

CHAPTER 5. THE ROLE OF PHYSICAL EDUCATION IN PROMOTION OF PHYSICAL ACTIVITY: A GOOD CASE EXAMPLE

The IMPACT Intervention

To investigate whether the IMPACT model is effective to promote youth PA through PE, IMPACT researchers developed **educational material and webinars**. The aim was to train and help PE teachers to increase their effectiveness with regard to promotion of students' motivation and physical activity, especially for those who need it mostly. The webinars were developed in English, French, Greek, Italian and Turkish and were delivered to PE teachers of four countries: France, Greece, Italy and Turkey.

The educational material content was developed based on the various theories that were used to develop the IMPACT project model. Specifically, we used trans-contextual models for PA promotion through PE (Standage et al., 2003; Hagger et al., 2003; Papaioannou et al., 2004) that incorporated primarily Achievement Goals Theory (AGT) (Ames, 1992; Nicholls, 1989) and Self-Determination Theory (SDT) (Ryan & Deci, 2017) to increase pupils' motivation in PE, and social cognitive models including Theory of Planned Behavior (TPB) (Ajzen, 1991) and self-regulation models and behavior change techniques (Abraham, & Michie, 2008; Lock & Latham, 2006) aimed at the increase of PA (Carraro & Gaudreau, 2013; McEwan et al, 2016; Olander et al., 2013).

In total, **five webinars** were developed and delivered to PE teachers. Researchers also included a **sixth webinar** between webinars 4 and 5 in order to discuss with PE teachers various issues related to the application of the IMPACT project in schools. The webinars were delivered through the Big Blue Button platform that enables participants' interaction. The development of the educational material was an arduous and long process and lasted one year. Researchers adopted the following strategies in order to ensure that webinars' content will respond to PE teachers' needs and abilities: a) Visiting to schools and having formal conversations with PE teachers in the four countries took place (i.e. Greece, Turkey, Italy, and France) b) Literature review and adoption of effective intervention strategies that previous studies reported, and c) Organizing a significant number of online and in-person meetings where researchers based on the information gathered from the previous stages, the theoretical background used for the development of the program and the suggestion of the representatives of PE teachers' associations (e.g., EUPEA, CAPDI) and Ministries (i.e. Greek Ministry of Education and Turkish Ministry of Education) was discussed and decided on the structure and content of each of the five webinars.

All webinars had the following structure: a) Introduction (a brief introduction to the topic or problem), b) Explanation of the theory (fundamental principles without extending to theory analysis), c) Presentation of ideas how the theory can be converted into practice, d) Examples of best practices (included PE teachers' ideas and suggestions), and e) Discussion with PE teachers (recommendations, questions, etc.) and guidelines for the activities that teachers should follow during the implementation of the program.

Researchers developed the Webinars by allocating limited time for lecturing. On the contrary, (a) they included videos in which pupils demonstrate examples of applied theory to practice (e.g. a video with an example that students set goals by using S.M.A.R.T. acronym), (b) they probed PE teachers to make suggestions for a topic or exchange opinions about a specific topic by forming groups in chat rooms, and (c) they included multiple-choice questions (quiz or gallop, etc.) that PE teachers should answer.

The content of the five webinars

Webinar 1 included information about the purpose and the structure of the IMPACT. Additionally, participants were informed of the importance of daily physical activity and the role of physical education in the promotion of students' physical activity. The main aim of this webinar was to raise PE teachers' awareness of the limited time students spent in physical activities. An additional goal was to provide PE

teachers with useful information that they would use in order to increase pupils' awareness of the benefits of physical activity to their health and the recommendations of the World Health Organization about at least one hour of vigorous-moderate intensity PA daily.

Webinar 2 included useful information that would help PE teachers to increase students' enjoyment and motivation in PE. Additionally, PE teachers were informed about the key-concepts of achievement goals theory and self-determination theory. Finally, they have become key stakeholders in strategies that promoting empowering motivational climate and increase students' motivation in PE.

Webinar 3 included useful information for promoting students' motivation to participate in out of school physical activities by implementing self-regulated strategies (e.g. goal setting, self-monitoring, self-assessment). An emphasis was given to apply these strategies in an autonomous-oriented way.

Webinar 4 included the "Athlos" or "Team Pentathlon" program. This program was adopted in order to urge students to participate in out of school physical activity. The program lasted for nine weeks. PE teachers were asked to act as facilitators by helping students to apply during the implementation of the "Athlos"/"Team Pentathlon" program the information and strategies related to motivation and self-regulation that they had previously been taught. Students had to form teams and then to set personal and team goals for increasing physical activity by using strategies such as planning, evaluation, recording, and evaluation.

