

Received: 2016.12.15
Accepted: 2017.03.06
Published: 2017.07.19

Evaluating the Effectiveness of a Health Promotion Intervention Program Among Physiotherapy Undergraduate Students

Authors' Contribution:
Study Design A
Data Collection B
Statistical Analysis C
Data Interpretation D
Manuscript Preparation E
Literature Search F
Funds Collection G

ABCDEF 1 **Liat Korn***
ACDEF 2 **Noa Ben-Ami***
DEF 2 **Michal Azmon**
ABDEF 2 **Ofira Einstein**
DEFG 2 **Meir Lotan**

1 Department of Health Systems Management, Faculty of Health Sciences, Ariel University, Ariel, Israel
2 Department of Physiotherapy, Faculty of Health Sciences, Ariel University, Ariel, Israel

Corresponding Author:
Source of support:

* Liat Korn and Noa Ben-Ami contributed equally
Liat Korn, e-mail: Liatk@ariel.ac.il
Departmental sources





This study evaluated the effectiveness of a health promotion (HP) intervention program among physiotherapy undergraduate students in an academic institution by examining pre- and post-intervention health perceptions and behaviors compared to a control group (non-physiotherapy students).

Participants completed questionnaires on their health perceptions and behaviors at T1 (April 2009–May 2009) before the intervention program was initiated, and at T2 (April 2015–May 2015) after the intervention program was implemented for several years. At T1, 1,087 undergraduate students, including 124 physiotherapy students, participated. At T2, 810 undergraduate students, including 133 physiotherapy students participated. Self-reported health-related perceptions and behaviors were compared in the study group (physiotherapy students) over time (T1 versus T2), and between the study group and the control group (non-physiotherapy students) pre-intervention (T1) and post-intervention (T2). Findings showed more positive perceptions and behaviors at T2 compared to T1 in the study group (51.0% at T2 versus 35.2% at T1; $p < 0.05$). There was no significant difference at T2 compared to T1 in health perceptions reported by the control group (37.8% at T2 versus 32.8% at T1; non-significant difference).

Our findings demonstrated the effectiveness of the intervention program.

MeSH Keywords: **Health Promotion • Motor Activity • Nutrition Assessment • Physical Therapists • Program Evaluation**

Full-text PDF: <http://www.medscimonit.com/abstract/index/idArt/902864>

 4057  6  1  26



Background

Health promotion interventions among physiotherapy students

Strong evidence suggests that health promotion (HP) involving recreational physical activity (PA), healthier nutrition habits, and smoking avoidance is effective in preventing and managing numerous chronic conditions [1,2]. The American Heart Association and the American College of Sports Medicine have recommended at least 30 minutes of moderate PA at least five days a week or 20 minutes of vigorous PA at least three days a week to maintain one's health [3].

There appears to be a steep decline in PA rates between the ages of 18 and 24 years [4]. The college years represent an opportunity to increase PA rates through deliberate interventions that prepare students for long-term PA maintenance as they move into adult roles [4,5]. A systematic review [2] examined the effectiveness of interventions aimed at improving PA, maintaining a healthy diet, and weight-related behaviors among university and college students. Of the 41 studies included in the review, 34 reported significant improvements in one of the key outcomes. According to the meta-analysis [2], intervention groups showed significant increases in moderate PA compared to control groups. The authors concluded that tertiary institutions were appropriate settings to implement and evaluate healthy lifestyle interventions, although more research is needed to improve such strategies.

Physiotherapists are well positioned to use PA as a HP strategy [6]. Research shows that physiotherapists who maintain a healthy lifestyle can more effectively endorse HP to their patients [7]. A 2014 review of research examined the degree to which the physiotherapy literature includes PA as a component of HP in practice and education [1], and concluded that more interventional research is needed to develop efficacious strategies to integrate PA as a HP strategy in physiotherapy practice, and that contemporary physiotherapy entry-level education curricula should include benchmark standards for HP. In another review [8], the authors found only one article (a study of four Irish undergraduate physiotherapy curricula) that described the current state of PA, exercise promotion, and prescription content, suggesting that all other programs evaluated had insufficient detailed descriptions of their intervention programs. Nualnetr et al. [9] compared physiotherapy students' behavior with regard to HP at different stages of their course of studies, and investigated how knowledge influenced behavior over the years of their studies. Results showed that first-year students scored relatively lower in the area of health nutrition, whereas students in their third and fourth years of study scored better, both on this measure and on measures of stress management and well-being. The authors consequently

concluded that studies in the area of HP, nutrition, and the importance of PA included in the curriculum may help change the behaviors of physiotherapy students. However, a recent study [10] found that even when the majority of health science students believed PA was beneficial, most students were found to be inactive during their academic studying and did not implement theory into practice.

