

The Effects of Extended Parallel Process Model on Obese Soldiers' Knowledge, Attitudes, and Practices about Obesity Management: A Randomized Controlled Clinical Trial

Abstract

Background: There are standard guidelines for obesity management, although only few obese people can adhere to these guidelines. This study aimed to assess the effects of Extended Parallel Process Model (EPPM) on obese soldiers' knowledge, attitudes, and practices (KAPs) about obesity management. **Materials and Methods:** This randomized controlled clinical trial was conducted in Yazd, Iran (2016). Two military centers were chosen through simple random sampling. They were randomly assigned to the experimental or the control group. Then, individuals were randomly selected and either received or did not receive high-risk and efficacy information about obesity. The KAPs of soldiers were measured by researcher made questionnaires before, immediately after, and 1 month after training. **Results:** Independent *t* test showed significant differences in perceived severity susceptibility response efficacy self-efficacy knowledge and practices between two groups immediately after training ($p < 0.001$). **Conclusions:** It seems that obesity management training according to EPPM is effective to the improvement of soldiers' KAP during military services.

Keywords: Health education, Iran, military personnel, obesity management

Introduction

The prevalence of obesity has been neglected in the globalization criteria around the world.^[1] According to the World Health Organization, the prevalence of obesity and overweight is 39% and 13% in adults, respectively.^[2] The number of obese individuals is still rising and is projected to reach 537 million people by 2030.^[3] Based on a study from Iran, a considerable number of Iranian young men have obesity (23.2%) and overweight (9.5%) at the onset of their military training.^[4]

Different diseases, such as diabetes, hypertension, coronary heart disease, stroke, and false self-esteem, are caused by obesity and overweight.^[5] Accordingly, there are standard guidelines for obesity management,^[6] although only few obese people can adhere to these guidelines.^[7] Today, different training models are employed to detect and reinforce effective factors of behavior. One of these models is the extended parallel process model (EPPM), which has attracted

a great deal of attention as the theoretical framework for public health promotion.^[8]

According to EPPM, if people assume that they are strongly exposed to a disease (access to threat appraisal), the efficacy appraisal of coping strategies will change their attitudes and behaviors.^[9,10] Previous studies have used EPPM to survey whether fear-appeal messages are successful in changing people's attitudes and behaviors about different phenomena, such as physical activity,^[11] prevention of smoking,^[12] and prevention of melanoma.^[13] In this regard, a study applied EPPM to appraise women's attitudes toward vaginal birth.^[14] The results were consistent with the predictions of EPPM. Therefore, a training intervention according to EPPM may be effective in the management of obesity and overweight.

We could not find any studies in the literature, assessing the effects of EPPM on obesity management. A knowledge, attitude, practice (KAP) study from Iran showed that soldiers did not have an ideal KAP toward obesity management.^[15] Therefore,

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we designed the present study to investigate the effects of EPPM on soldiers' KAP about overweight and obesity management.

Materials and Methods

This study was a randomized controlled clinical trial with pretest and repeated posttest designs. The study was registered in the Iranian Registry of Clinical Trials (ID: IRCT2015120417468N2). A single-blind technique was used and first research assistant that was responsible for data collection had not been aware of the group allocation (conducted by researcher). Also, all sessions were held by second research assistant.

Study population consists of soldiers who were recruited to two military centers of Yazd, Iran, from February 20 to April 19, 2016. The inclusion criteria were as follows: (1) desiring to participate in the study; (2) not participating in the training programs for obesity; (3) being overweight (BMI 25–29.9) or obese (BMI 30–39.9); (4) the ability to speak and communicate; (5) having a minimum level of literacy (to be able to read and write); and (6) lack of history of metabolic disease related to obesity. Absence in training sessions (absence more than one session) and not completing the research tools were considered as exclusion criteria.

Sample size was (at least 39) calculated with confidence level of 95%, a power of 80%, and according to one previous study ($\mu_1 = 13.91$, $\mu_2 = 13.43$, $S_1 = 2.21$, and $S_2 = 3.42$)^[16] using the comparison of two mean formulas. However, we got 47 soldiers for each group to compensate the possible attrition.

