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Impact of a French social marketing campaign to increase parental support and physical activity in adolescents aged 11–14 years: a longitudinal study

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Abstract

Background Due to the lower prevalence of adolescents meeting the physical activity guidelines, Santé Publique France launched a social marketing campaign aimed at their parents in September 2022. This campaign aimed to increase parental support and ultimately, adolescents' physical activity.
The objectives of this study were to evaluate the variations in 1) the determinants of parental support, 2) parental support, and 3) adolescents' physical activity reported by parents between before and after campaign.

Methods A prospective study was conducted on the Internet. A representative sample of 4,005 French parents (69.7% of women, 53% less than 45y old) was recruited and questioned before the campaign (T0), just after its end (T1), and 9 months later (T2). Analyses were conducted at T1 and T2, with 2,808 and 2,173 parents responding, respectively. The association between changes in the indicators and recollection of the campaign was assessed using adjusted generalized estimation equation models. Data were weighted according to the socio-demographic distribution of the French population.

Results Overall, parents who recalled the campaign increase more their self-efficacy for helping their adolescent find an enjoyable sport w at T1 ($p < 0.05$), especially among the parents of girls ($\beta = 0.06$, $p = 0.03$) and from a low socio-professional category ($\beta = 0.06$, $p = 0.02$). Parents who recalled the campaign gave more encouragement to their adolescent ($\beta = 0.04$, $p = 0.04$).
Among parents with a low level of different indicators at T0, recalled of the campaign was associated with more positive attitude by encouraging their adolescent to be physically active at T1 ($p = 0.04$) and T2 ($p = 0.0008$) and by taking part in physical activity with their adolescent at T1 ($p = 0.0009$); practice of physical activity with their adolescent more frequent at T1 ($p = 0.0003$). and high physical activity for its teenager ($p < 0.05$).

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Conclusions This evaluation showed positive and encouraging results, with some even maintained over the long term. Given these promising results, the campaign has been rebroadcast. Its effectiveness will be investigated with the same cohort of parents.

Keywords Physical activity, Adolescents, Parents, Social marketing, Parental support

Background

In children and youths, physical activity confers positive benefits on physical, mental, psychological, cognitive, and social health, not to mention academic achievement [1, 2]. International guidelines recommend that they should do at least an average of 60 min per day of moderate to vigorous physical activity across the week [1, 3]. Unfortunately, as mentioned by the 2022 Report Cards from 57 countries [4], the prevalence of children meeting the physical activity guidelines decreases with age. In France, the Esteban study observed a decrease in physical activity among 11–14 year-olds, with only 33% of boys and 20% of girls deemed to reach the physical activity guidelines [5]. In this context, and because physical activity practiced during childhood is a predictor of physical activity practiced during adulthood [6], promoting physical activity among adolescents is a major public health issue in France [7].

Several reviews identified the determinants of physical activity in adolescents, including individual, interpersonal, social, and environmental factors [8–10]. An important and modifiable interpersonal determinant identified in these reviews is parental support which corresponds to behaviors with its core components being encouragement (e.g., encouraging an active lifestyle), logistical support (e.g., facilitating physical activity, enrolling children in sport), and co-activity (e.g., jointly engaging in physical activity) [11]. A recent qualitative study conducted in Slovakia on a sample of 24 adolescents with the aim to identify barriers and enablers for adolescents' physical activity from their own point of view identified also the importance of parental support [12]. In a Canadian study, Doggui et al. [13] found that parental support provided to children or adolescents was associated with higher levels of physical activity in the long term. Given their important role in encouraging physical activity among adolescents, parents' involvement in interventions aimed at promoting physical activity would seemingly increase its effectiveness. interventions for adolescents could have a greater impact if they also involved the family.

The effect of mass-media campaigns to increase PA has been extensively studied over the past decades and summarized in various reviews [14]. Several impacts have been observed, including changes in individual psychological determinants related to PA (e.g., intentions, attitudes and knowledge) as well as changes in PA behaviors [14]. Because parents are a key determinant to increase the physical activity for their children, and in regard to the conclusion of the Physical Activity Guidelines Advisory Committee [15] which concluded that intervention including family have greater impact on adolescents' physical activity; mass media campaign promoting physical activity adolescents should include their parents [15, 16]. To our knowledge, only two other mass media campaigns have been developed to increase adolescents' physical activity by promoting parental support: notably, the Verb campaign [17] and the "Think Again" campaign. In the Verb campaign, launched in the US in the early 2000s, parents were asked to support, recognize, and praise their children for being active; to encourage them to try new activities; and to be physically active as a family or group. In the "Think Again" campaign [18], launched in Canada in 2011 by the ParticipAction organization, the aim was to draw parents' (and specifically mothers') attention to the amount of physical activity undertaken by their children relative to the national guidelines. However, these two campaigns did not target specific determinants of parental support, although the scientific literature has highlighted determinants from the theory of planned behavior [19].