A study by Mipatrini and associates looked at interventions to reduce smoking rates among physiotherapy students and found that interventions were considered to be effective and lead to a decline of 7.7% in smoking rates after three years [11].

Previous literature identified three key areas as lacking or in need of further emphasis in physical therapy curricula: PA for public health, strategies for changing PA behavior, and PA for lifestyle-related diseases [8].

The aim of our study was to evaluate a HP intervention program instituted among physiotherapy undergraduate students in an academic institution in Israel and to determinate the intervention's effectiveness. We tested the following hypotheses: 1) physiotherapy students will present higher initial levels of PA, healthy eating habits, and less cigarette smoking than non-physiotherapy students; and 2) implementation of the intervention program will enhance PA and healthy eating habits, and will reduce cigarette smoking among participants compared to a control group that did not participate in the intervention program.

Material and Methods

Ethics

Approval from the Ethics Committee from the University was obtained prior to the pilot phase of the study in 2009, and prior to data collection in 2015. The research was explained to participants before data collection, and students were advised that participation was voluntary. Completion of the questionnaire was considered an expression of informed consent.

Participants

Two sample sets were used in this study: T1 was taken during April 2009–May 2009, and included 1,087 undergraduate students (830 females and 257 males); T2 was taken during April 2015–May 2015, and included 810 undergraduate students (616 females and 194 males). Both sample sets matched the study population for gender differences. Response rates were 93.5% and 88.4% at T1 and T2, respectively. Table 1 describes the participants' characteristics by group. Adjustments were made (sex, age, and study field) to match study and control groups.

Table 1. Respondent's socio-demographic characteristics by study and control groups.

		T1, 2009				Sig	T2, 2015				Sig
		Study		Control			Study		Control		
		%	n	%	n		%	n	%	n	
All sample	N	100.0	124	100.0	1439		100.0	133	100.0	1300	
Gender	Females	71.8	89	65.7	946	NS	62.4	83	62.8	816	NS
	Males	28.2	35	34.3	493		37.6	50	37.2	483	
Marital status	Single	66.9	83	61.6	884	NS	57.9	77	73.2	942	***
	Married	33.1	41	36.6	525		42.1	56	24.6	317	
Have one or more children		4.8	6	23.2	326	**	17.3	24	16.9	217	NS
Visits to synagogue last month	None	44.2	53	50.0	670	*	47.2	59	55.3	652	**
	1–2 times	10.0	12	14.9	199		8.8	11	14.6	171	
	3+ times	45.8	55	35.1	469		44.0	55	30.1	355	
¹ Family monthly income	Above average	12.9	13	11.9	148	NS	40.5	53	38.6	482	NS
	Average	45.5	46	40.8	506		35.1	46	45.0	562	
	Under average	41.6	42	47.2	585		24.4	32	16.5	206	

¹ Questions were asked differently between the measures: Significant difference between study and control groups within each sample: NS – non significance; * p<0.05; ** p<0.01; ***p<0.001; Variables not sum to 100% as for other values not detailed in the table.

Intervention

A Health Promotion and PA Coordinator was appointed to a faculty position and led a departmental team that developed ideas for a HP intervention that could be integrated into the academic curricula. The intervention was initiated in 2012, and is an ongoing project. The intervention program included the following components.

- 1) Principles of PA were integrated into various existing courses in the curriculum. Materials on HP (PA, smoking prevention, and other health concepts) were added to the following courses: "Pediatrics", "Geriatrics", "Orthopedic Treatment", "Neurological Treatment", "Study of Pain", "Women's Health" and "Introduction to Medical Sociology".
- 2) Several new courses devoted to HP and PA were added to the curriculum. These courses include "Movement Education", a theoretical and practical course that could be studied as early as the first year of the program. A new course "Principles of Physical Activity and Health Promotion" was added to the curriculum. This course teaches the basics of exercise physiology and nutritional principles related to PA, and the course included a practical workshop in which students could practice and implement behavioral change models. In addition, a significant portion of the first-year course "Introduction to the Sociology of Health" was devoted to HP theory and practice.
- 3) Two behavioral models were incorporated into the first and second years of the program: the trans-theoretical model (TTM) [12] and motivational interviewing (MI) model [13].

Through role playing, the students received personalized feedback that raised their awareness of obstacles to engagement in PA. Students who expressed an interest in changing their behavior could set specific PA goals under the supervision of a facilitator.