The aim of **webinar 5** was to promote teachers' self-reflection concerning the application of the IMPACT intervention through information about the findings of the IMPACT project. Additionally, PE teachers were informed about the ESTIMATE network. Additionally, strategies and procedures regarding the establishment of the ESTIMATE Coordinating Committee and the development and sustainability of this network were discussed among participants. Finally, PE teachers were invited to express their experiences with the program, their suggestion, and the evaluation of the program.

Between webinars 4 and 5 a **sixth webinar** with the PE teachers was also delivered to allow discussion between researchers and PE teachers concerning the application of the Athlos/Pentathlon program and to clarify issues that emerged during the implementation of the Athlos/Pentathlon program.

IMPACT project forum

An online forum was developed in the IMPACT website to facilitate discussion between PE teachers and exchange ideas.

Trained PE teachers and delivery of webinars

The webinars were delivered to **189 in-service PE teachers** in four countries (France, $n = 27$; Greece, $n = 68$; Italy, $n = 31$; and Turkey, $n = 63$). The duration of each of the five webinars was approximately 120 minutes. Members of the research team delivered the webinars in each of the four countries. The webinars in each country were recorded through the BigBlueButton platform and the material is available at IMPACT project's website.

The IMPACT webinars, teacher educational material and forum can be found at the IMPACT Project website (<https://www.impactpe.eu/site/index.php/en/about/webinars>).

Pupils participating in IMPACT project intervention

Participants in Time 2 (T2) measurement (May 2019) were 4169 pupils, aged 10 to 18 years old (Mage: 13.55 ± 1.99 years old) from 4 European countries (FR, GR, IT, TR; Table 37) where the IMPACT intervention program was implemented. These pupils had also participated in Time 1 (T1; October 2018) measurement (matched cases). Regarding their gender, 1933 were boys and 2201 were girls (one pupil reported "other"

and 31 did not report their gender). Pupils' sample was randomly divided into two intervention groups: 1) the **experimental group** consisted of pupils ($n = 2688$) whose PE teachers took part at the 5 online webinars in the academic year 2018-2019 and tried to implement the principles of IMPACT project during this period of 5 months and b) the **control group** consisted of pupils ($n = 1481$) whose PE teachers did not receive any training in the academic year 2018-2019 and continued to implement their regular teaching program. The cross-tabulations between pupils' gender and educational level with intervention groups are presented below in Tables 5.1, 5.2 and 5.3 respectively.

Research Ethics

All PE teachers participating in the control group received the IMPACT project training one year after the training of PE teachers in the experimental group, i.e., in the academic year 2019-2020.

All measurements and the application of the impact project were conducted following approval of the methodology from ethics committees of all implicating educational authorities, schools and universities. All pupils and parents provided written consent for their participation in the project. Several PE teachers who attended the webinars in the academic year 2018-2019 did not provide written consent from parents for Time 2 measurement and therefore their pupils did not reply to Time 2 measurements. The majority of the French pupils did not deliver this consent, thus reducing considerably the sample size from France.

Table 5.1. Cross-tabulation between country and intervention groups in T2 measure

	Experimental group		Control group		Total	
	Teachers	Pupils	Teachers	Pupils	Teachers	Pupils
France	14	149	9	112	23	261
Greece	56	1290	23	598	79	1888
Italy	23	517	21	487	44	1004
Turkey	24	732	12	284	36	1016
Total	117	2688	65	1481	182	4169

Table 5.2. Cross-tabulation between pupils' gender and intervention groups in T2 measure

Intervention groups			
	Experimental group	Control group	Total
Boys	1253	680	1933
Girls	1416	785	2201
Other	2	2	4
Total	2671	1467	4138

Notes. Thirty-one ($n = 31$) did not report their gender

Table 5.3. Cross-tabulation between pupils' age/educational level and condition in T2 measure

	Experimental group	Control group	Total
Primary school (age 11-12)	491	360	851
Secondary school (age 13-15)	1152	440	1592
High school (age 16-17)	1038	672	1710
Total	2681	1472	4153

Notes. Sixteen pupils ($n = 16$) did not report their educational level

Intervention Effects: Preliminary findings

Results from 2x2 repeated measures analyses of variance revealed that **experimental group pupils** (whose PE teachers had been trained through online IMPACT project webinars) **increased from T1 (October 2018) to T2 (May 2019) their out-of-school PA** compared to control group pupils (whose PE teachers had not received any training). Regarding the pre-intervention measure (T1), there were no significant differences in out of school PA, e.g., in the PACE+ measure between experimental and control group pupils: $F_{1,3980} = 2.365$, $p = .124$; on the other hand, there were significant differences in pupils' out of school PA between experimental and control group only at the post-intervention measure, e.g., in the PACE+ measure T2; $F_{1,3980} = 52.497$, $p = .001$.