The Canadian authors Rhodes et al. [11] examined the predictors of parental support and adolescents' physical activity based on the theory of planned behavior [19] using structural equation modeling. The theory of planned behavior included the attitude toward adolescents' physical activity (evaluation of the perceived impact of adolescents' physical activity) attitude toward parental support (evaluation of the perceived impact of parental support), and perceived self-efficacy regarding parental support (ease/difficulty of performing parental support) as determinants of parental support, which was itself the determinant of adolescents' physical activity. The authors concluded that the only determinant associated with both parental support and adolescent's physical activity was perceived self-efficacy regarding parental support. This study also showed that the parents already had a high level of positive attitude toward adolescents' physical activity and toward parental support, whereas the level of self-efficacy had a potential for improvement. Interventions aimed at parents should therefore focus on improving their perceived self-efficacy in order to increase parental support and ultimately, adolescents' physical activity.

Interventions should also pay attention to girls and adolescents of parents with a low socio-professional

status, education level or physical activity level, as these adolescents have been shown to have lower levels of physical activity [5, 20]. Indeed, the French representative ESTEBAN study observed that girls practiced less physical activity than boys (34% of boys attained the physical activity guidelines vs 20% of girl). In this report, adolescents with parents of high educational level practiced more frequently sport in a club than adolescents with parents of low educational level (86% vs 75% for boys and 87% vs 65% for girls filles).

To increase adolescents' physical activity, Santé publique France – the French public health agency – implemented a social marketing campaign in 2022. Briefly, social marketing consists of using commercial marketing techniques to encourage healthy behaviors [21]. This campaign had two components:

- One part directly targeted adolescents, with the specific aim to increase their desire to be more active through regular solicitations via a playful app designed to spark their immediate interest in engaging in physical activity through challenges and a reward system.
  The campaign's other part targeted the adolescents' parents, aiming to encourage them to actively support their children in engaging in physical activity by strengthening their sense of self-efficacy. This study will focus on this second part in direction to adolescents' parents.

The objectives of this study were therefore to evaluate the effect of the campaign recall, that targeted parents with regard to variations in 1) the determinants of parental support (i.e., attitude toward adolescent's physical activity, attitude toward parental support, and perceived self-efficacy regarding parental support), 2) parental support, and 3) adolescents' level of physical activity between before and after the campaign. It also investigates whether the effect differs with respect to the adolescents' sex or the parents' socio-professional status, education level, and physical activity was also investigated.

Methods

French media campaign "Faire bouger les ados"

A new national social marketing campaign was launched on September 1, 2022, by Santé publique France. The 1-month campaign called "Faire bouger les ados" (in English "Get teens moving") included several communication tools that were broadcast throughout the campaign. The theory of planned behavior was the theoretical model that guided the development of this campaign, complemented by the findings of Rhodes et al., which highlight the need to focus on parental self-efficacy in relation to parental support [11].

One 30-s TV spot (adapted as a 15-s spot for social media)

This TV spot emphasized a key form of parental support: offering encouragement. A recent study concluded that encouragement was the type of parental support most associated with adolescents' physical activity [13]. The objective of the TV spot was to motivate parents to encourage their adolescents to be more active, even when it feels challenging.

Three 25-s radio spots

To help design the campaign, a qualitative exploratory study was conducted among 60 parents of adolescents and 45 adolescents. This unpublished study revealed that many people lack a clear understanding of what constitutes physical activity. Therefore, the first radio spot explained what is meant by physical activity (e.g., active travel, informal sports games), and recalled the recommended physical activity guidelines for adolescents: at least 1 h of physical activity per day.

The two other spots focused on two forms of parental support: helping adolescents to find an enjoyable sport and practicing physical activities with them.

Seven internet banners

The qualitative exploratory study also highlighted parents' need for practical advice to increase the physical activity of their adolescents. Three Internet banners thus provided practical tips for parents to encourage their adolescents to be more active such as dedicating an hour per week to family physical activity, challenging their child to a jump skipping rope challenge, or participating in a photo challenge. Banners were linked to the mangerbouger.fr website for additional guidance.

