Interactive communication in the process of physical education: are social media contributing to the improvement of physical training performance

Suyi Jiang1 · Chang Feng Ning2

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Abstract
The development of modern technologies and the use of social networks create an environment for the exchange of information, interactive communication, learning, and optimization of various processes. The study describes the results of the effectiveness of using various social media tools to increase the level of physical activity in people of different ages (12–35 years old). Effective tools for increasing the level of physical activity that can be used on social media have been considered. A survey created in Google forms was conducted to select research participants and group them; the pedagogical experiment is the introduction of social media tools to encourage users to do sports. The experiment involved 148 people of different age groups: adolescents, students, adults. After the experiment with the experimental group, there were 59.20% of participants with an average level of physical activity and 22.37% of participants with a high level of physical activity; in the control group, 31.58% of participants had a low level of physical activity, 48.70%—average, 10.53%—high. Most participants of all ages (88.16%) refrained from posting videos of their achievements on social media, while nine participants (5 pupils and 4 students) posted their achievements in the form of short video exercises or screenshots, and reports of exercises in mobile applications in their groups. The research results are applicable to various social groups and can be used to create private groups on social media to encourage physical activity. The data obtained can be used for further development of specialized training programs using digital technology and social networks.

Keywords Content · Exercise · Lifestyle · Personal trainer · Sports · Trainer · Video

1 Introduction

Physical activity is needed to maintain health, harmonious development, and a positive psychological and emotional attitude at different ages [1, 2]. Lack or poor level of physical activity leads to adverse health effects: an increased risk of cardiovascular disease, excess weight, problems with the musculoskeletal system [3]. Physical activity contributes to the development of motor, cognitive social and emotional skills, as well as the maintenance of health throughout life.

Recently, a variety of youth wellness concepts have been gaining popularity because of the increasing trend of deteriorating student well-being [4]. For example, about 84% of the students surveyed at a London university pointed to the need to strengthen physical education practices in higher education because they need to address unhealthy lifestyles during their studies [5].

Interactive learning is learning that involves interaction between students and the teacher, as well as between students [6]. The use of interactive tools contributes to the study of various subjects on a convenient scale. But for the effective use of interactive tools, it is important to be able to create e-courses, plan and conduct classes based on one’s own developments [7]. The introduction of interactive technologies in the process of physical education has a positive effect on the motivation for physical activity [8].

Social media content allows users to develop knowledge about the characteristics of exercise, movement, and physical fitness, as well as to find healthy lifestyle communities [9].

1 Department of Physical Education, Hohai University, Nanjing, China
2 Institute of Physical Education, Yancheng Institute of Technology, Yancheng, China
The use of social media allows learners to further study the educational material in their free time and provides opportunities to increase motivation to engage in physical exercise [10].

According to the research results, the use of the Ning platform for educational purposes strengthened the interaction between students, as well as between the teacher and the student; it increased students’ motivation, improved the microclimate in the classroom, optimized the exchange of educational materials, made it possible to use and increase students’ interest in the educational material [11]. Physical education teachers can use web tools to design their own exercises; students better understand content with the help of web tools [7, 12]. The use of interactive computer assistance is not a new phenomenon; its effectiveness has been confirmed experimentally [13]. Moreover, the use of innovative interactive approaches and social media tools can motivate adolescents to lead a healthy lifestyle, promote this idea with the help of social connections, authority, and a trend toward a healthy lifestyle [12].

The emergence of the coronavirus pandemic has caused one of the greatest demands of transforming the educational process in a new way in the twenty-first century [14]. It should be noted that the implementation of digital technologies in the learning process of some specialties (namely those that need direct contact between a student and a teacher) contains many opportunities and obstacles that directly affect learning quality [15]. Studies of a sample of students from 15 Korean universities on the effectiveness of implemented online physical education classes indicate that most students have begun to lose enthusiasm for the discipline’s classes. Researchers found that the main determinants of the success of the classes remained the provision of timely and high-quality feedback; thorough preparation of teachers for the classes, the reduction of system technical failures, and students’ motivation [16].

Physical exercise is a socially contagious behavior [9], and social intervention strategies along with peer influence can promote deviant behavior but can also have a positive effect on people’s behavior and lifestyle [8, 12].

2 Literature review

An interesting development for increasing the level of physical activity that is based on social comparison (Active2Gether system) was made by Klein et al. [2]. One of the main ideas of the system is that a healthy lifestyle can be maintained and achieved with the help of social support. In this system, social comparison is implemented at the individual level through the user ranking system and at the group level by displaying the average group indicators together with user data (that is, the user can see the position of their group in the ranking and their contribution to it) [2].

Child et al. [17] also note the possibilities of improving physical activity, namely the creation of outdoor walking groups for low-income communities with the help of social networks.

It has been found that social media can increase the level of physical activity of adolescents [10, 18] and adults depending on the content or purpose of use [19]. The use of social networks contributes to student motivation, allows users to create platforms and discussion forums for discussing topical issues and sports events, as well as maintains content relevance [11]. The contribution of social media tools to an increase in physical activity is described in detail by Korda and Itani [20].

