

PROBLEM SOLVING APPROACHES OF HIGH SCHOOL STUDENTS EXERCISING REGULARLY IN SPORT TEAMS

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Abstract

In this article, the effect of regular sport activities on the solution approaches performed for solving the problem by high school students when they encountered the said problem, was analyzed. Six hundred and forty high school men students participated in the study. ($M_{age} = 15.45$ years, age range = 14-17 years). Problem-Solving Inventory (PSI) was used to evaluate problem solving solutions of the students. Athlete students were selected from the students who took charge in school teams, exercised for 6 days in a week provided that this exercise did not exceed 1 hr 30 min and who also participated in competitions. Mann-Whitney U test which is non-parametric test was used to examine two samples (athlete & non-athlete) and Kruskal-Wallis one way analysis was used to make intergroup (branches of sport) examinations. According to findings which were obtained, a significant difference was found among self-confident approach values of athlete and non-athlete students ($U=45,0$ $p=0,008$). A significant difference was observed among assessor approach values of athlete and non-athlete students ($U=46,2$, $p=0,033$). The students who did sport regularly were more self confident than those who did not do sport regularly and of the same age when they encountered a problem and they evaluated phase of solving problem and results that they obtained more carefully than the students who did not do sport regularly and of the same age. Athlete students believed that they would solve the problem that they encountered. Besides, athlete students preferred using systematic method while solving a problem and making decision more often than those who were not athlete and of the same age.

Keywords: problem solving, sport, exercising, school, education

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Introduction

Parents, educators, physicians, coaches, and adolescents acknowledge and promote the health benefits of regular physical activity in shaping the lives of young people (Pateli & Greydanus, 2010). The schools are one of the most important institutions in which regular physical activities are carried out. The schools contribute to behavior and personal development of students with different programs and systematic activities and prepare the students against the problems that they will encounter during their life time. Supporters having youth adopt a competitive attitude towards their sport participation confirm their actions by saying that competition is a beneficial tool to teach these youth how to make physical activity as a part of a lifelong strategy, to continue to be physical fit and also to teach them many important things on the participation in life, how to win and even more important, how to lose but maintain a winning behavior (Pateli & Greydanus, 2010). In this article, the effect of regular sport activities on the solution approaches performed for solving the problem by high school students when they encountered the said problem, was analyzed.

Futures of the societies are shaped with new solution ways that young generation raised by them will develop against problems that they encounter. Schools take on an important task for raising young generations and providing that they gain problem solving skill. Problem-solving skills can be developed with systematic work from primary school (Ulucinar, 2011). D'Zurilla, Nezu and Nezu (2007) emphasized that we encounter numerous problems against which we should struggle during our life and that the most important thing is that we should know how to struggle with these problems for our mental and physical health. The problems are obstacles which oppose the current strengths gathered by an individual to achieve demanded goal and which also include known or indefinite subjects (Bingham, 1958). D'Zurilla and Nezu (1990) stated that problem solving is a cognitive, affective and behavioral process that an individual develops and produces to be able to find the way for coping up with problems effectively that he/she encounters in his/her daily life. This process looks for a way to get rid of tension via meeting the requirements or decreasing obstacles and to provide that organism has an internal balance. Problem solving is a skill which should be learned and obtained. Since it is multi-directional, it combines intelligence, emotions, desire and action in itself with creative (reflective) thinking (Bingham, 1958). Besides, problem solving requires trying new strategies to obtain the result and eliminating those who are unsuccessful (Thorton, 1998). Those who can

solve problems efficiently can adapt to life's difficulties individually. D'Zurilla et al. (2007) stated that efficient problem solving facilitates that health and emotions get better and self-esteem and self-confidences develop and that it increased life quality. Efficient problem solving process is realized in five steps. These are respectively; believing in solving problem and adapting to problem, defining the problem correctly and determining achievable targets, forming different alternatives to clear the hurdle, predicting how positive and negative results of alternatives and how maximum efficiency is obtained with the lowest cost and lastly creating a plan and trying it in the real life. At the end of all these phases, if you are unhappy, it is necessary to back to square one and start to look for the best solution (D'Zurilla et al., 2007).