Another two banners outlined the guidelines of physical activity and screen use for adolescents. These banners were linked to relevant articles on the mangerbouger.fr website.

Finally, two further banners encouraged parents to evaluate their adolescents' physical activity level using a test available on the mangerbouger.fr website. In the qualitative exploratory study, as in a Canadian study, the majority of parents wrongly believed their children were sufficiently active [22].

Study design

To assess the effect of this campaign, a 1-year prospective study was conducted from July 2022 to July 2023. A sample of 4,005 parents of adolescents aged 11 to 15 years was recruited in an access panel by a French market research company (BVA) and asked to complete a questionnaire on an Internet platform. The questionnaire was specifically develop for this study (Appendix 1 in Supplementary Material). The sample was selected according to quotas of sex, age, occupation, size of area of residence,

and region, thus reflecting a representative sample of French parents of adolescents. Parents were first interviewed before the media campaign (T0). All parents were contacted just after the end of the campaign (T1) and 9 months later (T2).

Study population

As presented in the Fig. 1, among the 4,005 participants interviewed at T0, 2,808 (70%) responded at T1 and were considered in the present analysis. Of them, 2,173 also answered at T2, which represents 54% of the population initially interviewed at T0.

Data were weighted according to the French socio-demographic distribution in 2022 in terms of sex, age, socio-professional category, region, and size of area of residence.

Campaign recall assessment

Recalling the social marketing campaign was measured using the self-reported campaign recall at T1 by consecutively showing participants the different communication assets used throughout the campaign (one TV spot, one of the three radio spots selected at random, one of seven Internet advertising banners selected at random). For each asset, parents were asked the following: "Here is an advertisement broadcast on television/radio/Internet. Please indicate whether you remember seeing it." Parents were considered to recall the campaign if they reported seeing at least one of the campaign's communication assets.

Parental support

Three forms of parental support were assessed at T0, T1, and T2:

- encouraging their adolescents to engage in physical activity on most days of the week (twice a week or less vs. three times a week or more);
- helping their adolescents discover an enjoyable sport (no vs. yes);
- engaging in physical activity together (less than once a week vs. once a week or more).

Determinants of parental support

The determinants of parental support investigated here were taken from the theory of planned behavior [19]. Three determinants were investigated at T0, T1, and T2:

- attitude toward the benefits of physical activity for adolescents: "It's important to me that my adolescent does enough physical activity."
- attitude toward the three types of parental support investigated: "In order for my adolescent to be physically active, is it important (or not) to…
  - encourage him/her to engage in physical activity on most days of the week;
  - help him/her discover a sport that he/she enjoy;
  - engage in a physical activity together."
- self-efficacy about the three types of parental support investigated: "Do you find it easy or difficult to…
  - encourage my adolescent to engage in physical activity on most days of the week;
  - help him/her discover a sport that he/she enjoy;
  - engage in a physical activity together?"

Because of the high levels of positive attitude and self-efficacy, these variables initially in four classes, were dichotomized for the analyses into 1- somewhat or 2-strongly disagree versus 3-totally or 4-somewhat agree for the positive attitude toward the benefits of physical activity for adolescents; 1- not very or 2- not at all important versus 3- very or 4- somewhat important for the positive attitude toward parental support; and 1- rather or 2- very difficult versus 3- very or 4- fairly easy for self-efficacy.

Adolescents' physical activity

Different types of physical activity among the adolescents were assessed by parents in the questionnaire at T0, T1, and T2:

- average daily duration of physical activity (weekdays and weekend) (< 1h/day vs. ≥ 1h/day corresponding to the physical activity guidelines);

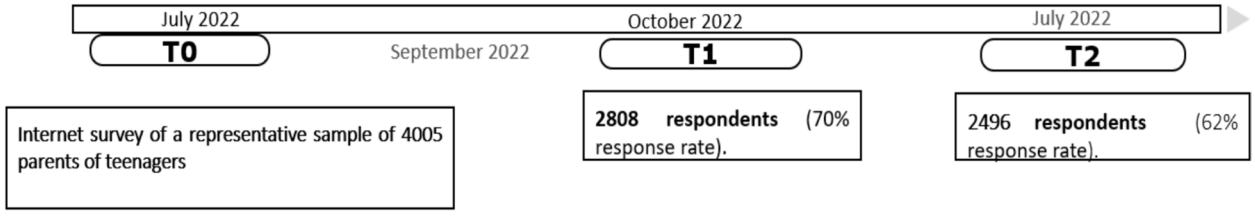


Fig. 1 Flowchart

- frequency of active travel to school (< 3/week vs. ≥ 3/week, i.e., most of the week or not);
- frequency of sports practiced in a club (excluding sport at school) (never vs. at least once per week);
- frequency of informal physical activities (never vs. at least once per week).