Social media allow users to create healthy lifestyle communities that value physical activity and encourage participation in a variety of activities to promote a healthy lifestyle [20]. Giannikas [21] points out that physical education teachers need to learn and teach students to use Facebook for Education content to ensure effective leisure time including physical exercise. On the other hand, research on the interaction of physical education and sport students with their teachers on Facebook at a Turkish university indicates a passive response of the sample to this format of communication. At the same time, the study notes that the main determinant of this result was the low level of digital competence of teachers and the low differentiation of educational content in this social network [22].

Social media are a huge platform for personal development of trainers and physical education teachers [23]. In a study by Raggatt et al. [24], half of the participants (a total of 180 participants, of which 151 were women, average age was 23) indicated that they are interested in learning about health and fitness through online communities. The motives for this included not having to go to the gym and being able to do exercises at home. At the same time, it was noted that when studying information about physical exercise on social networks, many young women perceive a perfect body image that they would like to achieve; this can negatively affect their physical and mental health [24]. Therefore, it is important to be confident in the safety of the content for each user in accordance with their health grounds, goals, and other factors. A survey of sports management educators in North America found that educators consider the use of social media in education as a means of improving both teaching and learning, but in a real-case scenario, social media teaching strategies are hardly used there [25].

The students who participated in the research by Balciikanli [11] noted that they wanted teachers to use social networks more often because of accessibility and the desire to communicate with teachers in a relaxed manner; in addition, some students (in the study it is indicated that
the students are introverts) found it easier to communicate via social media rather than face-to-face [26].

E-learning tools and the use of social networks provide effective mechanisms for educating trainers and physical education teachers. According to the results of numerous studies, these are the possibilities of interactive communication, discussion of various issues, unrestricted and unlimited access to content, autonomy, competence [23, 27]. Thus, experienced trainers (n = 322, various sports) who have used Twitter also find it a valuable learning platform [23].

Various topics that are not available in the classroom can be studied with the help of social media. That is, Facebook can be used most advantageously [21]. Korda and Itani [20] argue that people often search for a solution to their health problems on social media; but this requires a careful approach and does not always help to achieve the desired outcome. Researchers have analyzed a variety of studies considering the impact of social media on physical activity and indicated the need for further developments and research. However, it is argued that social media can greatly promote physical activity and guarantee the anonymity of users and their preferences. Nevertheless, we do not know whether the exercises will be performed by those who saw them on the social network and how to measure the effect of information on the network on the performance of exercises or failure to do them.

Researchers have shown a positive relationship between youth exercise performance and a range of social skills, peer relationships, social behavior, respect, leadership, problem-solving skills, and responsibility [28]. The development of social skills in the context of physical education combined with the development of such skills on social networks, as well as the encouragement of an increase in the level of physical activity, should have a twofold positive effect.

According to the research [29], the use of social networks had a positive effect on the physical activity of students who led a fairly active lifestyle (exercising almost every day). However, a sedentary lifestyle (no exercise or lack of exercise) is also characterized by the frequent use of social media. Apparently, there is a difference in the purpose of social media use (finding and performing exercises, programs, or passive “surfing”). Students described as moderate social media users based on a Likert scale (once or twice a month!) were most likely to report doing intense daily exercise [29]. It follows that moderate use of social media brings the greatest benefit to physical activity levels. Other researchers have found that the use of online social media groups and self-control do not increase the level of physical activity in young people, but interactive communication through social media may have a more positive effect on encouraging physical exercise and the use of information related to it [24].

Experts note several possible roles of mobile applications in the improvement of the quality of physical education; these are tools used for communication, namely a whiteboard, a scoreboard, a display platform. I-pad applications can be used as classroom management tools, timer, music display, self-assessment, and feedback tools. Digital technology can improve children's motivation to exercise and contribute to the development of cognitive and motor skills [30].

Most studies have confirmed the effectiveness of the use of mobile technologies to increase the level of physical activity of users [31].

In connection with the apparent possibilities of using interactive communication on social networks to increase the level of physical activity, the purpose of the study was to check whether the use of social networks helps to improve the level of physical activity in people of different ages, and what methods of using social networks are appropriate and effective for increasing physical activity. It should be noted that a large number of publications are currently devoted to a detailed analysis of the implementation of interactive learning in various spheres of human activity. Due to the stringent requirement for continuous student–teacher interaction, the effective implementation of online learning technologies in physical education is a challenge for educational institutions, which currently lacks a sufficient research basis.

3 Methodology

3.1 Participants

The study involved 148 people who regularly (2–3 times a week) exercise due to social requirements (school attendance), or on their own initiative (fitness classes).