Solving problem is one of teaching methods used by teachers and trainers. In problem solving method, coach-teacher sets problems for the learners to solve, which encourages learners to think about their sport and to be creative in their approach to problems (Woods, 2004). The most difficult skills for being learned are skill types that a child has to apply an abstract rule (discipline, respect, patience and etc.) or analyses a situation and develops a strategy beforehand. We want children to learn these things in the school (Thorton, 1998). Problem solving is one of abstract skill types. In the process from childhood to adulthood, game is one of the important tools for developing problem solving skills. In the schools, physical education lessons, sport team studies and game activities are performed systematically and in a planned way and they include an important time frame in the period of training a student. The most important material in the game is solving the problem (Thorton, 1998). The students gain new experiences in physical education lessons and with sport team activities. The more children have new experiences, the richer information they gather and they also discover new tools for problem solving (Thorton, 1998). Sport can only be deemed as being consistent with education rather than as just a beneficial tool which provides its own internal values in the way of skills, standards and excellences are deemed as beneficial and followed in a moral manner for their own sake (Arnold, 1997). While children observe, listen to other people and solve problems in a social pattern easily, they learn lots of things (Thorton, 1998). Success in problem solving depends on the fact that children make different inferences, can know and understand all aspects of the said subject and find and use new strategies (Thorton, 1998).

In the sporting arena, performers encounter many competitive demands and react in different ways (Mellalieu, Fletcher & Hanton, 2009). Exercise was defined as a subset of

physical activity that is volitional, planned, structured, repetitive and aimed at improvement or maintenance of an aspect of fitness or health by Biddle, Kenneth and Boutcher (2002). Athletes encounter many physical and mental difficulties during period of prepping for competitions. Athletes improve different physical, technical, tactical and psychological skills for handling difficult, monotonous training and stressful competition conditions. Different psychological strategies/interferences should be applied to develop psychological skills (Blumenstein & Orbach, 2012). Solution ways that athletes developed against problems that they encountered and mental struggle provide them different advantages and they obtain both physical and mental experiences.

It is obvious that the situation for exercise in reducing physical illness is well understood, there has also been increasing interest in exercise contribution to lower problems on mental illness (Biddle et al., 2002). Davis, Roscoe, Roscoe, Bull (2005) stated that successful athletes have a more positive mental health profile than less successful athletes or used term of general population. Studies which were carried out is evidence of a relationship between psychological well-being and regular exercise participation. Cox (1998) accepts that people who do sport have different personal characteristics such as being more independent, objective and less anxious. Besides, Cox(1998) stated that regular exercise not only improves cardiovascular fitness but it is also believed that it has a beneficial effect on the psychological mood of mentally healthy individuals.

Participation in regular exercise is a determinant of a number of psychological variables such as positive affect and well-being (Hagger & Chatzisarantis, 2005). We become aware of the things happening around us during physical activity. Information is transmitted to and from the brain via the nervous system. There are two elements constituting this system: (i) the brain and the spinal cord forming the central nervous system (CNS) together and (ii) the peripheral nervous system which compiles the nerves connecting the spinal cord with all body parts, radiating from (the afferent system) the CNS. Davis et.al (2005). Cox (1998) emphasized that a high level of performance in any human activity requires a certain amount of concentration and attention and athletes should develop a highly refined and develop ability to focus and have characteristics of refocusing. High school students who exercise regularly use their concentration and focusing skills in each exercise and competition regularly.

The player of games such as the politician or business executive has to learn to cope with disappointment as well as with triumph without being unduly affected by either (Arnold, 1997). Athletes may be stressful because of many reasons. Athletes are stressful because of exercise program, difficulty and dense life conditions. However; the most important one is competition stress. Athletes have to manage competition stress regularly. Athletes use two types of technique while they manage the stress, these techniques are somatic (relating to body) or cognitive (relating to the mind). Athletes usually use both these two techniques in the phase of controlling the problem (Woods, 2004). The athletes who continuously apply these techniques use similar management techniques for problems that they encounter in their daily life. These admired qualities such as loyalty, cooperation, courage, resolution, willpower, self-control, endurance and determination are often mentioned as being arisen from a participation in games and sport (Arnold, 1997).

It can be evaluated that concentration and attention characteristics that the athletes have and that they continuously develop and focusing skill assist that they concentrate on problem solving phase when they encounter a problem. When considering studies which were carried out, it can be said that regular sport activities contribute to mental and psychological health of athletes. In this study, potential effect of regular physical activities on problem solving skills of high school students during transitional period from adolescence and to adulthood was investigated. In parallel with studies which were carried out beforehand, it is expected that perception, comprehension, decision making and problem solving skills obtained thanks to regular exercise and participation into competitions will positively contribute to problem solving methods of students.