Covariates

Data on multiple potential confounding factors were collected at T0. In particular, parents' sex (male, female), age (≤ 50, > 50), area of residence (Paris / Paris suburbs, Northeast, Northwest, Southeast, Southwest), socio-professional status (high socio-professional status: manager, intellectual and middle-level professions, and self-employed; low socio professional status: manual workers; unemployed or retired), educational level (< high school diploma, high school diploma, > high school diploma), perceived financial situation (good financial situation, bad financial situation, refuse to answer), number of children, age of the adolescent considered in the questionnaire (11–12 years, 13–15 years), sex of the adolescent considered in the questionnaire (boy, girl), perception of the physical activity level of adolescent considered in the questionnaire (sufficient, insufficient), adolescent's practice of a sport (no, yes), and parent's practice of a sport (no, yes).

Statistical analysis

For present analysis, data were weighted according to the French distribution in 2018, provided by INSEE. The DAISIE software was used to weight the data with the margin calibration method.

Descriptive analysis

For all the investigated covariates, participants who recalled the campaign were compared to those who did not using Chi-square tests. All factors associated with recalling the campaign were included as confounding factors in multivariable-adjusted regressions.

Association analysis

Mixed models were used with random effects using generalized estimating equations to evaluate the association between the parents' campaign recall and the variation in parental support determinants, parental support, and adolescent's physical activity, between before and after the campaign. Mixed models were adjusted for some parental characteristics: sex, age, socio-professional status, education level, and practice of a sport. P-values reported were p-values of the interaction term: time*X variable.

To evaluate if the campaign increased these indicators among those with an initial low level of the dichotomized variable, interactions were tested between campaign recall and initial level of indicators. Interactions were found for each tested indicator ($p < 0.0001$). Multivariable-adjusted logistic regressions were thus performed among parents whose adolescent had an initial low level of physical activity, or who had an initial low level of parental support, or who had an initial low level of parental support determinant, to compare outcomes between participants who recalled the campaign at T1 and T2 and those who did not.

Interactions with socio-professional status, education level, and parental physical activity as well as adolescent's sex were also tested. Because mixed models were used, interaction between time and the X variable was integrated in the model, thus triple terms of interaction were used to assess potential interactions with socio-professional status, education level, and parental physical activity. For socio-professional status and education level, which were non-binary variables, the category of reference was low socio-professional status and < high school diploma.

Parents were considered to recall the campaign if they reported seeing at least one of the campaign's communication assets (i.e., TV spot, radio spot, or Internet banner).

Specific analyses were also performed regarding the recollection of each tool: recalling the spot TV, at least one radio spot, and at least one Internet banner.

All statistical analyses were performed using SAS Entreprise Guide V.7.1 (SAS Institute, Cary, North Carolina, USA). Statistical significance was set to $\alpha = 0.05$ for all analyses except for the interaction analysis, which was set to $\alpha = 0.10$.

Results

Study population characteristics

Individual characteristics of the study population are presented in Table 1. Overall, 66.0% of parents recalled the campaign. More specifically, 55.2% recalled the TV spots, 41.6% recalled at least one radio spot, and 29.1% recalled at least one banner (among them, 93% recognized at least one other support and 69% all three supports). Parents who recalled the campaign were more likely to have a low education level ($p = 0.0002$) and to practice a sport at least once a week ($p = 0.0006$). No statistical difference was observed regarding the parents' sex, age, or region of residence, or the adolescents' age, sex, or practice of a sport.

Determinants of parental support

Attitude about the benefits of physical activity for adolescents

Overall, the recall of the campaign had no impact on positive attitudes about the benefits of physical activity for adolescents ($p > 0.05$ at T1 and T2, Table 2).