4 Research design

The choice of a social network as the basis for the formation of interactive environment was justified based on the statistics of the popularity of applications, calculated by the number of active users. In recent years, Facebook has been the undisputed leader in this ranking [32]. The selection of adult participants in the experiment (students aged 17–23 and adults aged 24–35) was carried out based on the requests on social networks obtained through advertising (a Facebook-based ad was placed (the ad reached about 25 public groups related to fitness and sports), where everyone who wanted to participate in the study sent a request with his
or her email information); persons interested in the experiment filled out a questionnaire (they noted the absence/presence of health problems and permission to publish the results) and based on the results of the survey, they were invited to join a private group on Facebook. School children aged 12–16 years (all from the same school) with no health issues (absence of diseases and injuries) could take part in the study with parental consent.

The questionnaire is available at: https://docs.google.com/forms/d/1tj-LXsMElzlhxmIuis35Ln4s1QFuc2INLMOfTP9BR_M/edit?usp=sharing. The participants were also interviewed based on Google form No. 1, which contained directive questions about the purpose of exercising and expected results (achievements, weight loss, better health). A sample questionnaire can be found in the appendix and is also available at: https://docs.google.com/forms/d/1Oj0mpN6gGMGvRKFOP8ipVVw5183c5hy1II1297mSs5U/edit?usp=sharing, or by QR code.

In order for the adolescents aged 12–16 to be allowed to fill out the questionnaire, the presence of one or two parents was required.

The level of physical activity of the participants after the experiment was also determined based on the results of the questionnaire contained in Google form No. 2 that was developed for the purpose of the study. Some questions differed for the control and experimental groups. For the experimental group, the form is available at: https://docs.google.com/forms/d/1bVhT_HYOp6TgLcz7gwY_Vy_shLtZTwGp1MeWGB/edit?usp=sharing.

For the control group, it can be found at: https://docs.google.com/forms/d/1O3bS3kR9oUaJ1jpgYF-rWe8hP_TVelgm-VKUtGoORco/edit?usp=sharing.

The important responses included the number of hours per week devoted to sports, the presence/absence of classes with a personal trainer, participation, or non-participation in competitions/sports games, going to the swimming pool, or going to the gym.

4.1 Social media tools used in the experiment

To increase the level of physical activity, the following tools were used:

- For all age groups—advertisements of various fitness classes in the form of content posted in a private group; announcements of sports events that can be visited in order to develop knowledge about sports; monitoring the dynamics of one’s own progress based on the information shared in the group (completed a set of exercises, swam a distance in the pool, completed the set of exercises found in the application, learned how to perform the exercise, etc.), comparison of oneself with other group participants (this one is optional);

- For students aged 12–16—posting videos of their own achievements, moments of competitions; films and videos encouraging participation in sports or physical activities; advertisement of fitness applications (home workout and Adidas training);

- For adolescents aged 17–22 and adults aged 23–35—creation of groups with certain content; advertisements and an opportunity to find a personal trainer; advertisement of fitness applications (home workouts and Adidas training); creation of events (cycling, jogging, competitions). Optionally, the participants posted videos featuring exercises or sets of exercises done to analyze their performance, increase the motivation of other participants, and monitor the results achieved. Table 1 describes the tools used in different age groups.

| Table 1 | Experiment participants and social media tools used in the experimental groups |
|---------|--------------------------------------------------|
| Number of participants in the age group (number of participants in the control and experimental groups, age) | Type of physical activity | Purposes of social media use in the experimental groups |
| n = 52 (n = 26—control group and n = 26—experimental group), 12–16 (students) | Attendance of physical education classes | To demonstrate achievements; to post the results of games and competitions held in the classroom; to reward students and support students who cannot complete certain tasks (publishing a video, an exercise, a text with an explanation, as well as something motivating and eliminating fear) |
| n = 46 (n = 23—control, n = 23—experimental), 17–22 (students) | Attendance of group fitness classes | Completion of programs published in private groups on social networks (Facebook) or fitness app programs; announcement upon the completion of the program tasks; sharing one’s own achievements (optional) |
| n = 50 (n = 25—control, n = 25—experimental), 23–35 (adults) | Publication of activities (swimming, water aero- bics, CrossFit) to attract people and, accordingly, to improve the level of physical activity |
All the participants in the experiment were required to visit the Facebook group once a week, scroll the feed, watch videos (optional) posted by other participants or share their own one.

### 4.2 Resources required to conduct the experiment

All participants were required to be able to access a private Facebook group from any device; schoolchildren of 12–16 years old were allowed to use their parents’ accounts. To implement social media tools, 3 private groups were created (for different age groups).

The following tools were used in the group (according to the study by Korda and Itani [20]):

- Web blogs;
- Microblogging;
- Social networking healthcare websites;
- Video widgets;
- Distribution of content (sports, mobile applications, etc.).

Difficulties associated with the experiment include control over the content (whether it has been viewed or not) and the amount of time spent on social media, as well as the impossibility to determine whether those who have seen the content have completed the exercises/are going to do them/ or are going to the gym.