Experimental group pupils reported higher levels of PA after IMPACT intervention compared to control group pupils. Findings shown in Figure 5.1 imply that the average days of PA in the total intervention group increased by approximately 0.3 days per week, while there was no increase in PA in control group.

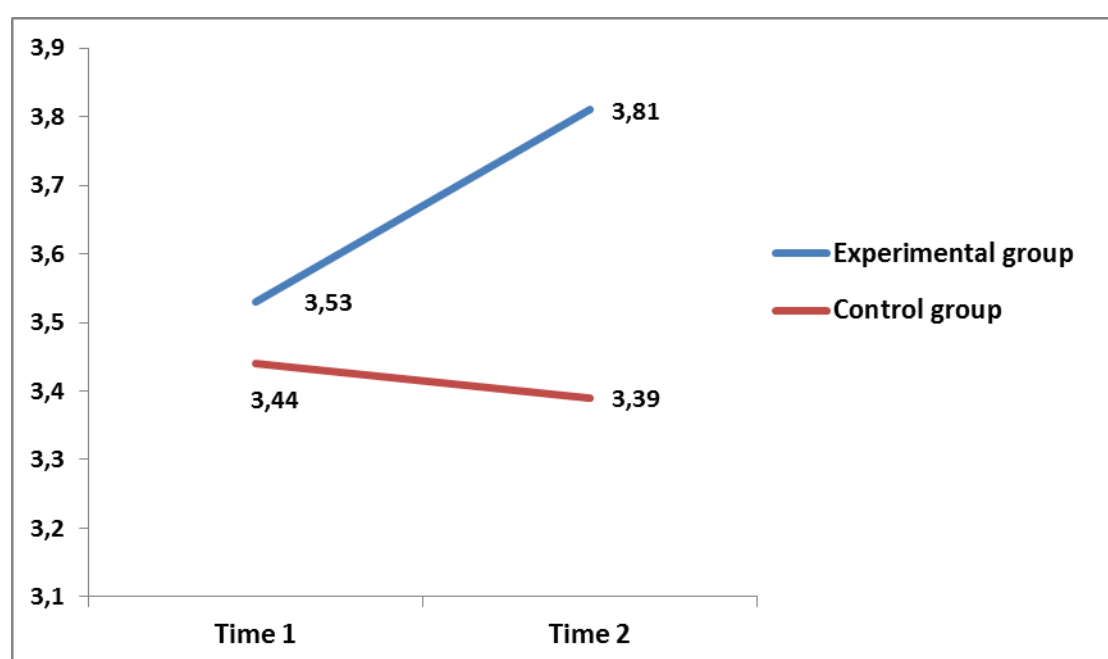


Figure 5.1. Effects of IMPACT project intervention on days of physical activity per week (PACE+ measure)

Intervention effects for students participating in goal-setting program or not

A key-feature of the IMPACT project program was promotion of self-monitoring and goal-setting for out-of-school PA. We did not expect that all PE teachers in intervention groups would implement the goal-setting program to promote out-of-school PA, because this is relatively new strategy for most teachers who had not been previously trained to adopt health-related PE curricula and might face several personal or external barriers to adopt rapid changes in their teaching. Without goal-setting pupils miss the opportunity to use both goal-setting and self-monitoring of their PA. Even if pupils apply self-monitoring, it is useless when it is not accompanied by deliberate goal-setting to improve levels of PA.

To capture the effects of goal-setting adoption on physical activity and its motivational determinants, in Time 2 pupils had indicated in T2 measure how often they participated in classes adopting self-monitoring which is requirement for goal-setting, and in classes requiring to set measurable goals to increase PA. Accordingly, they replied to the following items: “During the last 2 months, how many times has your PE teacher asked you to observe and record how often you did physical activity outside of school?”, and “Over the past 2 months, how many times has your PE teacher asked you to set measurable goals to improve your

physical activity outside of school?”. Responses were given on 5-point scales (1= never; 2 = 1-2 times; 3 = 3-4 times; 4 = 5-6 times; 5 = 7 or more than 7 times). Based on pupils’ answers, we divided the sample in the four groups shown in Table 5.4. That is, we classified students in groups including students who participated at least 1-2 times in self-monitoring and goal-setting programs (Mean score to the above items ≥ 2) and groups of students who did not (Mean score to the above items < 2). Missing cases either in reports of PA, or in the aforementioned scales precluded classification of 269 pupils from the total sample.