Table 1 Characteristics of the weighted and unweighted study population[1] according to campaign recall ($n = 2,808$)

	Weighted population			Unweighted population	
	Campaign recall		*P*-value[1]	Campaign recall	
	Yes ($n = 1,840$)	No ($n = 968$)		Yes ($n = 1,840$)	No ($n = 968$)
Sex, %			0.9		
Male	30.2	30.4		30.3	29.9
Female	68.8	69.6		69.7	70.1
Age (years), %			0.7		
< 45	52.4	53.3		53.3	52.3
≥ 45	47.6	46.7		46.7	47.7
Region, %			0.3		
Paris / Paris suburbs	19.8	18.5		16.3	17.7
Northeast	23.4	22.2		23.1	24.5
Northwest	19.6	21.8		24.6	22.1
Southeast	21.2	19.7		17.9	19.3
Southwest	16.1	17.9		18.1	16.3
Socio-professional status, %			0.5		
Manager, intellectual and middle-level professions, and self-employed	55.5	49.7		49.4	55.1
Manual workers	41.5	47.0		47.3	41.9
Unemployed, retired	3.0	3.3		3.3	3.0
Education level, %			0.0002		
< High-school diploma	17.1	14.2		17.4	14.2
High-school diploma	26.3	21.1		26.6	21.6
> High-school diploma	56.6	64.7		56.0	64.2
Perceived financial situation			0.5		
Poor financial situation	56.1	56.6		57.3	56.5
Good financial situation	43.6	42.7		42.0	43.2
Refused to answer	0.3	0.7		0.7	0.3
Number of children			0.7		
1	18.2	18.8		18.7	18.1
2	49.0	50.0		50.1	49.2
3 or more	32.8	31.1		31.1	32.7
Age of the adolescent considered in the questionnaire			0.2		
11–12 years	54.6	52.2		52.1	54.4
13–15 years	45.4	47.8		47.9	45.6
Sex of the adolescent considered in the questionnaire			0.3		
Boy	53.1	51.1		53.1	51.2
Girl	46.9	48.9		46.9	48.8
Perception of the adolescent's physical activity level			0.2		
Sufficient	66.8	69.1		66.7	69.0
Insufficient	33.2	30.9		33.3	31.0
Adolescent's practice of a sport			0.6		
No	33.8	34.8		32.8	32.0
Yes	65.2	65.2		67.2	68.0
Parent's practice of a sport			0.0006		
No	44.6	51.3		44.7	51.4
Yes	55.4	48.7		55.3	48.6

[1] *p*-value for the comparison between campaign recall using Chi-square

Attitude about parental support

Overall, recalling to the campaign had no impact non positive attitude toward the three types of parental support ($p > 0.05$ at T1 and T2, Table 2).

However, among parents with an initial low level of positive attitude (Appendix 2 in Supplementary Material), those who recalled the banners more frequently showed a positive attitude for encouraging

Table 2 Association between the determinants of parental support and campaign recall[1]

	Positive attitude about the benefits to the adolescents' physical activity			
	T1		T2	
	β	*p*-value	β	*p*-value
Overall campaign recall	−0.005	0.6	0.006	0.5
TV spot recall	−0.003	0.7	0.001	0.9
Radio spot recall	−0.006	0.4	0.005	0.6
Banner recall	−0.008	0.4	−0.002	0.8

	Positive attitude about encouraging him/her				Positive attitude about helping him/her find an enjoyable sport				Positive attitude about being physically active with him/her			
	T1		T2		T1		T2		T1		T2	
	β	*p*-value	β	*p*-value	β	*p*-value	B	*p*-value	β	*p*-value	β	*p*-value
Overall campaign recall	−0.006	0.8	−0.1	0.5	0.01	0.5	−0.01	0.5	−0.0003	0.9	−0.02	0.4
TV spot recall	0.001	0.9	−0.03	0.2	0.007	0.6	−0.02	0.3	0.02	0.3	−0.01	0.5
Radio spot recall	−0.007	0.7	−0.01	0.6	0.006	0.6	−0.01	0.5	0.01	0.6	−0.01	0.6
Banner recall	−0.008	0.6	−0.007	0.7	−0.001	0.9	−0.008	0.6	0.03	0.2	−0.02	0.9