- 4) In the second year of the program, students were encouraged to take part in an extracurricular "Physical Fitness and Health Instructors" (gym instructors) course. This course was not part of the curriculum, but was developed specifically for physiotherapy students. The course curriculum was adjusted to the students' theoretical background, and its cost was subsidized by the university.
- 5) Physiotherapy students were encouraged to be involved in related PA projects, such as an annual departmental sports day, which involved all students in the program and was organized by second-year physiotherapy students.
- 6) Faculty members organized HP conferences and PA seminars and workshops for university faculty and staff and for clinical physiotherapy instructors.

The Questionnaire

A structured, self-report, anonymous questionnaire was distributed to undergraduate students at our institution at T1 (2009) and T2 (2015). The items originated from Jessor's Survey of Personal and Social Development [14], and were translated and culturally adapted to the local student population. Detailed descriptions of the methodology of the survey

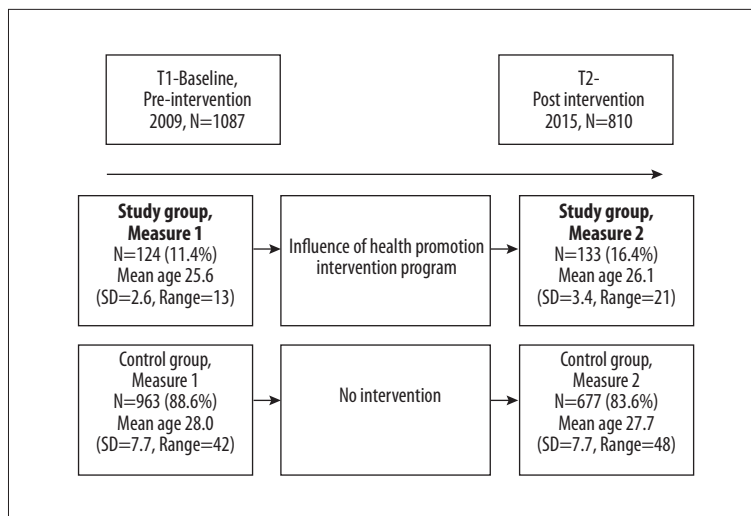


Figure 1. Procedure of the study and respondent's characteristics by study groups.

have been previously published, including information on the questionnaire development and methodology [15]. The original questionnaire is available at <http://www.colorado.edu/ibs/jessor/questionnaires.html>.

The questionnaire includes socio-demographic parameters, questions about PA habits, nutrition behavior, self-perceptions, health perceptions, self-image and body image, emotional stressors, social support, social relationships, risk behaviors, psycho-somatic issues, etc. A complete description of the tool is described elsewhere [16].

Figure 1 is a graphic representation of the study procedure and participants' features by group. Data from the study and control groups were collected at two time points: T1 (in 2009 before the intervention was initiated) and T2 (several years after intervention in 2015). At both data collection time points, questionnaires were distributed ten minutes before the end of a lesson. The research team read an introduction to the class before distributing the questionnaires, and gave students an opportunity to decline participation. In total, the research team entered 70 classrooms at T1 (2009), and 59 classrooms in T2 (2015). The study group comprised physiotherapy students who participated in the intervention program, and the control group comprised all other students in other university departments who did not participate in the intervention program.

Table 1 presents the socio-demographic characteristics of the study and control groups at T1 and T2. At T1, the study and control groups were similar for gender and monthly household income, although the groups significantly differed with regard to marital status and number of children: a smaller proportion of physiotherapy students reported having children. At T2, study and control groups did not differ in terms of gender, number of children, and family income, but marital status and religion were different. The study group had a higher

frequency of married and religious students (visits to synagogue) compared to the control group.

Measures

Physical exercise

This item asked about the frequency of engaging in physical exercise (e.g., running, riding a bike, or lifting weights). Values ranged from: 1- "not at all" to 6- "more than 15 hours a week." Scores were divided to create three categories: non active students (value 1), less than one hour a week; active students (values 2 and 3), from one hour a week up to five hours a week; extremely active students (values 4, 5, and 6), from six hours a week to over 15 hours a week.

Health perceptions

Health perceptions were evaluated using five questions: 1) How important is it for you to feel in good shape? 2) How important is it for you to feel like you have plenty of energy? 3) How important is it for you to keep yourself in good health all year round? 4) How important is it for you to keep yourself fit even if it takes some extra effort? 5) How is your health compared to others your age? For the first four questions, values ranged from 1- "not too important" to 5- "very important". For the fifth question, values ranged from 1- "my health is much worse" to 5- "my health is much better".