Method

Participants

Six hundred and forty school students participated into the study (Mage= 15.45 years, age range= 14-17 years). Athlete students who do regular physical activity were formed by the students who continue to do exercises regularly in sport teams of the school and compete in national competitions ($N_{\text{athlete}}=319$). The students who take charge in sport teams exercised for 6 days in a week provided that this exercise does not exceed 1,5 hours. They regularly participated

into league competitions required by branches of sport. Non-athlete students were selected randomly from among the students who do not do sport regularly ($N_{\text{non-athlete}} = 321$).

Material and Procedure

In the study, “Personal Information Form” developed by researcher and “Problem-Solving Inventory (PSI)” were used to evaluate problem solving skills. In personal information form, it was demanded from the participants to reply 3 personal information questions: their age, whether they are athlete or not and their branch of sport. Problem-Solving Inventory (PSI) was developed by (Heppner & Petersen, 1982) in the United States of America to analyze main dimensions of personal problem solving period in the real life and factors in this period. Problem-Solving Inventory (PSI) was translated into Turkish by (Sahin & Petersen, 1993). Turkish data provide additional psychometric support for the PSI and improve the generalizability of some of the previous findings which are based on U.S samples. The Problem-Solving Inventory (PSI) is a 32- item Likert-type tool and style for problem solving. The responses to the items range between (1) *strongly agree* to (6) *strongly disagree*. Example items include ‘When confronted with a problem, I generally do the first thing that come to my mind for solving it’ and ‘When faced with new novel situation, I have confidence that I can handle problem that may arise’. Total score range is 32 to 198 (Karabulut & Kuru, 2009). PSI scores are related to a wide range of cognitive, affective and behavioral activities thought to be important in the coping the process and also to a number of indices of psychological well-being. Lower scores indicate that the person perceives himself/herself as more confident in problem solving, having more personal control over his/her problems and a tendency to approach problems (Ferah, 2000).

Turkish version of problem solving inventory consisted of 6 factors. These factors are respectively; precipitant approach, thinking approach, avoidant approach, assessor approach, self-confident approach and planned approach. Reliability results (Cronbach’s alpha =0.88) of Turkish version of Problem-Solving Inventory were satisfactory. Confirmatory six factor analyses have provided good support. The alphas coefficients for the six factors were respectively 0.78, 0.76, 0.74, 0.69, 0.64 and 0.59, (Şahin & Petersen, 1993). Six main factors of Problem-Solving Inventory were defined in brief.

1. Precipitant Approach: This approach includes attitude and behaviors of an individual such as directing towards first solution way while solving problems and acting accordingly,

focusing on details more than adequate without touching on the main problem, not creating new and a great number of solutions to solve the problem and not evaluating success possibility of potential solution options, considering other factors apart from itself which may contribute to solution of the problem that the said individual encountered, approaching to the problems very sentimentally and considering many dealing ways.

2. Assessor Approach: This approach includes attitude and behaviors of an individual such as comparing emerging results and results thought to be occurred by the said individual to solve the problem after trying a definite way, thinking all ways that he/she can use all together and considering his/her emotions for a problem.

3. Planned Approach: This approach includes attitude and behaviors of an individual such as being able to solve problems even though they are not in the first step of the problems, making decisions about him/herself, being able to take responsibility about the fact that whether he/she is pleased with them, not directing towards another subject without thinking about the said problem and solving it when he/she encounters a problem and believing in him/herself about the fact that he/she can manage that plan when he/she makes a plan for solving a problem.

4. Thinking Approach: This approach includes attitude and behaviors of an individual such as thinking all current choices while solving a problem, making a decision, comparing the choices with each other, reviewing the results one by one, anticipating problems, advantage and disadvantages that it may cause before applying a definite problem solution, firstly reviewing the problem when faced with a problem, defining the problem completely and clearly, gathering every kinds of information relating to that problem and considering these things and the fact that emerging result does not generally meet the satisfaction after applying a decision.