	High self-efficacy about encouraging him/her				High self-efficacy about helping him/her find an enjoyable sport				High self-efficacy about being physically active with him/her			
	T1		T2		T1		T2		T1		T2	
	β	*p*-value	β	*p*-value	β	*p*-value	B	*p*-value	β	*p*-value	β	*p*-value
Overall campaign recall	−0.03	0.1	−0.04	0.09	0.03	0.06	0.008	0.7	−0.007	0.7	−0.06	0.8
TV spot recall	−0.03	0.2	−0.04	0.07	0.04	0.03	0.006	0.7	−0.0003	0.9	−0.02	0.4
Radio spot recall	0.02	0.2	0.01	0.6	0.04	0.01	0.01	0.6	−0.01	0.6	0.002	0.9
Banner recall	−0.03	0.08	−0.07	0.05	−0.008	0.7	−0.01	0.6	0.01	0.6	−0.04	0.1

[1]adjusted on sex, age, education level, socio-professional status, and parental practice of sport

their adolescent to be physically active (OR 95%CI: 1.63 [1.03–2.57], p-value = 0.04 at T1 and 2.09 [1.21–3.60], p-value = 0.0008 at T2) compared to those who did not recall the banners. A similar trend was observed at T1 for the positive attitude regarding parents engaging in physical activity with their adolescent (1.55 [1.12–2.14], p-value = 0.0009).

Self-efficacy about parental support

Regarding self-efficacy about parental support, overall, the campaign significantly increased one form of self-efficacy wich was helping their adolescent find an enjoyable sport was observed between (β = 0.04, p-value = 0.03 at T1 for TV spot, and β = 0.04, p-value = 0.01 at T1 for radio spot recall, respectively, Table 2). An interaction was found with the adolescent's sex (p = 0.02 at T1 for overall recall, p = 0.02 at T1 for TV recall). When analyses were stratified by the adolescent's sex, this positive association between the recall campaign and self-efficacy for helping him/her to find an enjoyable sport was only observed among girls (β = 0.06, p-value = 0.03 for overall recall, β = 0.06, p-value = 0.01 for TV recall). Regarding the banner recall, an interaction with socio-professional status was found at T1 (p-value = 0.0003, data not shown). Analyses were then stratified by socio-professional status, and a significant positive association between campaign recall and self-efficacy about being physically active with their adolescent was found only among those with a lower socio-professional status (β = 0.06, p = 0.02, data not shown).

When analyses were conducted among parents with an initial low level of self-efficacy (Appendix 2 in Supplementary Material), those recall of the campaign was associated with higher increase of self-efficacy toward encouraging their adolescent at T1 (1.36 [1.01–1.84], p-value = 0.04) and at T2 (1.70 [1.20–2.40], p-value = 0.0003 for the recognition of banners). Similarly, those who recalled the radio spots significantly increased their self-efficacy for engaging in a physical activity with their adolescent at T1 (1.37 [1.07–1.75], p-value = 0.01).

Parental support

Among parents who recalled the campaign, a significant increase for the encouragements was observed (β = 0.04, p-value = 0.04) (Table 3).

More specifically, among parents with an initial low level of parental support (Appendix 3 in Supplementary Material), radio spots impact positively their practice of physical activity with their adolescent at T1 (1.63 [1.25–2.13], p-value = 0.0003). Regarding the banner recall, an interaction with socio-professional status was found (p-value = 0.07 at T1 and p-value = 0.01 at T2; data not shown). Analyses were then stratified by socio-professional status, and a significant positive association between campaign recall and being physically active with one's adolescent was found only among those with a lower socio-professional status (p-value < 0.0001 at T1 and p-value < 0.0001 at T2; data not shown).

Adolescents' physical activity

Overall, the campaign did not impact adolescents' physical activity evaluated by parents (p > 0.05 at T1 and T2, Table 4).

When analyses were performed among parents with an adolescent with an initial low level of physical activity (Appendix 4 in Supplementary Material), radio spots positively impact probability of practicing physical activity at least 1h/d during the weekend at T1 (1.74 [1.23–2.40], p-value = 0.008) and frequency of informal physical activities at T1 (1.57 [1.15–2.14], p-value = 0.004). Similar trends were observed for adolescents whose parents recalled the banners compared to those who did not recall, with a significant increase in the following:

- duration of physical activity practiced during the weekend (1.99 [1.38–2.87], p-value = 0.002 at T1 and 1.69 [1.10–2.60], p-value = 0.02 at T2);
- frequency of active travel for going to school (1.40 [1.05–1.86], p-value = 0.02 at T1 and 1.45 [1.03–2.03], p-value = 0.03 at T2);
- frequency of sport practiced in a club (1.59 [1.17–2.17], p-value = 0.003).