Nutrition

Five questions dealt with how much attention the respondents paid to the following: 1) Seeing that your diet is healthy. 2) Keeping down the amount of fat you eat. 3) Eating healthy even when eating out. 4) Eating healthy snacks like fruit instead of candy. 5)

Table 2. Distribution of physical activity and health perceptions variables by study and control groups and by years.

Topics of expected change	Measures	T1, 2009					T2, 2015					χ^2 study	χ^2 control
		Study		Control		χ^2 2009	Study		Control		χ^2 2015		
		%	n	%	n		%	n	%	n			
Physical exercise	Non-active students at all even not an hour a week	31.4	39	44.4	422		19.6	25	37.2	245			
	Active student (values 2–3) from one hour a week up to 5 hours a week	59.2	73	46.3	441	*	68.8	88	53.8	354	***	NS	**
	Extremely active students (values 4–6) from 6 hours a week to over 15 hours a week	9.4	12	9.3	88		11.6	15	9.0	59			
Health Perceptions	How important is it for you to feel in good shape? (important 3–4)	75.6	94	75.1	710	NS	83.9	112	75.1	502	*	NS	NS
	How important is it for you to feel like you have plenty of energy? (important 3–4)	95.0	117	91.2	855	NS	95.8	127	90.5	603	NS	NS	NS
	How important is it for you to keep yourself in good health all year round? (important 3–4)	92.8	115	88.2	826	NS	95.5	127	87.1	580	**	NS	NS
	How important is it for you to keep yourself fit even if it takes some extra effort? (important 3–4)	67.3	83	66.4	619	NS	75.8	101	67.2	449	*	NS	NS
	How is your health compared to others your age? (better 4–5)	35.2	25	32.8	160	NS	51.0	67	37.8	252	**	*	NS

Significant difference between study group or control group within each sample, or between years: * p<0.05; ** p<0.01; *** p<0.001.

Eating foods that are baked and broiled rather than fried. 6) How often do you skip breakfast? In answering to the first five questions, respondents were asked to mark their responses on scale with values ranging from 1- “none” to 3- “a lot.” For the sixth question values ranged from 1- almost never to 3- most of the time.

Self-image

There were three items that assessed self-image: 1) Decision-making about important things in life. 2) Handling setbacks and disappointments. 3) Overall satisfaction with oneself. Values ranged from 1- “very good” to 4- “not so good”.

Body image

There were three items that appraised body image: 1) Thinking you are physically attractive to other people (values ranged from 1- “very attractive” to 4- “not attractive at all”). 2) Feelings about the way you look (values ranged from 1- “very satisfied” to 4- “not satisfied at all”). 3) Feelings about your weight

(values ranged from 1- “I would like to lose more than 10 kilos” to 5- “I would like to gain more than 10 kilos”).

Smoking

There were three items that appraised cigarette smoking: 1) Experience: Did you ever smoke a cigarette (not just a few “drugs”?). 2) Frequency, general: Which of the following statements fits you the most? (Values ranged from 1- “I don’t smoke and I don’t have plans of starting with it” to 7- “I smoke every day”). 3) Frequency, past month: During the past month, how many cigarettes did you smoke on an average day? (Values ranged from 1- “not at all” to 8- “about two packs per day”; and were divided to three categories: “smoke less than half a pack a day”; “smoke half a pack a day”; and “smoke a pack or more a day”).

Data analysis

Analyses included descriptive, relationship, and prevalence quantitative measures and bi-variate tables (cross tabulation).

Table 3. Distribution of nutrition variables by study and control groups and by years.

Topics of expected change	Measures	T1, 2009					T2, 2015					χ^2 study	χ^2 control
		Study		Control		χ^2 2009	Study		Control		χ^2 2015		
		%	n	%	n		%	n	%	n			
Nutrition	Seeing that your diet is healthy (a lot -6)	44.8	54	31.7	272	**	48.7	55	39.6	209	NS	NS	**
	Keeping down the amount of fat you eat (a lot -6)	34.3	41	25.7	222	*	39.9	45	34.1	179	NS	NS	***
	Eating healthy even when eating out (a lot -6)	34.9	42	24.4	211	*	34.4	39	31.5	167	NS	NS	**
	Eating healthy snacks like fruit instead of candy (a lot -6)	40.7	49	29.4	254	*	42.1	48	36.1	191	NS	NS	**
	Eating foods that are baked and broiled rather than fried (a lot -6)	40.3	49	26.3	227	**	37.8	43	35.2	187	NS	NS	***
	How often do you skip breakfast (most of the time -1)	21.9	26	39.0	338	***	12.8	15	33.1	179	***	NS	*

Significant difference between study group or control group within each sample, or between years: * p<0.05; ** p<0.01; *** p<0.001.