Two of four military centers in Yazd, Iran, were selected by simple random sampling method (using lottery) and randomly allocated to the experimental or the control group. Then, 1,710 soldiers were assessed for eligibility according to inclusion and exclusion criteria, and 47 soldiers were enrolled in each group through simple random sampling method (using random numbers). In both groups, any individual was not excluded during the course of follow-up. So, final analysis was done for 94 individuals in each group [Figure 1].

The demographic questionnaire was designed with seven items on variables such as age, height, weight, body mass index (BMI), education level, habitat, marriage status. The knowledge questionnaire was used to measure the soldiers' knowledge about nutrition, dietary habits, physical activity, causes and consequences of obesity. This questionnaire consisted of 112 phrases (true and false) for example "Consumption of fish twice a week is recommended in a healthy diet." The scores 12 and 0 represent the highest and lowest levels of knowledge, respectively.

To measure perceived threat, risk perception and efficacy beliefs related to obesity, we designed a questionnaire based on Witt's EPPM scale.^[10] This questionnaire was designed in four subscales as follow: perceived severity with five phrases (e.g., "Even a bit of obesity can be dangerous"), perceived susceptibility with three phrases (e.g., "I am concern about obesity consequence in future"), perceived response efficacy with four phrases (e.g., "Using methods of weight loss in stance physical activity and diet, increased my confidence"), perceived self-efficacy with four phrases (e.g., "I am able to control my weight in

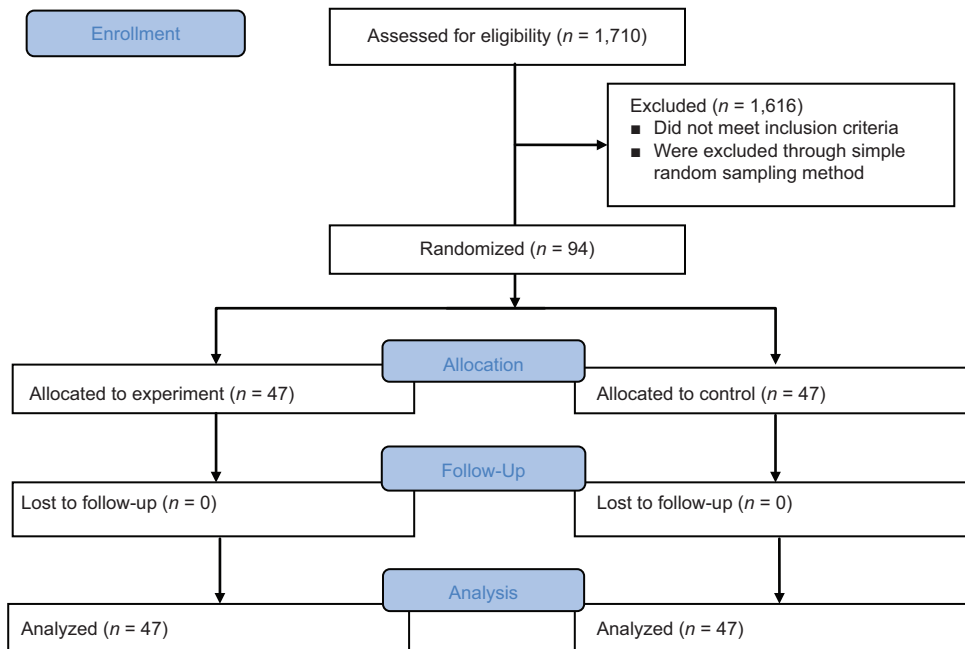


Figure 1: The process of the study

any condition"). Each phrase of this questionnaire was measured by Likert scale having five descriptors of strongly agrees (4 points) to strongly disagree (0). The scores 20 and 0 represent the highest and lowest levels of perceived severity. The scores 12 and 0 represent the highest and lowest levels of perceived susceptibility. The scores 16 and 0 represent the highest and lowest levels of perceived response and self-efficacy.

Practice questionnaire was used to measure the practice of soldiers regarding to physical activity, monitoring obesity, and dietary habits. This questionnaire consisted of eight items (e.g., "I try to eat less food in any meal"). The scores 12 and 0 represent the highest and lowest levels of knowledge, respectively. Each statement of this questionnaire was measured by Likert scale having five descriptors of always (4 points) to never (0). The scores 40 and 0 represent the highest and lowest levels of practice, respectively.