However, studies considering the impact of social media content show its practical effect (that is, exercise, lifestyle changes, and so on) on the user, and the results of physical activity surveys have been validated. To check whether everyone saw the content and an advertisement in the form of a post in the group, the participants were asked to “like” a certain message. However, it was difficult to determine whether they had carefully studied the content or simply “liked” the post. This could be assessed based on comments but forcing the participants to write comments would contradict the idea of the experiment (social networks are used to simplify and optimize physical activity).

### 4.3 Requirements for participants of different age groups to perform proposed physical activities or attend sporting events

To perform the proposed exercises, adolescents aged 12–16 had to agree with their parents on the attendance of additional classes, the pool, competitions, or workout sessions with a personal trainer; the adolescents’ parents gave their permission and coordinated these classes with trainers and the management of fitness clubs and pools personally.

Students and adults arranged classes with trainers and the management of fitness clubs and swimming pools in person or by phone.

Schoolchildren performed physical exercises from fitness applications under the supervision of parents (online via Skype, Zoom, Viber, or in person); physical education teachers could also control the performance of such exercises (by prior agreement).

Students and adults performed such exercises on their own with the fulfillment of the condition to monitor their state or under the supervision of trainers (online via Skype, Zoom, Viber, or in person by prior agreement).

The exercises were performed in the afternoon after school or work and the experiment lasted for 6 months (September 2019–May 2020).

### 4.4 Determining the effect of social media on the level of physical activity

The level of physical activity was determined based on Google form No. 2 that was completed once a month; based on the results obtained, the metabolic equivalent was calculated as an indicator of the level of physical activity [33]. In the form, the participants noted the time spent on physical exercises, the number of classes a week, and had the opportunity to make notes, record new skills and sports achievements. This option to monitor the level of physical activity was recognized as valid—the agreement between survey results and observation ranged from 73.4 to 86.3% [34].

The answers to the survey questions were processed with the help of the mathematical techniques in Google tables, which allow calculating statistics (the Wilcoxon test) and comparing the presence/absence of certain elements of physical activity. The participants were also interviewed based on Google form No. 2, which contained directive questions about the purpose of exercising and expected results (achievements, weight loss, better health). The questionnaire is available at: https://docs.google.com/forms/d/1Oj0m pN6gGMGvRKFOP8ipVVw5183c5hyIIII297mSs5U/edit?usp=sharing.

The level of physical activity of the participants in the experiment was determined based on the results of the surveys; the important answers were the number of hours per week devoted to sports, the method of getting to work and the time the activity takes, the presence/absence of classes with a personal trainer, participation, or non-participation in competitions/sports games.

The experiment lasted for 6 months (September 2019–May 2020).

The level of physical activity was analyzed using the metabolic equivalent [33]. The metabolic equivalent was calculated using the number of physical activity numbers indicated in Google form No. 2, in which the participants noted the amount of time spent on exercise and the frequency of classes per week, and had the opportunity to make notes, record new skills and sports achievements. This option to
monitor the level of physical activity was recognized as valid—the agreement between the survey results and the observations described by Sirard and Pate [34] ranged from 73.4 to 86.3%.

The answers to the survey questions were processed with the help of the mathematical techniques in Google tables, which allow calculating statistics (the Wilcoxon test) and comparing the presence/absence of certain elements of physical activity.

4.5 Ethical issues

All adult participants in the study received consent letters to their email addresses to participate in the study. In doing so, at the request of school administrators, a written consent to participate in the experiment and publish its results was obtained from the parents of the schoolchildren. At least one of the parents of adolescents aged 12–16 was invited to join a private Facebook group to be aware of the current events.

5 Results and discussion

As a result of the use of some social media tools to increase the level of physical activity, the behavior of the participants in the experiment was studied. The dynamics of the increase in the level of physical activity and the results of the experimental and control group participants are described below.

Thus, before the experiment, the level of physical activity of the participants was as follows (see Fig. 1).

Generally, the baseline level of physical activity did not differ between the groups; thus, the sample selection was based on this criterion.

As a result of the use of social media tools, the level of physical activity significantly increased in the experimental group. In addition to the increase in the level of physical activity in this group, the participants' interest in various sports increased and their visits to the swimming pool and personal training sessions became more frequent (see Fig. 2).

At the same time, respondents also noted the positive effect of absorbing extraneous sources of information (Facebook ads, colleagues' comments, etc.). This increases their motivation to learn and broadens their perception of the physical education paradigm.

The Wilcoxon test results show significant differences between the indicators (the differences before and after the experiment are significant).

This is mainly due to the improvements in physical activity which were also noted in the questionnaire (created with the help of Google Forms). These improvements are described below (see Table 3).

Also, there is an interesting observation on the use of mobile applications. Thus, 72.36% of experimental group participants used fitness apps while giving their preference to Adidas training (87.3% of those who tried mobile apps). The features of the use of such applications are as follows (see Table 4).