Table 4. Distribution of Self-image and Body image variables by study and control groups and by years.

Topics of expected change	Measures	T1, 2009					T2, 2015					χ^2 study	χ^2 control
		Study		Control		χ^2 2009	Study		Control		χ^2 2015		
		%	n	%	n		%	n	%	n			
Self-image	Decision-making about important things in life (good 1-2)	93.5	115	92.8	887	NS	96.3	127	92.0	614	NS	NS	NS
	Handling setbacks and disappointments (good 1-2)	82.4	102	78.4	746	NS	87.5	115	81.5	547	NS	NS	NS
	Overall satisfaction with oneself (pleased 1-2)	89.3	110	87.8	829	NS	91.7	121	87.6	573	NS	NS	NS
Body image	Thinking you are physically attractive to other people	70.1	84	79.9	724	*	80.0	104	74.2	477	NS	NS	**
	Feelings about the way you look	82.6	102	84.8	809	NS	93.1	123	81.3	542	***	**	NS
	I would like to lose more than 10 kilos	10.9	13	13.5	128	NS	3.8	5	12.7	85	**	*	NS

Significant difference between study group or control group within each sample, or between years: * p<0.05; ** p<0.01; *** p<0.001.

Relationship analysis was based on chi-square tests for differences between years and differences between study and control groups.

Results

Figure 1 shows that at the two data collection time points (T1 and T2), the study and the control groups were similar in terms

of the number of participating students and their mean age, standard deviation, and range.

Table 2 presents the distribution of PA and health perception variables by group and study year. Physiotherapy students reported performing PA at a higher frequency in T2 compared to T1 (non-significant difference) and at a higher frequency than the control group at T1 compared to T2, (p<0.05 and p<0.001 for T1 and T2, respectively). The control group also

Table 5. Distribution of smoking variables by study and control groups and by years.

Topics of expected change	Measures	T1, 2009					T2, 2015					χ^2 study	χ^2 control
		Study		Control		χ^2 2009	Study		Control		χ^2 2015		
		%	n	%	n		%	n	%	n			
Smoking	Ever smoke a cigarette	55.4	69	54.1	504	NS	47.6	62	50.4	329	NS	NS	NS
	Smoke occasionally (once a day)	67.0	24	40.3	106	NS	15.0	16	18.9	109	NS	***	***
	Smoke less than half a pack a day	93.7	55	77.7	316		98.6	48	84.6	219			
	Smoke half a pack a day	3.0	2	13.1	53	*	0	0	12.1	31	*	NS	*
	Smoke a pack or more a day	3.3	2	9.2	38		1.4	1	3.3	9			

Significant difference between study group or control group within each sample, or between years: * p<0.05; ** p<0.01; *** p<0.001.

Table 6. Distribution of Physical activity and self and body image variables of physiotherapy students by grades and by years.

Topics of expected change	Measures	T1, 2009					T2, 2015					χ^2 First grade	χ^2 Second, third and fourth grades
		First grade		Second, third and fourth grades		χ^2 2009	First grade		Second, third and fourth grades		χ^2 2015		
		%	n	%	n		%	n	%	n			
Physical exercise	Non-active students at all even not an hour a week	34.1	14	29.3	24		19.4	7	17.4	16			
	Active student (values 2–3) from one hour a week up to 5 hours a week	58.5	24	59.8	49	NS	72.2	26	69.6	64	NS	NS	NS
	Extremely active students (values 4–6) from 6 hours a week to over 15 hours a week	7.3	3	11.0	9		8.3	3	13.0	12			
Self-image	Decision-making about important things in life (good 1–2)	100.0	41	90.2	74	*	91.7	33	97.9	94	NS	NS	*
	Handling setbacks and disappointments (good 1–2)	95.1	39	75.9	63	**	88.9	32	88.5	85	NS	NS	*
	Overall satisfaction with oneself (pleased 1–2)	97.6	40	85.4	70	NS	97.2	35	90.6	87	NS	NS	NS
Body image	Thinking you are physically attractive to other people	75.0	30	67.5	54	NS	82.9	29	78.9	75	NS	NS	NS
	Feelings about the way you look	90.2	37	79.5	66	NS	88.9	32	95.8	92	NS	NS	***
	I would like to lose more than 10 kilos	7.3	3	12.2	10	NS	2.9	1	4.2	4	NS	NS	*

showed an improvement in PA performance in T2 compared to T1, but the study group showed a greater improvement in PA compared to the control group. For example, the frequency of “not active at all” students in the study group declined from 31.4% in T1 to 19.6% in T2, a decline of 11.8% (non-significant difference), while “not active at all” students in the

control group declined from 44.4% in T1 to 37.2% in T2, representing a decline of 7.2% (p<0.01).