To investigate the content validity, 10 experts reviewed and judged the appropriateness of items by content validity index (CVI).^[17] At this step, CVI of each item was excellent (at least 0.90). In the next stage, 10 obese soldiers of two military centers reviewed items in terms of clarity and difficulty levels. To assess structural validity of questionnaires by using exploratory factor analysis method, 100 soldiers were recruited. Items were included on the final version of the questionnaires if they had to load significantly (greater than 0.30) on a given factor and lower than 0.30 on the other factor. We used Cronbach's alpha, Kuder-Richardson 20 and test-retest methods to survey the reliability of questionnaires.^[18] For this purpose, a pilot study was conducted on 100 soldiers with overweight and obesity. Estimated Cronbach's alpha coefficients for perceived severity, susceptibility, response efficacy, and self-efficacy subscales were 0.86, 0.70, 0.70, and 0.71, respectively. Also this value for practice questionnaire was 0.64. Kuder-Richardson 20 coefficient for knowledge questionnaire was 0.58. Estimated intraclass correlation coefficient for perceived severity, susceptibility, response efficacy, and self-efficacy subscales were 0.55, 0.32, 0.32, and 0.32, respectively. Also this value was 0.10 and 0.15 for knowledge and practice questionnaires, respectively. Therefore, these questionnaires had adequate to good internal consistency. As well as, correlation coefficients for perceived severity, susceptibility, response efficacy, and self-efficacy subscales were 0.81, 0.89, 0.87, and 0.92, respectively ($p < 0.001$). These values for knowledge and practice questionnaires were 0.85 and 0.70, respectively ($p < 0.05$).

At the first, BMI was calculated as weight (kg) divided by height (m^2). Weight was measured to the nearest 0.1 kg using a digital scale with a minimum of clothing (Seca model 708; Seca Mess und Wiegetechnik, Vogel and Halke GmbH and Co, Hamburg, Germany). Height

was measured without shoes or boots to the nearest mm with a stadiometer (Seca model 213; Seca Mess und Wiegetechnik, Vogel and Halke GmbH and Co, Hamburg, Germany) without shoes or boots. Then, questionnaires were completed before the training by individuals in both groups.

In this study, a training program, designed based on EPPM, was implemented in a military center (experimental group). The subjects received high-risk and efficacy information about obesity. For this purpose, two posters containing high-risk information about obesity and consequences of obesity were hung on the walls of soldiers' dormitory and health department of the military center. Also, four lectures, discussion, and question-and-answer sessions (60 min each) were held by the second research assistant in the training classes at the military center.

The topics discussed in the educational sessions were as follows: first session, discussions about the definition and assessment of obesity; second session, understanding the causes and consequences of obesity; third session, understanding the importance of physical activity and correction of dietary habits in obesity management; and fourth session, practices for the development of dietary and physical activity programs. At the end of each session, researcher-made brochures and booklets related to the discussed topics were distributed among participants. In control group, individuals did not receive any kind of specific training. Also, the posters containing high-risk information about obesity were not hung on the walls of the military center. Finally, the questionnaires were completed immediately after, and 1 month after training by participants. Subsequently, to know about the ethical considerations, the brochures and booklets were distributed among soldiers in control group, too. Data were collected by first research assistant in three phases.

Quantitative variables were shown as mean and standard deviation of mean. Qualitative variables were represented as number of frequency and their percent. We used Chi-square, Fisher's exact, and independent samples *t* tests to assess homogeneity of the demographic and baseline characteristics of the two groups. Independent *t*-test was used for comparison the average of KAP of the soldiers before, immediately after, and 1 month after training between groups. The comparison of these variables within the groups across three phases of study was analyzed through repeated measures analysis of variance test. To do statistical analysis, SPSS software (version 18.0, SPSS Inc., Chicago, IL, USA) was used. $p < 0.05$ was considered significant.

Ethical considerations

The study was approved by the Ethics Committee of the Islamic Republic of Iran Army (AJA) University of Medical Sciences (ethics ID: IR. AJAUMS.REC.1394.47)

and followed ethical considerations of declaration of Helsinki.^[16] A letter was provided to chief of military centers and individuals were informed on the purpose of the study. Also a written informed consent was obtained from each soldier and they could leave the study any time.