About 27% of students (N = 690) in experimental groups reported that their PE teacher had not applied goal-setting program to promote PA in their classes. Interestingly, about 46% of the students in control groups (N = 633) reported that their PE teacher implemented goal-setting programs to promote PA, suggesting that goal-setting to promote PA is a known strategy to several PE teachers who teach their pupils to adopt it. Good for the present intervention is the finding that among the four groups shown in Table 5.4, the largest one is **the experimental and goal-setting group comprising 47% of adolescents of the total sample (N = 1832)**, implying that the majority of PE teachers who received the IMPACT project training applied the goal-setting program in their classes.

Then we conducted 2 (time) x 2 (condition-group) repeated measures Analyses of Variance using physical activity and its determinants as dependent variables.

Table 5.4. Classification of pupils into four groups according to their participation in goal-setting program to promote Physical Activity

Mean score in goal-setting & self-monitoring items		Condition - 4 groups				Total
		Control NO monitoring/ goal-setting	Control YES monitoring/ goal-setting	Experimental NO monitoring/ goal-setting	Experimental YES monitoring/ goal-setting	
Frequency of participation in goal- setting program	1.00	566	0	427	0	993
	1.50	179	0	263	0	442
	2.00	0	271	0	417	688
	2.50	0	95	0	206	301
	3.00	0	136	0	358	494
	3.50	0	44	0	179	223
	4.00	0	31	0	236	267
	4.50	0	15	0	98	113
	5.00	0	41	0	338	349
Total		745	633	690	1832	3900

Effects of intervention on physical activity

- Adolescents in **Experimental and goal-setting groups** reported **higher increase from T1 to T2** in reported **days of Physical Activity**, in comparison to other groups (Figures 5.2 & 5.3). These findings imply that **the IMPACT project and the content of webinars were effective in terms of promoting European adolescents’ physical activity**.
- Adolescents in the **control group** whose teachers implemented **goal-setting** had **no significant change** in physical activity from T1 to T2, indicating that goal-setting is necessary but not enough if it is not accompanied by strategies to increase pupils’ motivation.
- Physical activity of adolescents in **control and no-goal setting** program **decreased from T1 to T2**, due to developmental effects when no particular intervention takes place.

- **No increase but neither decrease** in physical activity emerged for **experimental group** pupils whose teachers **did not apply goal-setting** programs, implying that strategies to increase pupils' motivation might act as a buffer for the decrease of adolescents' physical activity, but they are not enough if they are not accompanied by goal-setting programs to promote out of school physical activity.
- Regarding **physical active days per week in out of school PA**: in the **experimental and goal setting group** the percentage of **relatively active pupils increased by 7%**, while the percentage of **very inactive pupils decreased by 11%** (Figure 5.3).
- Regarding **hours per week in out of school PA**, in the **experimental and goal setting group**, the percentage of **very active pupils increased by 7.5%** while the percentage of **inactive pupils decreased by 7.3%** (Figure 5.4).
- On the other hand, in the control/no goal-setting group there was a 5% increase of very inactive pupils (days/ week).

Days of out-of-school Physical Activity

Intervention had positive effects (experimental & control group)

