Menchola, The efficacy of motivational interviewing: a meta-analysis of controlled clinical trials. Journal of consulting and clinical psychology, 2003. 71(5): p. 843.

Carron, A.V., H.A. Hausenblas, and P.A. Estabrooks, The psychology of physical activity. Vol. 1. 2003: McGraw-Hill Companies.

Deci, E.L. and R.M. Ryan, Cognitive evaluation theory, in Intrinsic motivation and self-determination in human behavior. 1985, Springer. p. 43-85.

Deci, E.L. and R.M. Ryan, Overview of self-determination theory: An organismic dialectical perspective. Handbook of self-determination research, 2002: p. 3-33.

DeLong, L.L., College Students'motivation For Physical Activity. 2006, University of Louisiana.

Duda, J.L., et al., Effects of a standard provision versus an autonomy supportive exercise referral programme on physical activity, quality of life and well-being indicators: a cluster randomised controlled trial. Int J Behav Nutr Phys Act, 2014. 11: p. 10.

Esteghamati, A., et al., Physical activity in Iran: results of the third national surveillance of risk factors of non-communicable diseases (SuRFNCD-2007). Journal of Physical Activity and Health, 2011. 8(1): p. 27-35.

Farmanbar, R., et al., Psychometric Properties of the Iranian Version of the Behavioral Regulation in Exercise Questionnaire-2 (BREQ-2). Health promotion perspectives, 2011. 1(2): p. 95-104.

Feicht, T., et al., Evaluation of a seven-week web-based happiness training to improve psychological well-being, reduce stress, and enhance mindfulness and flourishing: a randomized controlled occupational health study. Evid Based Complement Alternat Med, 2013. 2013: p. 676953.

Friedman, H.S. and M.L. Kern, Personality, well-being, and health. Annual review of psychology, 2014. 65: p. 719-742.

Ghaneapur MR, M.A., Garmaroudi Gh, Yasseri M, Eftkhar H, Rezayi Ahvanuyi A, Impaired mobility, quality of life and happiness among Iranian women. The Journal of Reproduction & Infertility, 2017. 18(2): p. 52-53.

Goodwin, P.Y., D.A. Garrett, and O. Galal, Women and family health: The role of mothers in promoting family and child health. International Journal of Global Health and Health Disparities, 2005. 4(1): p. 30-42.

Hassel, G., J.J. Milroy, and M.M. Orsini, Investigating motivation for physical activity among minority college females using the BREQ-2. Journal of Student Research, 2015. 4(1): p. 40-44.

Holbrook, E.A., T.V. Barreira, and M. Kang, Validity and reliability of Omron pedometers for prescribed and self-paced walking. Medicine & Science in Sports & Exercise, 2009. 41(3): p. 670-674.

Ingledew, D.K., D. Markland, and A.R. Medley, Exercise Motives and Stages of Change. Journal of Health Psychology, 1998. 3(4): p. 477-489.

Kaminski, K., A Self determination theory based exercise intervention in a group of adult exercisers: a contextual evaluation. 2010.

Khazaee-pool, M., et al., Effects of physical exercise programme on happiness among older people. Journal of Psychiatric and Mental Health Nursing, 2015. 22(1): p. 47-57.

Kohl III, H.W., J.E. Fulton, and C.J. Caspersen, Assessment of physical activity among children and adolescents: a review and synthesis. Preventive medicine, 2000. 31(2): p. S54-S76.

Li, F., The exercise motivation scale: Its multifaceted structure and construct validity. Journal of applied sport psychology, 1999. 11(1): p. 97-115.

Lonsdale, C., K. Hodge, and E.A. Rose, The Behavioral Regulation in Sport Questionnaire (BRSQ): Instrument development and initial validity evidence. Journal of Sport and Exercise Psychology, 2008. 30(3): p. 323-355.

Markland, D. and V. Tobin, A modification to the behavioural regulation in exercise questionnaire to include an assessment of amotivation. Journal of Sport and Exercise Psychology, 2004. 26(2): p. 191-196.

Mullan, E., D. Markland, and D.K. Ingledew, A graded conceptualisation of self-determination in the regulation of exercise behaviour: Development of a measure using confirmatory factor analytic procedures. Personality and individual differences, 1997. 23(5): p. 745-752.

Muller, A.M. and S. Khoo, Non-face-to-face physical activity interventions in older adults: a systematic review. Int J Behav Nutr Phys Act, 2014. 11(1): p. 35.

Navidian, A., et al., Effect of motivational interviewing on blood pressure of referents suffering from hypertension. Trauma Monthly, 2010. 2010(2, Summer): p. 115-121.

Organization, W.H., Global action plan on physical activity 2018–2030: more active people for a healthier world. 2018.

Organization, W.H., Global health risks: mortality and burden of disease attributable to selected major risks. 2009: World Health Organization.

Organization, W.H., Global recommendations on physical activity for health. 2010.

Organization, W.H., WHO. Global Action Plan for the Prevention and Control of NCDs 2013-2020 [Internet]. WHA66. Geneva: World Health Organization; 2013 [cited 2014 Jan 27]. 55 p. 2013.

Patrick, H. and G.C. Williams, Self-determination theory: its application to health behavior and complementarity with motivational interviewing. International Journal of behavioral nutrition and physical Activity, 2012. 9(1): p. 18.

Pelletier, L.G., et al., Toward a new measure of intrinsic motivation, extrinsic motivation, and amotivation in sports: The Sport Motivation Scale (SMS). Journal of sport and Exercise Psychology, 1995. 17(1): p. 35-53.

Rollnick, S. and W.R. Miller, What is motivational interviewing? Behavioural and cognitive psychotherapy, 1995. 23(04): p. 325-334.

Schneider, P.L., et al., Accuracy and reliability of 10 pedometers for measuring steps over a 400-m walk. Medicine and science in sports and exercise, 2003. 35(10): p. 1779-1784.

Silva, M.N., et al., Using self-determination theory to promote physical activity and weight control: a randomized controlled trial in women. Journal of behavioral medicine, 2010. 33(2): p. 110-122.

van Stralen, M.M., et al., Exploring the efficacy and moderators of two computer-tailored physical activity interventions for older adults: a randomized controlled trial. Annals of Behavioral Medicine, 2010. 39(2): p. 139-150.

Vandemoortele, J., Are the MDGs feasible? Targeting Development: Critical Perspectives on the Millennium Development Goals and International Development Targets. London: Routledge, 2002.

Watson, K.B., et al., Physical Inactivity Among Adults Aged 50 Years and Older - United States, 2014. MMWR Morb Mortal Wkly Rep, 2016. 65(36): p. 954-8.

Westen, D. and K. Morrison, A multidimensional meta-analysis of treatments for depression, panic, and generalized anxiety disorder: an empirical examination of the status of empirically supported therapies. Journal of consulting and clinical psychology, 2001. 69(6): p. 875.

Williams, G.C., et al., A self-determination multiple risk intervention trial to improve smokers' health. Journal of General Internal Medicine, 2006. 21(12): p. 1288-1294.

Yates, R., Women and children first: an appropriate first step towards universal coverage. Bulletin of the World Health Organization, 2010. 88: p. 474-475.