Results

The mean (SD) age of experimental group was 23.51 (1.72) years and it was 23.13 (1.42) years in control group. In present study, all individuals in experimental group were collaged, but in control group, 2 (4.25%) of 47 individuals had diploma and 45 (95.75%) were collaged. The mean (SD) BMI of experimental group was 32.51 (3.12) kg/m² and in control group was 31.33 (2.34) kg/m². As shown in Table 1, two groups of individuals were equal in terms of age, height, weight, BMI, education level, habitat, and marriage status. However, the result of independent *t*-test demonstrated significant difference between two groups in term of weight ($p = 0.01$) and BMI ($p = 0.03$) in 1 month after training.

The result of independent *t*-test showed that there was no significant difference in the mean (SD) of perceived severity, susceptibility, response efficacy, self-efficacy, knowledge, and practice between two groups before training. However, we found a significant difference in the mean (SD) of perceived severity, response efficacy, self-efficacy, knowledge, and practice ($p < 0.001$) between two groups immediately after training. The results of independent *t*-test indicated that the mean (SD) of EPPM variables, knowledge, and practice significantly differed between two groups 1 month after training ($p < 0.001$). So that, the mean (SD) of experimental group was higher than the control group in terms of EPPM variables, knowledge, and practice in immediately after, and 1 month after training [Table 2].

Furthermore, the result of repeated measure ANOVA test demonstrated that training based on EPPM significantly enhanced the mean (SD) of perceived severity, response efficacy, and self-efficacy ($p < 0.001$) [Table 3]. As shown in Table 3, training based on EPPM significantly enhanced the mean (SD) of knowledge and practice ($p < 0.001$) [Figures 2 and 3].

Discussion

The present study was designed to survey the efficacy of EPPM-based training in encouraging soldiers to develop their KAP about overweight and obesity management. The results demonstrated that EPPM-based training can significantly increase KAP about obesity management among soldiers. Similarly, other studies confirm that EPPM, along with other training interventions, has significant efficacy in the expansion of individuals' goals and practice to prevent high-risk behaviors and promote health.^[11-14]

The knowledge scores before training demonstrated that the participants had an average level of knowledge about the definition, assessment, causes, consequences, and management of obesity. Our findings showed a significant difference in knowledge immediately and 1 month after training; diversity in the educational content between the groups can clarify this difference. Nevertheless, our findings are not congruent with a previous study, which showed that use of EPPM in the stroke education poster could not significantly enhance stroke knowledge. Also, the findings of this study revealed an insignificantly higher level of knowledge about stroke among individuals exposed to the modified poster including EPPM.^[19]

The perceived severity score before training revealed that soldiers were oblivious to the serious consequences of obesity, which could in turn aggravate their obesity. This finding is compatible with previous research, which

Table 1: Comparison of participants' background and demographic characteristics in two groups

Variables	Experimental group	Control group	95% CI	Statistical results	df	<i>p</i> *
Height Mean (SD)	178.21 (6.52)	177.02 (6.33)	-1.36 to 3.91	<i>t</i> =0.96	92	0.33*
Basal weight Mean (SD)	102.01 (12.32)	98.11 (9.01)	-0.44 to 8.40	<i>t</i> =1.78	84	0.07*
Basal body mass index Mean (SD)	32.51 (3.12)	31.33 (2.34)	-0.36 to 1.90	<i>t</i> =1.35	84	0.18*
Weight (1 month after education) Mean (SD)	100.53 (11.50)	95.19 (8.67)	1.16 to 9.51	<i>t</i> =2.54	85	0.01*
Body mass index (1 month after education) mean (SD)	30.38 (2.38)	31.59 (2.89)	0.12 to 2.29	<i>t</i> =2.21	92	0.03*
Education level Number (%)				Exact test=2.04	1	0.49***
Diploma	0 (0.0)	2 (4.25)				
College	47 (100)	45 (5.75)				
Habitat number (%)				$\chi^2=2.23$	1	0.13**
Village	4 (8.51)	9 (19.14)				
City	43 (91.49)	38 (80.86)				
Marriage status number (%)				$\chi^2=1.20$	1	0.27**
Single	41 (87.23%)	37 (78.80%)				
Married	6 (12.77%)	10 (21.30%)				

t*-test, ** χ^2 , *Exact test

Table 2: Comparison of EPPM variables, knowledge, and practice scores in three phases of the study between experiment and control groups