Table 3 presents the distribution of nutrition variables by group and time. At T1, frequencies of better nutritional habits were higher in the study group on all measures compared

to the control group. Differences between the study and control groups in T2 were non-significant but all differences reflected better nutritional habits in the study group compared to the control group, although an overall improvement in nutritional habits was also observed in the control group when comparing T1 to T2.

Table 4 presents the distribution of self-image and body image variables by group and time. Differences in self-image were non-significant. The study group showed a slight improvement from T1 to T2 compared to the control group. The study group also showed a significant improvement in body image from T1 to T2, in contrast to a decline or slight improvement in body image in the control group from T1 to T2. All of the variables in this table were in the hypothesized direction regarding differences in the study group above and beyond the differences observed in the control group.

Table 5 presents smoking variables by group and time. The differences in smoking behaviors were significant for occasional smokers (once a day). For other variables, the groups were too small to detect significant results.

Examining the study and control groups at T2 contributes to an evaluation of the intervention program's impact on participating physiotherapy students (study group). We assumed that the full impact of such a program should be greater among physiotherapy students in the second, third, and fourth years of the program compared with freshmen physiotherapy students (who had not yet been introduced to all the components of the program). Table 6 shows the distribution of responses regarding PA and self-image and body image from physiotherapy students by their years in the program. Differences in self-image and body image clearly were significant across the second, third, and fourth years of the program, supporting the expected change. This pattern was also evident physiotherapy students' responses regarding PA levels, although these differences were not significant, which may be due to the small number of participants in each PA group.

Discussion

The objective of this study was to evaluate the impact and effectiveness of a health promotion (HP) intervention program that addressed various aspects of change toward a healthier lifestyle that was implemented among undergraduate physiotherapy students in an academic institution in Israel.

Findings showed an increase in physical activity (PA), nutrition, self-image, and body image in the study group (physiotherapy students) compared to the control group (non-physiotherapy students), and in both groups when comparing data

collected in 2009 (T1) versus 2015 (T2). Positive health perceptions and smoking reduction showed a relative increase at T2 compared to T1, as well as in the study group compared to the control group, but these differences were not always significant. Comparing the study and control groups at T2 showed significant differences in PA, health perceptions, skipping breakfast, and body image. Changes in PA were consistent with our original hypotheses that our intervention would result in a positive change.

Sociodemographic differences between the study and control groups may explain some of the variance in the results of this research. A previous study [17] stressed that religious students tend to be less physically active and are less stringent about maintaining good nutrition compared to non-religious students. In our sample, although the study group was more religious than the control group, the study group was the more active group at the end of the intervention. This finding suggests that the intervention program had a significant impact that may have countered the potential effect of sociodemographic differences (family status, number of children, and religion) in the opposite direction, meaning, the positive influence of the intervention program was even better than expected due to the possible negative moderate effects of the sociodemographic differences.

A randomized trial in 2012 examined the short-term efficacy of a brief motivational intervention (BMI) designed to increase PA [5]. Seventeen college participants were randomly assigned to either the BMI or to an education-only (EO) intervention. Those in the BMI group reported more vigorous-intensity PA at a one-month follow-up than those in the EO group. These findings provided preliminary support for the efficacy of a BMI designed to increase PA among college students. In contrast, a randomized control trial [18] that involved 540 students assessed a 10-week, university-required "Lifetime Fitness for Health" (LFH) course on students' leisure-time exercise behavior and advancement through the stages of change for exercise. It found that the LFH course did little to change participants' exercise levels outside of class, and did little to positively influence participants' stage of change for exercise behavior. Another trial used TTM [19]; students receiving personal trainer services during the fall semester (experimental group, n=31) were cross-matched with students who did not receive such services (control group, n=31). The control group demonstrated a statistically significant regression in stage of exercise change scores, while the experimental group did not, although the experimental group did not become more physically active. The intervention in our study was specifically designed to enhance health perceptions and improve recreational PA, which may explain the higher PA results post-intervention (T2). Sallis et al. [20] examined the effect of a course promoting health and PA among students, where the course

included behavioral modification methods similar to those used in our study. They found a significant improvement in PA routines, but only among women; no change was found among the men. Martens et al. [5] examined the effects of a short-term intervention to increase PA using the MI approach among 70 college students and found that the intervention increased intense PA in the experimental group a month after the intervention, compared to the control group. Taking into consideration these previous studies, the intervention program in our study included theoretical knowledge in the area of PA, practical PA, and teaching health behavior change models. Notably, the increase in health-related behaviors seen in physiotherapy students (study group) and in other students (control group) was consistent with the trend observed in the general Israeli population reflected in surveys conducted by the Israeli Ministry of Health [21–24], which indicated an improvement in PA commitments of the general Israeli population in comparison to previous surveys. The results of our study supported results from previous studies [5,19–21] regarding the importance of an intervention to include practice as well as theoretical knowledge.