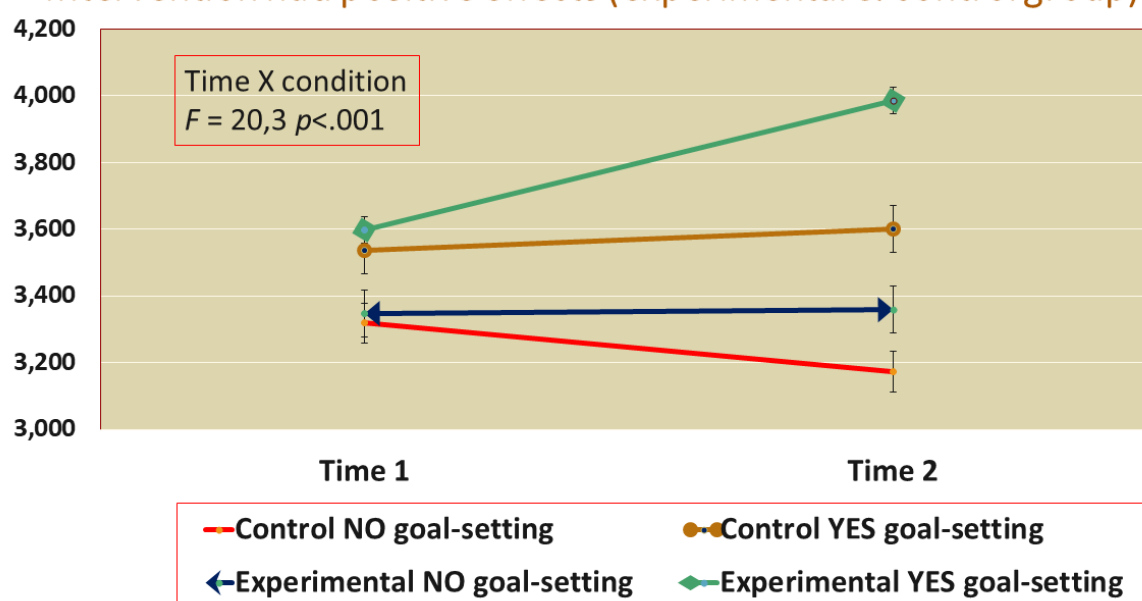


Figure 5.2. Effects of IMPACT project intervention on Days of out-of-school Physical Activity per week. Vertical lines indicate Standard Errors at 95% levels of confidence.

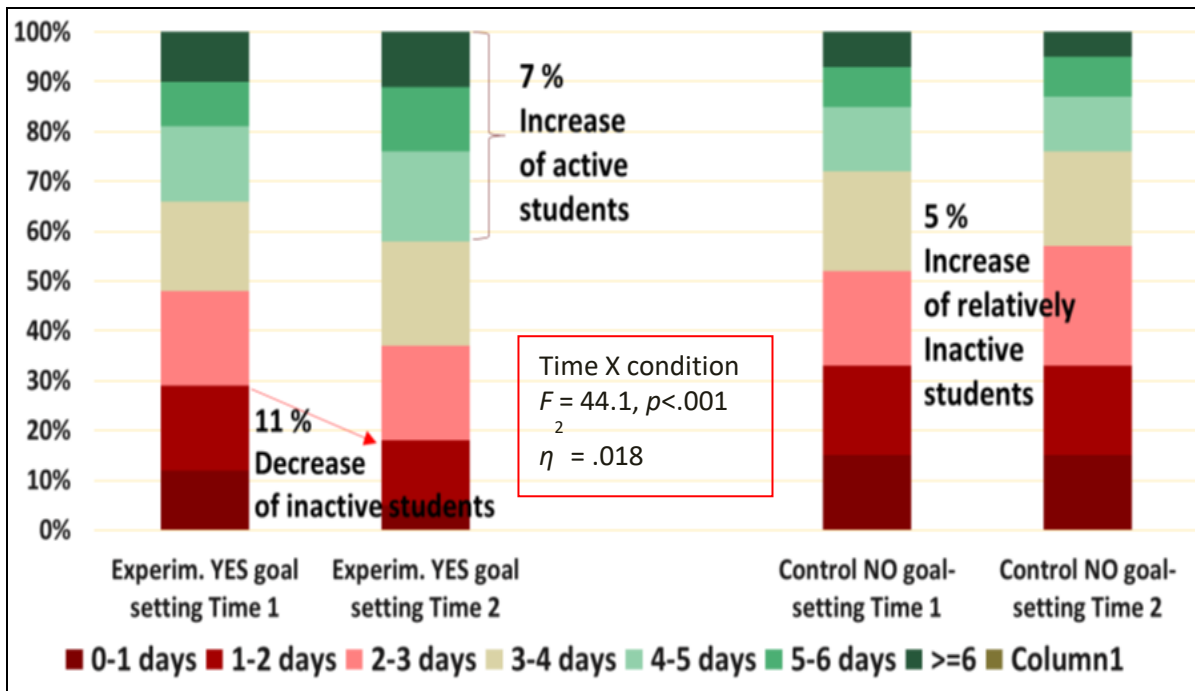


Figure 5.3. Effects of IMPACT project intervention on Days of out-of-school Physical Activity per week