About 84% of respondents said they were ready for a gradual transition to full digital learning, and 47% of them would not mind adding other social media to their use. Most participants of all ages (88.16%) refrained from posting videos of their accomplishments on social media. Nine participants (5 pupils and 4 students) posted their achievements in the form of short video exercises or screenshots, and reports of mobile application programs in their groups. However,

![Fig. 1 Number of people in each age group according to the level of physical activity before the experiment](image1.png)

![Fig. 2 Number of people in each age group according to the level of physical activity after the experiment](image2.png)

| Level of physical activity | EG Before the experiment | After the experiment | CG Before the experiment | After the experiment |
|---------------------------|-------------------------|---------------------|-------------------------|---------------------|
| Very low                  | 7                       | 4                   | 6                       | 5                   |
| Low                       | 34                      | 6                   | 33                      | 24                  |
| Average                   | 25                      | 31                  | 29                      | 37                  |
| High                      | 10                      | 10                  | 8                       | 8                   |
also been confirmed by the present study. Aral and Nicolaides [9] concluded that exercise is socially contagious, which has been confirmed in our study. Aral and Nicolaides [9] studied the impact of social media on runners’ behavior and concluded that exercise is socially contagious, which has also been confirmed by the present study.

On the other hand, some studies suggest that there are negative effects on the use of social media in the context of physical activity. In particular, a survey of Australian athletes identified several key risks associated with the active implementation of digital tools in the learning process: distraction by advertising and superfluous online messages, poor quality demonstration of the exercise or movement algorithm, and the unsuitability of the most popular social media for educator-student communication [37]. Also quite

| Improvements | EG  | CG  |
|--------------|-----|-----|
| Engaged in additional sports | 31  | 1   |
| Performed sets of exercises better | 55  | 2   |
| Lost excess weight | 12  | 1   |
| Increased self-confidence and elimination of complexes (to any extent) | 61  | 4   |
| Got interested in various sports | 63  | 5   |
| More frequent visits to the gym/swimming pool | 55  | 3   |

not a single adult respondent (neither student nor pupil) ventured to publicly share their videos, indicating a lack of moral preparation for online communication.

Based on the results obtained, it follows that the social media tools used in the study are effective for increasing the level of physical activity of the experiment participants. The experimental data supplement and confirm the data and claims that the use of relevant content and impact on social networks contributes to an increase in the physical activity of social media users among different population groups, as well as to an improvement in their knowledge about physical activity [17]. According to Montgomery et al. [18], the physical activity of adolescent boys (13–15 years old) is identical to the activity of their friends on social networks and in real life; the activity of girls correlates with the physical activity of a close friend. Our research confirms this finding as attending classes and learning about different types of physical activity had a positive effect on the behavior of friends. The results of the study by Josey and Moore [19] indicating that social media programs can increase physical activity and the findings by DeVitis et al. [10] showing that posting information about physical activity on a social network has a positive impact on its users have been confirmed in our study. Aral and Nicolaides [9] studied the impact of social media on runners’ behavior and concluded that exercise is socially contagious, which has also been confirmed by the present study.

Storey et al. [35] noted that social media can promote the creation of a healthy environment for schoolchildren, which has been supported by our findings. In addition, their further research on finding perfect networks to ensure long-term positive effects of physical exercises on schoolchildren’s health has been verified to some extent. Our study is also consistent with the research by Giannikas [21] who states that Facebook can be used for the greatest benefit; thus, it motivates students to learn or, in this case, to exercise, and facilitates collaboration between users. To some extent, the data obtained by Shimoga et al. [29] on the search for the optimal amount of time and purposes of the use of social media by adolescents to maintain health have been expanded.

Balcikanli [11] showed that social media have a positive effect on enhancing communication between the teacher and students, as well as between students in the context of educational purposes. The use of interactive tools promotes social interaction of students, and visual aids (i.e., the content offered in private social media groups) are an effective tool that allows teachers (trainers) to attract attention and present information in a convenient and clear way so that the users can view all the components of the required content [7]. Physical education teachers need to improve their knowledge of the use of social networks and the possibilities of their application to improve the level of physical activity taking into account the wide opportunities for learning and interactive communication on social networks; this fact complements the data obtained by Lebel et al. [25], Moura et al. [36], Weidong [13].

Our research confirms the thesis that social media influence individual behavior of children and adolescents in terms of health, and the correct use of innovative technological approaches will contribute to their leading healthy lifestyles [12]. The data obtained by Klein et al. [2] indicating that monitoring the level of one’s own physical activity contributes to its improvement among like-minded people and a healthy lifestyle can be promoted by social support have been expanded in our study. Our findings are also consistent with the ones obtained by Yang et al. [31] considering the promotion of physical education through mobile devices and the unpopularity of the use of such technologies for physical development as most of the participants did not know about the availability of mobile applications for exercise.