A clear decline in smoking and a clear rise in moderate PA have been previously reported. A previous control trial [11] with interventions aimed at reducing smoking rates among physiotherapy students showed a decline of 7.7% in smoking rates after three years. Our findings on smoking showed a very steep decline for occasional smoking (once a day) from 67.0% in 2009 to 15.0% in 2015 in the study group, a decline of 52% after 5 years. It is possible that the fact that our intervention was comprehensive and included different aspects of HP, its effect on changing health perceptions of the participants had a greater impact on reducing smoking.

Our study intervention significantly improved participation in moderate PA, which was consistent with the findings of Sallis et al. [20] who found that an intervention program to promote PA in a university mainly influenced those graduates who were already active, but not those who were initially inactive. Together, these findings suggest that motivating inactive individuals to change their lifestyle may require a different intervention mode than that used to improve participation in PA among individuals who are already active.

Health perceptions among physiotherapy students (study group) improved over time compared to the control group (non-physiology students) in our study. This finding was in line with findings of previous surveys [18,19,25] conducted on students' health perceptions and nutritional and PA habits. Our findings showed that health perceptions were initially relatively low at T1 (2009) and improved after the intervention. It is important to note that the effects of the intervention in this study were not examined using a longitudinal study design.

Experience with HP interventions and programs indicate that it is relatively easy to change students' health perceptions compared to their health-related behaviors. As explained by self-determination theory (SDT) [26], people display different types of motivation driven by three basic needs: autonomy, relatedness, and competence. According to SDT theory, psychological health and well-being are determined by the extent to which these three needs are satisfied and how such behaviors are internally regulated. The intervention program in our study focused on these needs. Students not only acquired new knowledge and practiced PA themselves, but they also engaged in role playing in which they encountered and responded to resistance to health promoting changes, and as a result acquired skills in coping with such obstacles as HP agents.

In summary, to properly prepare our graduates to become HP agents in their professional lives, the physiotherapy department initiated a curricular change in the area of HP, which included significant content adjustments in the areas of HP and PA. Our findings suggest that the PA, self-image and body image, health perceptions, nutritional habits, and smoking behaviors among physiotherapy students improved between 2009 (before initiation of the intervention) and 2015 (several years after the program was initiated), compared to other students at the university.

One main limitation of this study was that it was a cross-sectional case-control study rather than a longitudinal study. Improvements over time were demonstrated for different students groups within independent groups, which may explain a portion of the variance that was found. A longitudinal study might have presented more meaningful results by showing lifestyle changes in the same groups of participants, and shed greater light on participants' change processes. The authors take this point as an important issue for future studies. A second limitation of this study concerns the use of a self-reported instrument. Although the questionnaire was anonymous, findings may have been biased by a social desirability effect. The questionnaire delivery method was similar at both data collection points, but future studies should also consider using other methods (such as observations, weighted measures, objective measures of PA) to ensure that findings accurately reflect actual behaviors.

Conclusions

The aim of this study was to evaluate the effectiveness of a HP intervention program among physiotherapy undergraduate students in an academic institution in Israel designed to encourage changes in lifestyle, PA habits, healthy nutrition, health perceptions, self-image and body image, and cigarette smoking cessation. Effectiveness of the intervention program

was supported by findings that show positive changes in students' lifestyle, health perceptions, and well-being. This intervention success was attributed to the comprehensive intervention program that included a variety of components covering

many areas, and combined practical training with theoretical knowledge. This intervention could be replicated by other physiotherapy departments in other institutions with the aim of transforming physical therapists into better HP agents.