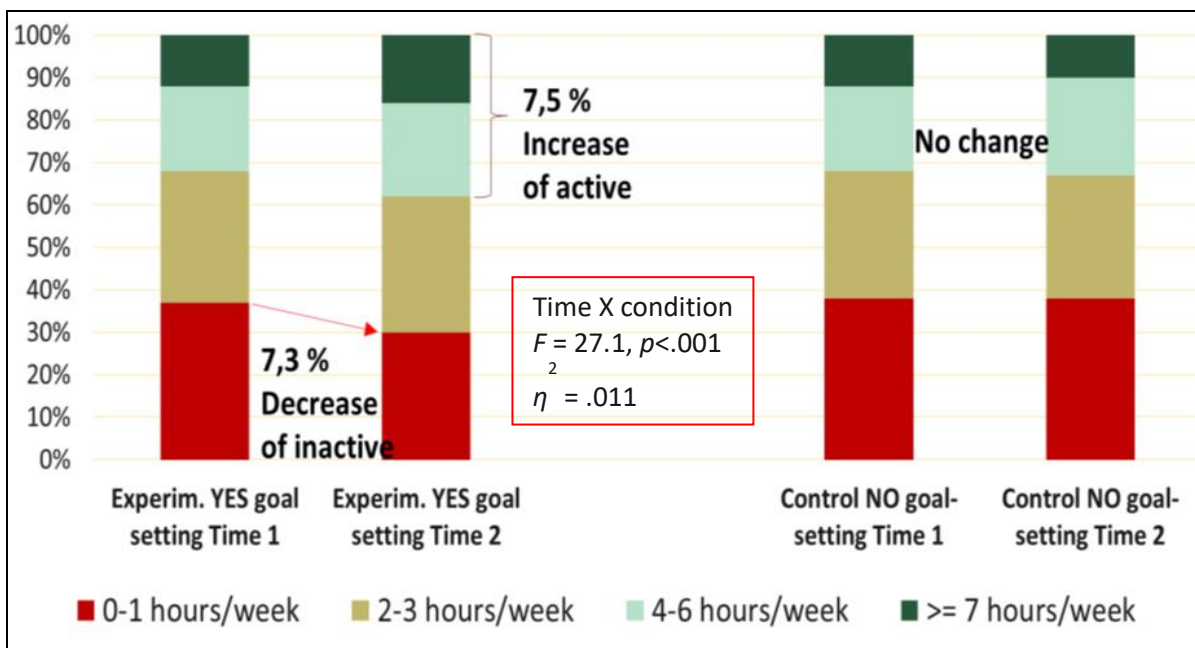


Figure 5.4. Effects of IMPACT project intervention on Hours of out-of-school Physical Activity per week

Effects of intervention on self-monitoring and action planning

Results reported in main study imply (Chapter 4) that it is important to teach adolescents to use self-monitoring and goal-setting/planning for PA. Findings from IMPACT project intervention imply that **only experimental and goal-setting group pupils increased substantially the adoption of self-monitoring strategies from T1 to T2** (Figure 5.5). Pupils who reported that their PE teachers did not apply goal-setting programs, either in experimental or goal control groups, slightly decreased self-monitoring from T1 to T2, indicating that the use of goal-setting programs is necessary to promote the adoption of self-monitoring strategies from adolescents. Pupils in control and goal-setting groups slightly increased their self-monitoring strategies from T1 to T2, but less likely than pupils in experimental and goal-setting groups. This finding implies that the emphasis on personal progress, mastery climate and all motivational strategies adopted in the IMPACT project are also necessary to boost adolescents' self-monitoring.

Similar results emerged with regard to the adoption of action planning strategies. Again the adoption of goal-setting programs had significant positive effects on action planning for students either in experimental or control groups, but the positive effects were significant and more pronounced in experimental groups (Figure 5.6). This also underlines that goal-setting programs are not enough to promote self-regulatory skills such as self-monitoring and action planning, if they are not accompanied by strategies emphasizing personal progress within an empowering climate supporting and motivating all pupils to progress.