5. Avoidant Approach: This approach includes attitude and behaviors of an individual such as decrease in reliance about being able to cope with that problem when the first effort fails while solving the problem, if solution ways which were applied are ineffective, researching why they were not be efficient, not thinking about the fact that what the problem that he/she encountered is and that how he/she needs to gather information to define the said problem completely and avoiding thinking on the factors positively or negatively affecting solution of the said problem after solving the problem.

6. Self-confident Approach: This approach defines new and difficult problems that the said situation will bring when a time is given to individual and that individual encounters with

new situations, competence for being able to solve his/her problems generally in an efficient and creative way and approaching to his/her problems in parallel with this reliance. This approach also includes that an individual follows a systematic method while solving his/her problem, comparing solution ways and making decisions. It is also accepted that this approach reflects self reliance of the individual while solving his/her problems, skill for being able to solve the problems, his/her belief, the fact that he/she can make decisions about him/herself and is pleased with these decisions.

Procedure

813 students of the same school participated in the study. The school where the study was carried out was a boarding school and the same daily working program was being applied for everyone. In other words, it was planned that when the students would get up in the morning, eat, relax and sleep at night. The students set free for participating in the study. The students who did not want to reply to the inventory did not answer it. 173 students, who made answering mistakes at the end of answering period of the inventory, did not comply with reliability tolerances of the scale and who did not want to be included into the study, left out of assessment for reliability and validity of the study. In total, 640 men students formed the basis of the research. Athlete students were selected from the students who took charge in school teams, exercised for 6 days in a week provided that this exercise did not exceed 1 hr 30 min and who also participated in competitions. The students answered the inventory in a free environment. Identity Information of students did not be demanded so that they would be comfortable during research and give answer more freely.

Data analysis

The data were displayed visually for outliers and these data were checked for normality. Having calculated from the scale, total score and subscale scores which belong to normal distribution was checked with K-S test and the uniformity of variances was checked with Levene's test. Mann-Whitney U test which is non-parametric test was used to examine two samples (athlete & non-athlete) and Kruskal–Wallis one way analysis was used to make intergroup (branches of sport) examinations. Descriptive statistics were also calculated on all study variables. A p-value of less than 0.05 was considered to be statistically significant.

Results

Problem-Solving Inventory values of the students who did and did not do sport regularly can be viewed in Table 1. For those who did sport regularly ($D(319)=0,119, p=0,000$) and those who did not do sport regularly ($D(321)=0,102, p=0,000$), distribution values of problem solving inventory of the participants did not have normal distribution according to points that they got. According to results of Mann-Whitney U test, a clear difference was not seen among precipitant approach values of athletes and non-athletes ($U=48,7, p=0,301, z=-1,035, r=-0,04$). No important difference was found among thinking approach values of athletes and non-athletes ($U=50,0, p=0,080, z=-0,243, r=-0,00$). Avoidant approach values of athletes and non-athletes were not be separated from each other ($U=48,8, p=0,319, z=-0,997, r=-0,04$). A significant difference was observed among assessor approach values of athletes and non-athletes (mean=7.94, $s=2.79$ vs. mean=8.35, $s=2.74$, respectively; $U=46,2, p=0,033, z=-2,133, r=-0,08$). The students who did sport regularly compare emerging results and results thought to be occurred after trying a definite way for solving a problem more often than the students who did not do sport regularly and they evaluate all ways that they can use for solving the problem. A significant difference was observed among self-confident approach values of athletes and non-athletes (mean=11.22, $s=3.98$ vs. mean=11.96, $s=4.05$, respectively; $U=45,0, p=0,008, z=-2,636, r=-0,10$). The students who did sport regularly believed in themselves that the problems could be solved more effectively and creatively while solving a problem more often than the students who did not do sport regularly and they followed more systematic way while solving a problem. A significant difference was not observed among planned approach values of athletes and non-athletes ($U=47,5, p=0,117, z=-1,567, r=-0,06$). When the effect of branches of sport of the students who did sport regularly on problem solving approaches was examined via Kruskal–Wallis one-way analysis, the difference of branches of sport did not have any effect on problem solving approaches ($H=4,757, SD=10, p=0,907$). In other words, branches of sports of athlete students did not cause any difference in their problem solving approaches.