On the other hand, some studies suggest that there are negative effects on the use of social media in the context of physical activity. In particular, a survey of Australian athletes identified several key risks associated with the active implementation of digital tools in the learning process: distraction by advertising and superfluous online messages, poor quality demonstration of the exercise or movement algorithm, and the unsuitability of the most popular social media for educator-student communication [37]. Also quite

Table 3 Improvements in the physical activity of the study participants

| Improvements | EG % | CG % |
|--------------|------|------|
| Engaged in additional sports | 22.94 | 0.74 |
| Performed sets of exercises better | 40.7 | 1.48 |
| Lost excess weight | 8.88 | 0.74 |
| Increased self-confidence and elimination of complexes (to any extent) | 45.14 | 2.96 |
| Got interested in various sports | 46.62 | 3.7 |
| More frequent visits to the gym/swimming pool | 40.7 | 2.22 |

Table 4 Features of the use of mobile applications by the experimental group

| % of mobile application users (n = 55) | Training features |
|--------------------------------------|-------------------|
| 52.73 | Trained regularly according to a specific program |
| 47.27 | Tried various workouts and programs |
| 60 | Trained regularly (twice a week) |
| 40 | Trained spontaneously (1–3 times a week) |
interesting was the data on the formation of branding pressure in social networks (in particular, Instagram and Twitter), which indicates the dual optimality of the use of these applications in education and the requirement of high digital orientation of participants in the educational process [38].

It should be noted that the present study is purposeful research and the use of social networks during the experiment was limited (up to 3 times a week, up to 3 h); the use of physical exercises, their completion, and the search for personal trainers was controlled taking into account the health-preserving goal (that is, the exercises were performed without excessive effort and training was aimed at increasing physical activity rather than achieving an ideal body shape).

6 Conclusions

To increase the level of physical activity in senior school children, it is effective to ask them to share their achievements in a private social media group, beautifully advertise sports, fitness clubs and swimming pools, as well as invite them to attend trial classes. At the same time, the attendance of classes and a note in the group by one participant, participant’s or parent’s feedback had an impact on the likelihood of a large number of participants visiting this place (conclusion based on comments and reviews, “likes”, and the dynamics of further visits). The same methods are effective due to the restrictions for children of this age on the network.

For students, the effective means of mental influence and interactive communication were invitations to participate in online fitness groups, performing exercises in these groups, moderate advertising of fitness clubs and swimming pools, notification of sports competitions. Thus, as a result of visiting such competitions, the participants got interested in these sports.

For adults (23–35 years old), invitations to participate in physical exercises at the place of work offered in a private social media group turned out to be effective (the experimental group was formed in the same way). Thus, 80.7% of participants began to attend fitness classes more often than before the experiment (1–2 times a week before the experiment and 2–3 times after the experiment), 46.6% started to perform the sets of exercises offered in mobile applications (workouts at home, Adidas training) at least once a week. At the same time, in Google form No. 1, all participants indicated that they were not particularly interested in the availability of such applications or did not know about them before the experiment. Also, 32.3% of the participants in this group began to visit the swimming pool at least once every 2 weeks.

The majority of the participants of all age groups (88.16%) refrained from posting videos of their achievements on social networks. Nine participants (5 pupils and 4 students) posted their achievements in the form of short videos of exercises or screenshots, reports on the completion of mobile app programs in their groups.

Writing reviews about training and improving well-being has a huge impact. Thus, according to statistics, a positive review of a person who has visited a pool or a fitness club ensures, on average, 3 visits by members of a private group where the review was published (conclusions made based on comments in groups and subsequent visits to the pool or fitness club). More than half of the participants in the experimental group (64.5%) tried workouts with a personal trainer and began to additionally visit the gym and/or pool.

In the experimental group, where the participants communicated using interactive social media tools to monitor the level of physical activity and search for ways to increase it, the indicators of the level of physical activity significantly improved: 59.20% of participants achieved the average level of physical activity and 22.37%—high while 31.58% of the control group participants at the end of the experiment had a low level of physical activity, 48.70%—average, 10.53%—high.

The current article can be used as a prototype for further development of specialized curricula for teaching the discipline of physical education in universities or schools using social media, since it takes into account the views of respondents of all ages.

At the same time, future researchers should pay more attention to social networks, which are not too popular in the global background—in this way they can discover a Klondike for improving the effectiveness of physical wellness practices in society in the context of digital globalization.

7 Research limitations

The study involved healthy people without any chronic diseases, injuries, abnormalities, and doctor prohibitions, who regularly performed basic physical exercise (at school or at a fitness club at least once a week). The results obtained are not recommended for use in the samples of people with any disease, injury, and/or disorder of the musculoskeletal system due to possible side or negative effects of the exercise load. All exercises offered by the mobile application and other types of exercises were performed under the supervision of a trainer. All social media tools were used to increase the level of physical activity. The level of physical activity was measured according to the results of surveys without the use of fitness trackers.

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Declarations

Conflict of interest Authors declare that they have no conflict of interests.