Change in Self-monitoring strategy

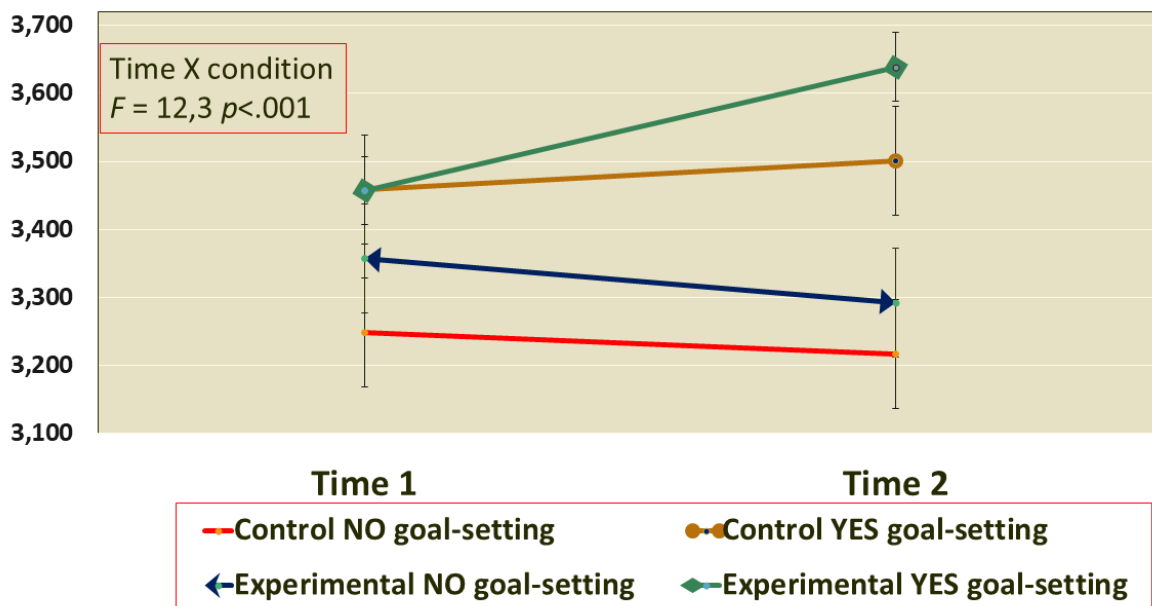


Figure 5.5. Effects of IMPACT intervention on Self-monitoring strategy. Vertical lines indicate Standard Errors at 95% levels of confidence.

Change in Action Planning strategy

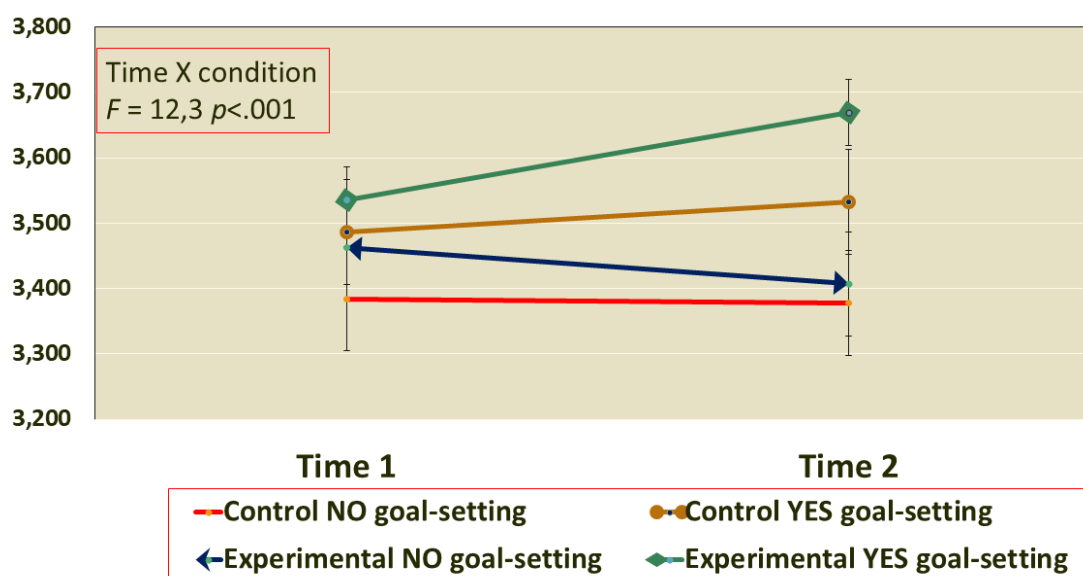


Figure 5.6. Effects of IMPACT intervention on Action Planning strategy

Effects of intervention on mastery climate and needs satisfaction

The results shown in Figure 5.7 imply that the IMPACT project intervention and goal-setting programs in particular acted as a buffer to inhibit the decrease of mastery climate that emerged in groups where no goal-setting program was applied. The adoption of goal-setting programs help pupils to monitor their progress and reinforce their belief that through effort and adoption of measurable challenging goals they can become more physically active, which is important to their health. On the other hand, not adoption of goal-setting programs in PE decrease pupils' perception that PE is mastery-oriented and participation in this kind of PE classes does not help them to progress.

As shown in Figure 5.8, from T1 to T2 pupils in goal-setting programs also increased their scores on perceived autonomy need satisfaction. When pupils are allowed to set their own goals, they perceive that they have autonomy is supported. Interestingly, while there was also a slight increase of autonomy support in experimental and no goal-setting group, perception of autonomy support slightly decreased in control and no goal setting group. Taking into consideration that the higher increase from T1 to T2 in autonomy support emerged in experimental and goal-setting group, these findings imply that PE teachers receiving the webinars managed to implement some strategies focused on support of pupils' autonomy.