Table 1

Mann-Whitney *U* Analysis of Variance of (PSI) Score of Athletes and Non-athletes

| PSI Variance | Athlete n =319 | | Non-athlete n =321 | | Z | p |
|-------------------------|----------------|-------|--------------------|-------|--------|------|
| | M | SD | M | SD | | |
| Precipitant Approach | 28.84 | 5.98 | 29.18 | 6.15 | -1.035 | .30 |
| Thinking Approach | 12.05 | 4.05 | 12.14 | 4.13 | -.243 | .80 |
| Avoidant Approach | 10.46 | 3.91 | 10.82 | 4.34 | -.997 | .31 |
| Assessor Approach | 7.94 | 2.79 | 8.35 | 2.74 | -2.133 | .03* |
| Self-confident Approach | 11.22 | 3.98 | 11.96 | 4.05 | -2.636 | .00* |
| Planned Approach | 9.26 | 2.58 | 9.57 | 2.82 | -1.567 | .11 |
| Total | 79.78 | 16.93 | 82.42 | 17.04 | -2.295 | .02* |

* $p < 0.05$

Discussion

According to results which were obtained from findings of the study, when the students who exercise regularly encounter a problem, they compare emerging results and results thought to be occurred after trying a definite way for solving a problem w more than the students who are not athlete, they evaluate all ways that they can use for solving the problem and they also include their emotions in problem solving process. Besides, when athlete students encounter a problem, they believe in themselves that they have capacity for solving new and difficult problems that will be caused by the situation effectively and creatively and that they will solve the problem more than non-athlete students. One thing which makes athlete students different is that they prefer reaching conclusion more often via a systematic method while solving the problem and making decision. Athlete students are pleased with decisions that they make during problem

solving process because of the fact that they believe in themselves too much. Athlete students have to cope with some different situations more than the students who are not athlete according to their branch of sport. For the great majority of people who do sport, performing well in difficult, challenging or highly emotional circumstances, e.g, competitive situations, is a problem. Elite athletes can control their anxiety at important times within their performance. Besides, anxiety perception of people who do sport is also crucial (Wesson, Wiggins-James, Thompson & Hartigan, 2005). For athlete students, each competition brings new question and problems with it. This situation normally causes stress on the athlete. This stress should be managed in a controlled manner. Teachers and trainers should decrease problem and factors constituting stress to be able to manage the stress and bring excitement under control (Wesson et al., 2005). All these difficulties that athlete students had, their struggle against these difficulties and their continuous and determined attitudes in solving the problems provide that they have some advantages than the students who do not have these difficulties and do not exercise regularly in school teams. The results of this study support that when the students who do sport regularly encounter a problem, they display more efficient problem solving approaches than the students who are not athlete and of the same age. Especially, behaviors of the students who did sport regularly were at more significant level and positive than the students who did not do sport because they believed in themselves while solving the problem. Similarly, the students who did sport regularly considerably showed more positive behaviors than those who did not do sport and of the same age about evaluating the results which were obtained after solving the problem. It was stated in the studies which were carried out that positive personality characteristics of individuals such as sense of self-confidence, being brash, being active and assertive, being able to think creatively, autonomy, leadership and courage have positive impact on problem solving skills (Clark, 2002; Gaffrey, 1987; Grawitch et al., 2003; Greenberger et al., 1991; Karabulut & Kuru, 2009). Exercise can be used as a tool for encouraging physical self-esteem and other important physical self-perceptions such as body image. This development is accompanied by enhanced self-respect in some situations (Biddle et al., 2002). Weinberg and Gould (2003), It was stated in a study carried out on Greek athletes that elite athletes have skills to cope with the difficulties more efficiently than the athletes who are not elite. Erozkan (2013) came to conclusion that having effective problem solving skills improved communication skills. It was also thought that efficient problem solvers use much behavior to be successful in an academic