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References

1. Andrieieva, O., Kashuba, V., Carp, I., Blystiv, T., Palchuk, M., Kovalova, N., Khrypyko, I.: Assessment of emotional state and mental activity of 15–16-year-old boys and girls who had a low level of physical activity. J. Phys. Educ. Sport 19, 1022–1029 (2019)

2. Klein, M.C., Manzoor, A., Mollee, J.S.: Active2Gether: a personalized m-health intervention to encourage physical activity. Sensors 17(6), 1436 (2017). https://doi.org/10.3390/s17061436

3. Novikova, I.I., Yerofeev, Y.V., Fyanku, I.P., Usacheva, E.V., Kulikova, O.M.: Physical activity and individual accidental risk of infringement of the health of schoolchildren. Hyg. Sanit. 99(3), 279–285 (2020). https://doi.org/10.33029/0016-9900-2020-99-3-279-285

4. Pronenko, K., Griban, G., Aloshyna, A., Bezpalyi, S., Yavorska, T., Hryshchuk, T., Tkachenko, P.P., Dzenzeluck, D.O., Bleshchynskyi, I.: The physical development and functional state as the important components of the students’ health. Wiad. Lek. 72(12a), 2348–2353 (2019). https://doi.org/10.36740/Wlek201912115

5. Haas, J., Baber, M., Byrom, N., Meade, L., Nouri-Aria, K.: Changes in student physical health behaviour: an opportunity to turn the concept of a Healthy University into a reality. Perspect. Public Health 138(6), 316–324 (2018). https://doi.org/10.1177/1356389818792580

6. Feito, Y., Heinrich, K.M., Butcher, S.J., Poston, W.S.C.: High-intensity functional training (HIFT): definition and research implications for improved fitness. Sports 6, 76 (2018). https://doi.org/10.3390/sports6030076

7. Malinovska, N., Borova, V., Benera, V., Shemchuk, V., Gogol, I., Androschuk, I.: Interactive training tools in the modern educational process. Syst. Rev. Pharm. 11(9), 478–480 (2020)

8. Nagovitsyn, R.S., Vaganova, O.I., Kutepov, M.M., Martynanova, L.N., Kosenovich, O.V., Moeseev, Y.V., Vorotova, M.S., Osipov, A.Y.: Interactive technologies in developing student’s motivation in physical education and sport. Int. J. Appl. Exerc. Physiol. 9(6), 72–79 (2020)

9. Aral, S., Nicolaides, C.: Exercise contagion in a global social network. Nat. Commun. 8(1), 14753 (2017). https://doi.org/10.1038/ncomms14753

10. DeVitis, C., Beddoes, Z., Szama, D., Hepler, T.: The influence of posting physical activity posts to social networking sites on young adults’ physical activity engagement and motivational profiles. Phys. Educ. 77(3), 595–614 (2020). https://doi.org/10.18666/TP/E-2020-V77-I3-9630

11. Balcikani, G.S.: Social networking in physical education: Undergraduate students’ views on Ning. Turk. Online J. Distance Educ. 13(2), 277–290 (2012)

12. Klavina, A., Veliks, V., Zusa-Rodke, A., Porozovs, J., Aniscenko, A., Bebrisa-Fedotova, L.: The associations between problematic internet use, healthy lifestyle behaviors and health complaints in adolescents. Front. Educ. 6, 147 (2021). https://doi.org/10.3389/feduc.2021.673563

13. Weidong, B.: Development of a Computer-Based Interactive Teaching Simulation Program for Physical Education. Middle Tennessee State University. ProQuest Dissertations Publishing (1995)

14. Killian, C.M., Kinder, C.J., Woods, A.M.: Online and blended instruction in K-12 physical education: a scoping review. Kinesiol. Rev. 8(2), 110–129 (2019). https://doi.org/10.1123/kr.2019-0003

15. Williams, L., Martinasek, M., Carone, K., Sanders, S.: High school students’ perceptions of traditional and online health and Physical Education courses. J. Sch. Health 90(3), 234–244 (2020). https://doi.org/10.1111/josh.12865

16. Yu, J., Jee, Y.: Analysis of online classes in physical education during the COVID-19 pandemic. Educ. Sci. 11(1), 3 (2020). https://doi.org/10.3390/educsci111010003

17. Child, S., Kaczynski, A.T., Moore, S.: Meeting physical activity guidelines: the role of personal networks among residents of low-income communities. Am. J. Prev. Med. 53(3), 385–391 (2017). https://doi.org/10.1016/j.amepre.2017.04.007

18. Montgomery, S.C., Donnelly, M., Badham, J., Kee, F., Dunne, L., Hunter, R.F.: A multi-method exploration into the social networks of young teenagers and their physical activity behavior. BMC Public Health 21(1), 77 (2021). https://doi.org/10.1186/s12889-020-10081-0

19. Josey, M.J., Moore, S.: The influence of social networks and the built environment on physical inactivity: a longitudinal study of urban-dwelling adults. Health Place 54, 62–68 (2018). https://doi.org/10.1016/j.healthplace.2018.08.016

20. Korda, H., Itani, Z.: Harnessing social media for health promotion and behavior change. Health Promot. Pract. 14(1), 15–23 (2013). https://doi.org/10.1177/1524839911405850