Change in Teacher-initiated Mastery climate

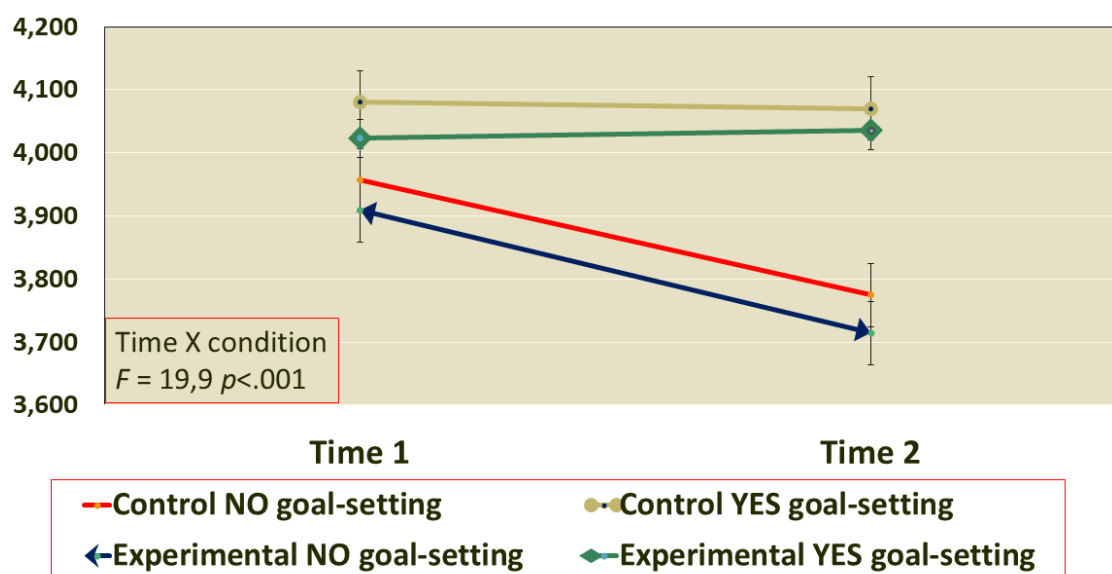


Figure 5.7. Effects of IMPACT intervention on Teacher-initiated Mastery Climate

Change in Autonomy Support

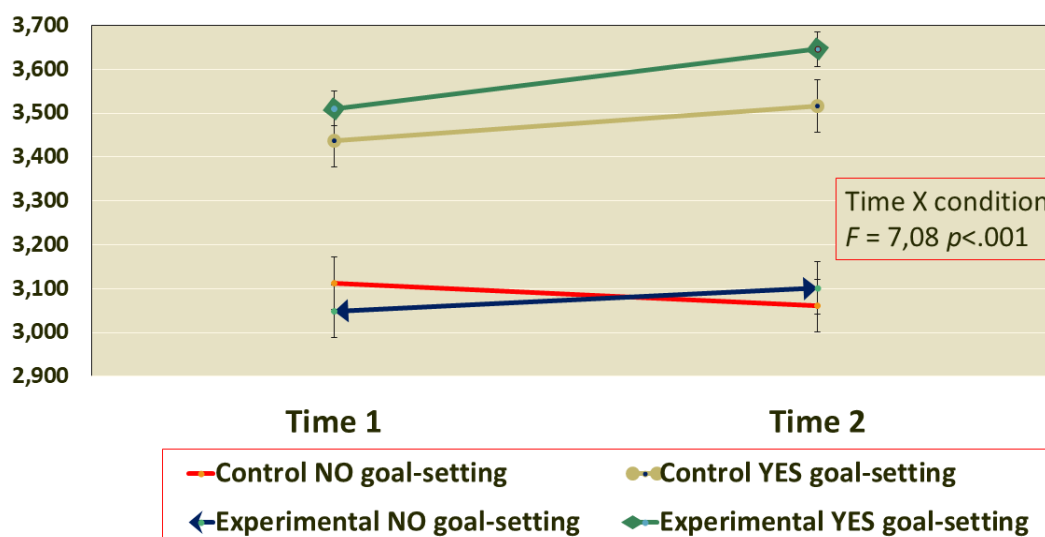


Figure 5.8. Effects of IMPACT intervention on Autonomy support

Summary

Educational material for five 120-minute webinars was developed and delivered concurrently online across four European countries, training **189 PE teachers** who applied the IMPACT project guidelines to their adolescent pupils. Matched responses to Time 1 and Time 2 measurements from 4169 pupils ($n = 2688$ experimental, $n = 1481$ control) revealed that:

- **The IMPACT project training was effective in terms of promoting European adolescents' Physical Activity (PA).**
- The effects of the IMPACT project intervention on adolescents' PA were evident when the trained PE teachers applied the goal-setting program for PA promotion.
- The application of goal-setting programs from PE teachers who were not trained to apply IMPACT project motivational principles, did not promote PA. Goal-setting alone is not enough to promote PA if it is not accompanied by the application of motivational principles.
- The IMPACT project intervention was particularly effective for physically inactive pupils, i.e., those who mostly need PA.
- The IMPACT project intervention was particularly effective for the promotion of self-monitoring and action planning, but also for the maintenance of a positive motivational climate in PE.