References:

1. Taukobong NP, Myezwa H, Pengpid S, Van Geertruyden JP: The degree to which physiotherapy literature includes physical activity as a component of health promotion in practice and entry level education: A scoping systematic review. *Physiother Theory Pract*, 2014; 30(1): 12–19
2. Plotnikoff RC, Costigan SA, Williams RL et al: Effectiveness of interventions targeting physical activity, nutrition and healthy weight for university and college students: A systematic review and meta-analysis. *Int J Behav Nutr Phys Act*, 2015; 12: 45
3. Haskell WL, Lee IM, Pate RR et al: Physical activity and public health: Updated recommendations for adults from the American College of Sports Medicine and the American Heart Association. *J Am Heart Assoc*, 2007; 116: 1081–93
4. Magoc D, Tomaka J, Bridges-Arzaga A: Using the web to increase physical activity in college students. *Am J Health Behav*, 2011; 35(2): 142–54
5. Martens MP, Buscemi J, Smith AE, Murphy JG: The short-term efficacy of a brief motivational intervention designed to increase physical activity among college students. *J Phys Act Health*, 2012; 9(4): 525–32
6. Frerichs W, Kaltenbacher E, van de Leur JP, Dean E: Can physical therapists counsel patients with lifestyle-related health conditions effectively? A systematic review and implications. *Physiother Theory Pract*, 2012; 28(8): 571–87
7. Black B, Marcoux BC, Stiller C et al: Personal health behaviors and role-modeling attitudes of physical therapists and physical therapist students: A cross-sectional study. *Phys Ther*, 2012; 92(11): 1419–36
8. O'Donoghue G, Doody C, Cusack T: Physical activity and exercise promotion and prescription in undergraduate physiotherapy education: Content analysis of Irish curricula. *Physiotherapy*, 2011; 97(2): 145–53
9. Nualnetr N, Thanawat T: Health-promoting behavior of physical therapy students. *J Phys Ther Sci*, 2012; 24: 1003–6
10. Dayi A, Acikgoz A, Guvendi G et al: Determination of factors affecting physical activity status of university students on a health sciences campus. *Med Sci Monit*, 2017; 23: 325–34
11. Mipatrini D, Mannocci A, Pizzi C, La Torre G: School-based anti-smoking intervention for physiotherapy students: A three-year non-randomized trial. *J Prev Med Hyg*, 2016; 57(2): E91
12. Prochaska JO, Velicer WF: The transtheoretical model of health behavior change. *Am J Health Promot*, 1997; 12(1): 38–48
13. Miller WR, Rollnick S: *Motivational interviewing: Preparing people for change*. New York: The Guilford Press: 2002
14. Jessor R, Turbin MS, Costa MF: Survey of personal and social development at CU. Institute of Behavioral Sciences, University of Colorado. 2003. Retrieved: July 19, 2016 http://www.colorado.edu/ibs/jessor/questionnaires/questionnaire_spsd2.pdf
15. Korn L, Shaked Y, Fogel-Grinvald H: Problem behaviors among Israeli undergraduate students: Applying Jessor's problem behavior theory (PBT) among young adult students *Front. Public Health*, 2014; 2: 273
16. Korn L, Gonen E, Shaked Y, Golan M: Health perceptions, self and body image, physical exercise and nutrition among undergraduate students in Israel. *PLoS One*, 2013; 8(3): e58543
17. Korn L, Billig M: Health-risk behaviors and a healthy lifestyle among students from different environmental and cultural backgrounds. *Int J Disabil Hum Dev*, 2013; 12(3): 267–81
18. Cardinal BJ, Jacques KM, Levy SS: Evaluation of university course aimed at promoting exercise behavior. *J Sports Med Phys Fitness*, 2002; 42: 113–19
19. Fischer DV, Bryant J: Effect of certified personal trainer services on stage of exercise behavior and exercise mediators in female college students. *J Am Coll Health*, 2008; 56(4): 369–76
20. Sallis JF, Calfas KJ, Nichols JF et al: Evaluation of university course to promote physical activity: Project GRAD. *Res Q Exercise Sport*, 1999; 70(1): 1–10
21. Israel Center for Disease Control. KAB. Knowledge Attitudes and health behaviors in Israel. 2011; Publication 354. Israel Center for Disease Control, Department of Health Promotion and Education, Ministry of Health, Publication 345, 2013 In: MoH. Health 2013; Publication 354. Jerusalem: Ministry of Health; 2014
22. INHIS-3 (in press) Israel Center for Disease Control, Department of Health Promotion and Education, Ministry of Health. INHIS-3. In: MoH. Minister of Health Report on Smoking in Israel 2014. Ministry of Health: Public Health Services; 2015; 103
23. MoH. Health 2013; Publication 354. Jerusalem: Ministry of Health; 2014: 530
24. MoH. Minister of Health Report on Smoking in Israel 2014. Ministry of Health: Public Health Services; 2015: 103
25. Chevan J, Haskvitz EM: Do as I do: Exercise habits of physical therapists, physical therapist assistants, and student physical therapists. *Phys Ther*, 2010; 90(5): 726–34
26. Blake AA, Kelsey LA, Ryan DD: Self-determination and meaningful work: Exploring socioeconomic constraints. *Front Psychol*, 2016; 7: 71