21. Giannikas, C.: Facebook in tertiary education: the impact of social media in e-Learning. J. Univ. Teach. Learn. Pract. 17(1), 23–36 (2020). https://doi.org/10.53761/1.17.1.13

22. Gö, Z.: Physical education and sport students’ interactions with their teachers on Facebook. Anthropologist 21(1–2), 18–30 (2015). https://doi.org/10.1080/09720207.2015.11891789

23. Harvey, S., Atkinson, O., Hyndman, B.P.: Chapter 7: an investigation into sports coaches’ Twitter use. J. Teach. Phys. Educ. 39(4), 481–490 (2020). https://doi.org/10.1123/jte.2019-0283

24. Raggatt, M., Wright, C.J., Carrotoe, E., Jenkinson, R., Mulgrew, K., Prichard, J., Lim, M.S.: “I aspire to look and feel healthy like the posts convey”: engagement with fitness inspiration on social media and perceptions of its influence on health and wellbeing. BMC Public Health 18(1), 1002 (2018). https://doi.org/10.1186/s12889-018-5930-7

25. Lebel, K., Danylchuk, K., Millar, P.: Social media as a learning tool: sport management faculty perceptions of digital pedagogies. Sport Manag. Educ. J. 9(1), 39–50 (2015). https://doi.org/10.1123/smej.2014-0013

26. Voorn, R.J., Koomers, P.A.: Social media and higher education: introversion and collaborative learning from the student’s perspective. JISSMILE 1(1), 59–73 (2013). https://doi.org/10.1504/JISSMILE.2013.051650

27. Hyndman, B.P., Harvey, S.: Chapter 6: preservice teachers’ perceptions of Twitter for health and physical education teacher education: a self-determination theoretical approach. J. Teach. Phys. Educ. 39(4), 472–480 (2020). https://doi.org/10.1123/jte.2019-0278

28. Opstel, K., Chapelle, L., Prins, F.J., De Meester, A., Haerens, L., van Tartwijk, J., De Martelaer, K.: Personal and social development in physical education and sports: a review study. Eur. Phys. Educ. Rev. 26(4), 797–813 (2020). https://doi.org/10.1177/135633X19882054
29. Shimoga, S.V., Erlyana, E., Rebello, V.: Associations of social media use with physical activity and sleep adequacy among adolescents: cross-sectional survey. J. Med. Internet Res. 21(6), e14290 (2019). https://doi.org/10.2196/14290

30. Lee, J.E., Gao, Z.: Effects of the iPad and mobile application-integrated physical education on children’s physical activity and psychosocial beliefs. Phys. Educ. Sport Pedagogy 25(6), 567–584 (2020). https://doi.org/10.1080/17408989.2020.1761953

31. Yang, Q.F., Hwang, G.J., Sung, H.Y.: Trends and research issues of mobile learning studies in physical education: a review of academic journal publications. Interact. Learn. Environ. 28(4), 419–437 (2020). https://doi.org/10.1080/10494820.2018.1533478

32. Statista: Most popular mobile social networking apps as of September 2019, by monthly users (2019). https://www.statista.com/statistics/248074/most-popular-us-social-networking-apps-ranked-by-audience/%:~:text=Despite%20a%20tumultuous%202018%2C%20Facebook,and%20106%20million%20users%20respectively. Accessed 18 July 2022

33. Holtermann, A., Stamatakis, E.: Do all daily metabolic equivalent task units (METs) bring the same health benefits? Br. J. Sports Med. 53, 991–992 (2019). https://doi.org/10.1136/bjsports-2017-098693

34. Sirard, J.R., Pate, R.R.: Physical activity assessment in children and adolescents. Sports Med. 31(6), 439–454 (2001). https://doi.org/10.2165/00007256-200131060-00004

35. Storey, K.E., Stearns, J.A., McLeod, N., Montemurro, G.: A social network analysis of interactions about physical activity and nutrition among APPLE schools staff. SSM Popul. Health 14, 100763 (2021). https://doi.org/10.1016/j.ssmph.2021.100763

36. Moura, A., Graça, A., MacPhail, A., Batista, P.: Aligning the principles of assessment for learning to learning in physical education: a review of literature. Phys. Educ. Sport Pedagogy 26(4), 388–401 (2021). https://doi.org/10.1080/17408989.2020.1834528

37. Hayes, M., Filo, K., Geurin, A., Riot, C.: An exploration of the distractions inherent to social media use among athletes. Sport Manag. Rev. 23(5), 852–868 (2020). https://doi.org/10.1016/j.smr.2019.12.006

38. David, J.L., Powless, M.D., Hyman, J.E., Purnell, D.M., Steinfeldt, J.A., Fisher, S.: College student athletes and social media: the psychological impacts of Twitter use. Int. J. Sport Commun. 11(2), 163–186 (2018). https://doi.org/10.1123/ijsc.2018-0044

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