Discussion

Among the surveyed parents, almost two-thirds recognized the campaign, with a higher percentage of parents with a low education level and a low level of physical activity. Overall, the campaign increased self-efficacy regarding two forms of parental support in addition to one form of parental support: namely, being physically active with one's adolescent. Among parents with an initial low level of positive attitude, self-efficacy, or support, or those whose adolescent did little physical activity, several increases were found in terms of their positive attitude or self-efficacy toward parental support, parental support itself, and adolescents' level of physical activity. Some results specifically applied to parents with a low socio-professional status or among parents of girls. It is also encouraging to note that for this first broadcast of the campaign, some of these results were maintained over the long term.

Although parents are an important target for social marketing campaigns that aim to promote children's physical activity [23, 24], only a few campaigns have targeted them directly. To our knowledge, two campaigns

Table 3 Association between parental support and campaign recall[1]

	Encouraging him/her to be physically active most days of the week				Helping him/her find an enjoyable sport				Being physically active with him/her at least once a week			
	T1		T2		T1		T2		T1		T2	
	B	*p*-value	β	*p*-value	β	*p*-value	B	*p*-value	β	*p*-value	β	*p*-value
Overall campaign recall	0.02	0.4	0.02	0.4	−0.03	0.03	−0.01	0.5	0.04	0.04	0.03	0.2
TV spot recall	−0.005	0.8	0.02	0.5	−0.02	0.1	−0.01	0.5	0.02	0.4	0.02	0.3
Radio spot recall	0.03	0.2	0.05	0.05	−0.01	0.3	0.002	0.9	0.03	0.1	0.02	0.5
Banner recall	−0.006	0.8	0.05	0.06	−0.007	0.7	0.02	0.3	0.02	0.3	0.02	0.4

[1]adjusted on sex, age, education level, socio-professional category, and parental practice of sport

had similar aims to the "Get teens moving" campaign: the Verb campaign [17] and the "Think again" campaign [18].

Our results were consistent with the aim of our campaign, which was to improve parents' self-efficacy toward parental support based on the previous findings of Rhodes et al., which suggested that it was the only determinant associated with parental support and adolescents' physical activity [11]. Parents' awareness of our campaign was indeed associated with the improvement of self-efficacy for several forms of parental support, which is in line with the results of the "Think again" campaign. The effectiveness of the campaign seems to be higher for the parents of adolescents at risk of low levels of physical activity. The improvement in self-efficacy to help their adolescents find an enjoyable sport was only observed among the parents of girls. This is an interesting finding in light of the higher drop-off in physical activity among adolescent girls [5]. This result was all the more interesting regarding another recent French report indicating that the proportion of girls doing sport at least once a week in a club was 8 points lower than that of boys [16]. The campaign also increased self-efficacy and parental support for being physically active with their adolescents among parents with a low socio-professional status. This result is in line with our objective to avoid widening social inequalities in health.

Overall, no variation of attitude toward parental support was observed, but when analyses were focused on parents with a low level of positive attitude, some improvements were observed. These results confirm the interest of campaigns that promote parents' positive attitude and self-efficacy toward parental support, especially among those with a low socio-professional status.

In our study, awareness of the campaign was associated with an increase in one form of parental support: being physically active with one's adolescent. This finding is consistent with the results of the "Think again" and "Verb" campaigns, which showed that parents who were aware of the campaign engaged in more parental support behaviours [18, 25]. However, like the "Think again" campaign, our study showed this improvement was not maintained in the long term, suggesting that future broadcasts are needed to increase and/or maintain these initially encouraging results.

Our study showed encouraging and promising results: among parents who declared that their adolescents had a low level of physical activity and who recollected the campaign, several increases in different forms of physical activity were observed, some even being maintained in the long term. Literature regarding the effects of campaigns on adolescents' physical activity is, however, heterogeneous: in the "Think again" campaign, the positive effect on parental support did not result in a positive impact on adolescents' physical activity [18], whereas in

Table 4 Association between adolescents' physical activity declared by their parents and campaign recall[1]