Phases	Variables	Mean (SD)		95% CI	Independent t-test		
		Experimental group	Control group		t	df	p
Before training intervention	Perceived severity	10.53 (2.24)	10.87 (1.42)	0.20 to 1.96	-0.86	78	0.39
	Perceived susceptibility	5.25 (1.24)	5.40 (1.39)	2.31 to 3.25	-0.54	92	0.58
	Perceived response efficacy	8.27 (1.94)	7.65 (1.86)	-0.05 to 1.50	1.57	92	0.12
	Perceived self-efficacy	8.48 (2.35)	8.08 (1.79)	-0.45 to 1.26	0.93	92	0.35
	Knowledge	8.22 (1.63)	8.31 (0.98)	-1.94 to 0.86	-0.38	75	0.70
Immediately after training intervention	Practice	16.63 (5.73)	15.42 (3.67)	-0.76 to 3.19	1.22	92	0.22
	Perceived severity	17.76 (1.53)	12.42 (1.45)	4.72 to 5.95	17.30	92	<0.001
	Perceived susceptibility	8.44 (1.62)	8.10 (1.28)	-0.20 to 1.0	1.12	92	0.26
	Perceived response efficacy	13.95 (1.50)	10.27 (1.61)	3.04 to 4.31	11.45	92	<0.001
	Perceived self-efficacy	14.14 (1.48)	11.31 (1.56)	2.20 to 3.45	8.99	92	<0.001
1 month after training intervention	Knowledge	10.70 (0.81)	8.12 (1.23)	0.26 to 0.92	12.10	92	<0.001
	Practice	25.87 (2.76)	20.29 (3.23)	4.34 to 6.80	8.98	92	<0.001
	Perceived severity	16.40 (1.92)	12.70 (1.45)	3.0 to 4.40	10.49	85	<0.001
	Perceived susceptibility	6.42 (1.67)	5.42 (1.47)	0.35 to 1.64	3.07	92	<0.001
	Perceived response efficacy	13.85 (1.41)	10.46 (1.51)	3.04 to 4.31	11.18	92	<0.001
	Perceived self-efficacy	12.55 (2.18)	10.93 (1.52)	0.84 to 2.38	4.16	92	<0.001
	Knowledge	10.78 (0.80)	8.00 (1.35)	0.42 to 1.23	12.14	75	<0.001
	Practice	26.63 (2.15)	19.27 (2.49)	6.40 to 8.31	15.33	92	<0.001

Table 3: Comparison of the EPPM variables, knowledge, and practice scores across three phases of the study in experimental group

Variables	f	df	p*
Perceived severity	225.93	1,77	<0.001
Perceived susceptibility	173.45	1,78	<0.001
Perceived response efficacy	287.73	1,46	<0.001
Perceived self-efficacy	159	1,80	<0.001
Knowledge	151.69	1,83	<0.001
Practice	182.90	1,56	<0.001

*Repeated-measures ANOVA test

aimed to investigate the effects of EPPM on prevention of cigarette smoking.^[14,20] Our results showed a significant difference in the perceived severity score between the groups immediately and 1 month after training. In fact, the perceived severity score increased by 40.70% immediately after training in the experimental group. The significant increase in the perceived severity score of the experimental group (12.90%) confirms the positive impact of high-risk obesity information on obesity management; this finding is in line with a previous study in this area.^[13]

In another experimental study, effects of fear-appeal message repetition (thrice) about melanoma on EPPM variables were evaluated. The results of this experimental study showed that the training intervention could increase the perceived severity; this supports our finding regarding the positive effect of EPPM on the perceived severity score.^[21]

In this study, individuals had a moderate level of perceived susceptibility about their health and might have been

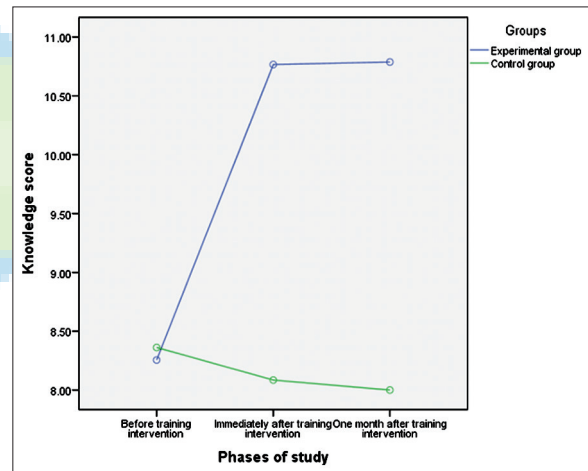


Figure 2: Knowledge scores across time

affected by overweight and obesity before training; this finding is compatible with another study in this area.^[20]