environment and in relation to that, it was seen that intrinsic feeling and behaviors such as problem solving capacity, social assistance and self confidence are also generally related to intellectual successes such as sport and art (Elliott, Godshall, Shroul, & Witty, 1990). Baumann (1994) stated that it should be paid attention to creative thinking in physical education lesson and especially in gymnastics lesson. Baumann also states that the students reveal their aesthetical characteristics and creativity in physical education lesson. The movements which are repeated continuously become autonomous in time. Benson (1995) emphasized that problem solving is an intellectual skill which can be learnt and developed with experiences. It can be said that the activities which are repeated continuously in physical education lessons develop skills and creativity characteristics and that this situation helps their problem solving skills. In the study carried out by (Wright, Macdonald & Burrows, 2004), it was stated that physical education will also contribute to the wider educational goals of providing opportunities for students to learn how to engage with knowledge – that is, that physical education will engage students in activities which require critical thinking, critical enquiry, problem-solving and collaboration with others in the process of learning. Weinberg and Gould(2003) stated that exercise and increased level of fitness appear to be associated with increases in self-esteem especially among individuals initially low in self-esteem. In the Unites States, physical activity program of at least 20 minutes was applied to elementary school students in the breaks, this physical activity which was provided to students ensured that the students had healthy body and that they spent their time by having fun. Besides it also allows children to have the opportunity to practice life skills such as cooperation, taking turns, following rules, sharing, communication, negotiation, problem solving, and conflict resolution (Reston, 2006). Researchers found that college academic support programs are most successful when they address not only students' academic needs but also their social and cultural needs (Grantt, 2012). It was revealed in the findings which were obtained in our study that high school students who do sport regularly believe in themselves while solving a problem more than those who do not do sport regularly and that they evaluate occurring situations more efficiently after the problem is solved and thus it can be said that regular physical activity should be absolutely included in the said programs while preparing academic education program. In a similar way with the findings that we obtained, it was determined in the study carried out by Sagir (2011) among teachers that physical education teachers get minimum

points from PSI than other branch teachers and that they have more efficient problem solving skill.

In another study, Pehlivan and Konukman (2010) stated that although there was not any significant difference among physical education teachers and other teacher for detecting problem solving skill, the points that physical education teachers got showed that they have more efficient problem solving behaviors. In study findings, no significant difference could be found between PSI scores of athletes performing different branches of sport. In similar studies, no significant difference was found in problem solving approach in comparing branches of sport. In the study in which Gulsen (2008) analyzed problem solving skills of footballers, their league level, positions and sport age variables, she did not encounter any significant difference statistically.

The fact that athlete students believe in themselves while solving problems, they think systematically and evaluate occurring results shows that they positively control pressure environment caused by the problem and stress. Studies have clearly and consistently shown that a period of exercise training can reduce trait anxiety (Biddle et al., 2002). Physical activity is consistently associated with positive affect and mood (Biddle et al., 2002). Sport participants who can defeat anxiety and focus on the task while they are controlling their physiological arousal responses will be more pleasant and perform better than those who cannot adjust or control their anxiety (Gill, 1986).

(Wesson et al., 2005) Trainers prepare their athletes via training programs planned by them for the difficulties that athletes will encounter during performance. Unexpected situations cause that negative anxiety occurs on athlete. Stress and anxiety continuously experienced by athletes during trainings cause that the athlete has solutions for the problem earlier. Besides, athletes react to stressful situations in more controlled way and solve the situation causing problem more determinedly. Exercise training appears to have the greatest trait anxiety-reducing effects when the duration is at least 10 weeks (with greatest benefits over 15 weeks) (Biddle et al., 2002). Besides, exercise training has been successfully used to reduce trait anxiety in a wide range of clinical and non-clinical setting (Biddle et al., 2002).

Conclusion

It is very clear that regular training has many physical and physiological gains. Adolescents are increasingly likely to develop lifelong habits of physical activity if they perceive sport participation as useful for their physical fitness, as a way to maintain or improve skills, and as a means to improve appearance, muscular strength, endurance and flexibility (Pateli & Greydanus, 2010). However, psychological and social gains of regular sportive activities increase still more the importance of fast living conditions of present-day. Especially, the fact that the students have skills for being able to cope with problems that they will encounter during their life time in the schools in which personality, character and behaviors are developed are among important purposes for parents and trainers. According to results of the study, it can be said that athlete students who do regular sport and exercise at high schools are more effective problem solvers than the students who are not athlete and in the same age group. Within this scope, the fact that a time frame in which the students can exercise regularly is constituted in high school curricula and that the students exercise regularly within a program will contribute to their problem solving skills positively. Besides, when students exercise regularly as a member of sport teams at out-of-school times, this will provide that they will be more effective problem solvers against the difficulties that they will encounter in their social lives. It is thought that if similar studies are applied to secondary and university students and they exercise regularly before and after adolescence, this will be beneficial to evaluate its effects on problem solving.

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