	Physical activity during the week ≥ 1 h/d				Physical activity during the weekend ≥ 1 h/d				Active travel going to school ≥ 3/week			
	T1		T2		T1		T2		T1		T2	
	β	*p*-value	β	*p*-value	β	*p*-value	β	*p*-value	β	*p*-value	β	*p*-value
Overall campaign recall	−0.007	0.7	−0.008	0.7	0.03	0.06	0.02	0.4	0.03	0.2	0.02	0.4
TV spot recall	−0.03	0.2	−0.006	0.8	0.01	0.4	0.02	0.3	0.03	0.1	0.001	0.9
Radio spot recall	−0.004	0.8	−0.008	0.7	0.02	0.2	−0.001	0.9	0.01	0.6	−0.006	0.8
Banner recall	−0.003	0.9	−0.008	0.7	0.03	0.1	−0.002	0.9	0.02	0.4	0.008	0.7
	Frequency of sport lessons ≥ 1/week				Frequency of informal physical activities ≥ 1/week							
	T1		T2		T1		T2					
	β	*p*-value	β	*p*-value	β	*p*-value	β	*p*-value				
Overall campaign recall	0.008	0.7	−0.02	0.4	−0.002	0.9	−0.003	0.9				
TV spot recall	0.006	0.7	0.02	0.4	−0.007	0.7	−0.02	0.4				
Radio spot recall	−0.005	0.7	−0.02	0.3	0.03	0.1	0.01	0.6				
Banner recall	0.02	0.4	−0.02	0.2	−0.03	0.2	−0.04	0.06				

[1]adjusted on sex, age, education level, socio-professional status, and parental practice of sport

the Verb campaign, a positive impact was found with an enhanced effect after 2 years of broadcasting [26].

One major strength of this study was its prospective evaluation of several forms of parental support as well as their determinants, collected before and after the broadcast of the social marketing campaign with detailed information regarding potential confounding factors.

However, several limitations should be acknowledged. First, as the cohort involved volunteers, it included a potential selection bias. Their level of parental support or their adolescents' level of physical activity could thus be higher than in the general population, which limited their possibility for improvement. Despite multiple adjustments regarding the measurement of associations with campaign recall, a confounding bias could not be completely eliminated. Furthermore, 70% of respondents at T0 completed the questionnaires at T1 and T2. Despite post-stratification weighting, we can assume a potential attrition bias. Finally, some bias could appear regarding our questionnaire: firstly, the self-declared financial perception could induce a declaration bias, and secondly the physical activity level of adolescents was declared by their parents with an unvalidated questionnaire due to the length of the overall questionnaire.

In conclusion, this first French social marketing campaign promoting parental support with the ultimate aim to increase adolescents' physical activity highlighted some positive effect regarding the increase of self-efficacy or parental support among parents who recalled the campaign, sometimes even maintained over the long term. Even among parents who declared little physical activity for their adolescent, the campaign led to an increase in their physical activity practiced during the weekend, the frequency of active travel for going to school and of sport practiced in a club. The campaign's aim of not widening social inequalities seems to have been achieved, as improvements in self-efficacy about parental support (helping its adolescent to find an enjoyable sport and being active with its adolescent) and in parental support itself (being active with its adolescent) were sometimes found specifically among girls' parents or among parents with a low socio-professional status.

Implications

In view of these encouraging results, the campaign was rebroadcast in September 2023 and September 2024; its effects will subsequently be investigated using the same cohort of parents. Moreover, the theoretical model used for the development of this campaign was the theory of planned behavior, although it could be interesting for future campaigns to investigate the predictors of adolescents' physical activity changes using mediation analyses.

Abbreviations
OR Odds ratio
CI Confidence interval

Supplementary Information
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Supplementary Material 1.

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Authors' contributions
A-JS and PF designed the research; A-JS and PF conducted the research; PF performed the statistical analysis; A-JS, DT, and PF analyzed the data; PF wrote the paper; A-JS, DT, FR, HE, and PF revised the paper for important intellectual content; PF had the primary responsibility for the final content; A-JS, DT, FR, HE, and PF read and approved the final manuscript.

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Data availability
The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate
In accordance with law N° 2021 – 300 (March 5, 2012), this observational study did not require approval by an ethics committee or informed consent. This study was not subject to the Jardé law since it did not fall within the scope of Article R.1121–1 of the French Public Health Code. The studies were conducted according to the guidelines laid down in the Declaration of Helsinki. A panel of eligible respondents was surveyed and ethical measures were undertaken according to BVA's procedures. The processing of the personal data of BVA panel members was carried out in accordance with the European regulation "General Data Protection Regulation (GDPR)". All participants were assigned unique identifiers by BVA. The unique identifier allowed registering in the panel and it is essential for BVA to manage the contacts with panelists. Researchers did not have access to identifying panelist data. Small incentives were given to parents for participation.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

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