Moreover, there were no significant differences in perceived susceptibility score between the groups immediately after training. This finding is not in line with the results of a previous study, which reported that EPPM-based training reduces feelings of threat.^[12] However, the perceived susceptibility score was significantly higher in the experimental group, compared to the controls 1 month after training. In other words, the experimental group believed that they were at risk of obesity and its adverse consequences.

Another study with a randomized, two-group, posttest design indicated that college students, who received

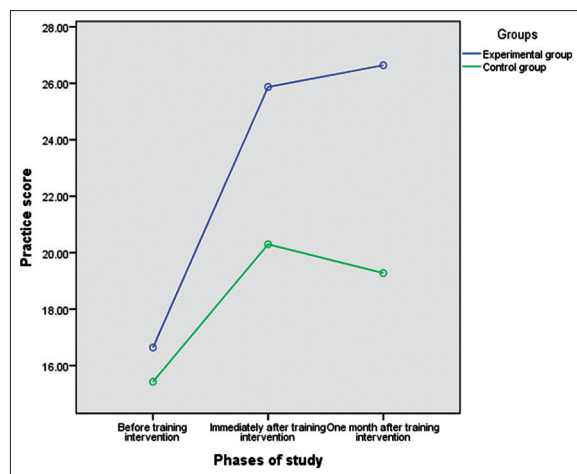


Figure 3: Practice scores across time

high-risk and efficacy messages to cope with noise-induced hearing loss, experienced greater received threat to use hearing protection.^[22] Previous studies have reported that increased perceived threat (perceived severity and susceptibility) to a disease can be an effective factor in adopting coping strategies for health problems.^[9,10]

Evaluation of the perceived response efficacy scores before training showed that individuals did not strongly believe in obesity management strategies; this finding is compatible with the literature.^[12,20] Additionally, our study showed a significant difference between the groups regarding the perceived response efficacy score immediately and 1 month after training. This difference may be a result of receiving high-efficacy messages (about physical activity and diet for obesity management) in the experimental group; a previous study confirms our finding.^[13]

Moreover, some previous studies have demonstrated that men, exposed to high-efficacy information, had greater intentions to apply coping strategies against threats.^[11,23] In a quasi-experimental study, Gharlipour *et al.* assessed the effects of training based on EPPM on the prevention of smoking among students. This study indicated that students, who attended the EPPM-based educational program, had a greater perceived response efficacy than the controls; another study in this area supports our finding.^[12]

Previous studies have indicated that high-risk messages play a highly effective role in change of behaviors.^[24] In this study, individuals had an average level of perceived self-efficacy before training, which is consistent with other studies.^[12,20] Also, findings of the present study support previous research, which revealed that use of high-risk and efficacy messages in training interventions could increase the perceived self-efficacy.^[11] This finding may be attributed to the use of high-efficacy messages and practices in the design of dietary and physical activity programs in the experimental group. Overall, according to previous studies,

improvement of perceived self-efficacy can enhance the individual's performance.^[9,10,12]

Based on the present findings, individuals had a moderate level of practice before training in both groups. The results showed that training based on EPPM (receiving high-risk and efficacy information) can improve the practice of soldiers in obesity management. In this regard, Hatchell *et al.* indicated that individuals, who received high-risk messages, were more likely to meet the Canadian physical activity guidelines.^[11] However, another study showed that practice of all advised behaviors did not change after repeated exposure to messages about melanoma prevention.^[21]

The limited follow-up of individuals is the main limitation of our study. Lack of calorie intake assessment and subject sensitization bias are also other limitations of this study. Therefore, further trials are recommended to determine the long-term effects of this educational intervention in both male and female participants.

Conclusion

The most obvious finding to emerge from this study is that EPPM (high threat, high-efficacy messages) may be a key method for obesity management, especially in military services.

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Conflicts of interest

Nothing to declare.

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