

Improving stress coping and problem-solving skills of children in disaster-prone area through cooperative physical education and sports lesson

SONI NOPEMBRI¹ ✉, YOSHIO SUGIYAMA², SARYONO¹, AHMAD RITHAUDIN¹

¹Faculty of Sport Sciences, Yogyakarta State University, Yogyakarta, Indonesia

²Faculty of Human-environment Studies, Kyushu University, Fukuoka, Japan

ABSTRACT

The present study examined the effect of cooperative games in physical education (PE) and sports classes on the stress coping and problem-solving skills. The fifteen elementary schools in the volcano disaster area assigned to the intervention and two control groups. The intervention group received PE and sports lessons with cooperative games while the control groups completed PE and sports lessons consistent with each school's existing curriculum over 28 weeks. The stress coping and problem-solving skills scales, previously developed for use with students, was implemented before and after the program. Two- and one-way analysis of variance and paired sample t-tests used to compare the three groups, and a Pearson correlation analysis used to examine the relationship between skills at pre- and post-test. The analysis showed a significant increase in stress coping and problem-solving skills in the intervention group over two control groups. The PE and sports lessons with cooperative games could effectively promote both students' stress coping and problem-solving skills. **Keywords:** Physical education, Skills, Disaster.

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✉ **Corresponding author.** Colombo Street Number 1 Karangmalang Yogyakarta. Indonesia. 55281.

E-mail: soni_nopembri@uny.ac.id

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INTRODUCTION

The last and largest eruption of the Merapi Volcano occurred in 2010, which greatly affected both the physical and psychological states of human victims, particularly children. Children experienced the negative psychological impact of the volcano (Ronholt, Karsberg, & Elklit, 2013). Children manifest trauma through psychological and behavioral changes (Kar, 2009). Another study demonstrated that the effect of a disaster on the mental health of children is sometimes indecipherable (Uemoto, Asakawa, Takamiya, Asakawa, & Inui, 2012). Various levels of general psychological distress are visible even 12 months after a disaster, and that the post-traumatic stress reaction may continue until 18 months after a disaster (Aslam & Tariq, 2010).

Some empirical evidence on children affected by the disaster showed that they require various abilities to survive and continue their lives, one of which is stress coping skills. Loss of family members, structural devastation, or a fear response results in emotional deterioration in children, and the related stress symptoms begin to appear immediately after the disaster (Mondal, et al, 2013). Another perspective explained that the coping strategy of children decides their disaster psychological reactions that build coping and recovery rapidly, ensuring enjoyment and sustainability (Kar, 2009). Jellesma (2013) stated that stress coping is complicated and that it physical symptoms emerge in many children. Thus, it is evident that children need to have appropriate stress coping skills to promote and maintain their physical and psychological well-being (Wagner, Myers & McIninch, 1999; Kadiravan & Kumar, 2012).

Physical and psychological problems have found to arise after a disaster, making it difficult for children to get out of these problems. As revealed by Aslam and Tariq (2010), disasters are traumatic events that are dangerous, overwhelming, and usually sudden. Therefore, it is necessary for children to have problem-solving skills. The benefit of updating problem-solving skills is very important for every part of students' forthcoming life, both personal and social life (Gorucu, 2016). Children with well-developed problem-solving skills will be able to identify effective solutions to problem (Thompson, Bhatt, & Watson, 2013). In the context of learning, problem-solving skills, we must stress on the method of teaching and on ways to develop these skills (Ozmutlu, 2014). Educational programs must be based on problems that students may face in their life, and education must be imparted through several activities that support them (Tasgin, 2011; Yigiter, 2013).

Psychosocial rehabilitation and intervention are indispensable for children in disaster-affected areas. Children who have lost their parents in a disaster need social and mental health support over the long term, and they need comprehensive intervention and psychological support afterward (Uemoto, Asakawa, Takamiya, Asakawa, & Inui, 2012). The main form of psychosocial support that meet's a child's needs depends on others, both during and after a disaster (Yonekura, Ueno, & Iwanaka, 2013). Children can support emotionally through the engagement processes, explain about difficult situations, and taught about bereavement and coping methods through play (Kar, 2009).

There are various intervention and psychosocial rehabilitation methods for children. Physical education (PE) and sport in the school setting is one such method. Henley (2005) mentioned that sport is a neutral and safe vehicle for the stabilization of the social and behavioral manifestation of children during and after major disasters. A PE program integrated technique to reduce stress with physical activity (Wahl-Alexander & Sinelnikov, 2013). Physical activity plays an important role in the psychological well-being of a student (Piko & Keresztes, 2006). It facilitates interaction and social development through full engagement in activities and exercises (Sozen, 2012). In the learning process of PE, students are engaged in activities that require critical thinking and inquiry, problem solving, and collaboration with others (Wright, Macdonald, and Burrows, 2004).

Cooperative learning is one of the well-known methods used in PE and sports classes. As revealed by Dyson (2001), many PE teachers use different forms of cooperative activities such as cooperative games, or some elements of cooperative learning in their PE program. Furthermore, he emphasized that PE teachers can become facilitators that enable students to interact socially with one another, to build up on their knowledge (Dyson, 2002). In cooperative learning, the main characteristic is to involve students in working in small groups, to help each other in the achievement of every learning objective (Gorucu 2016). Participation of students in cooperative learning based on the development of certain basic social skills demonstrated an improvement in their skills in and attitudes to group work (Goudas & Magotsiou, 2009). Specifically, Bay-Hinitz, Peterson, and Quilitch (1994) explained that coordinated effort between two or more students needed so that they can engage well in a variety of structured cooperative games. Finally, cooperative learning in PE will help achieve an improvement in academic performance, communication skills, and psychological health (Chiu, Hsin, & Huang, 2014).

In this study, the PE and sports program used cooperative physical activities in a group that based on psychosocial education practices to address problem solving and stress coping skills. The primary purpose of the program was to improve stress coping and problem-solving skills of the students and the holistic relaxation exercise helps to decrease negative emotions and symptoms such as depression, anxiety, and stress. The program development process included curriculum analysis, syllabus preparation, lesson plan, and determination of activities. In the curriculum analysis, we identified the core and basic competencies. Competencies are the skills that must achieve by the students in the learning process. Based on the identified competencies, we prepared the instructional syllabus which includes the translation of the identified basic competencies (cognitive, affective, and psychomotor), psychosocial skills, materials and lesson times, and corresponding activities. Subsequently, the syllabus was described in the lesson plan that included the day and date of the meeting, subject matter, instructional activities (opening, main, and closure activities), and learning time. Specifically, the students participated in 43 psychosocial-based physical activities in cooperative groups and 5-10 minutes holistic relaxation at the end of every instructional activity.

Based on the background and explanation of the various opinions of experts, it can conclude that children who live in disaster-prone areas require not only psychological support but also the development of various skills related to it. Evidently, children in disaster-prone areas need to possess stress coping and problem-solving skills. The vehicle for the development of these skills is planned and structured psychosocial interventions using PE and sport in the school setting, which include cooperative learning activities. Therefore, the purpose of the present study was to investigate the effect of a PE and sports program on the stress coping and problem-solving skills of the primary students in the Merapi volcano disaster-prone area.

MATERIALS AND METHODS

Participants

The fifteen elementary schools in volcano disaster-prone areas, 5–15 km from the top of the Merapi volcano, randomly assigned to an intervention group and two control groups. In the intervention program, school's determination can done randomly (Ronan & Johnson, 1999). Fifteen PE and sports teachers and 810 fourth-through sixth-grade students (440 girls and 370 boys) who experienced the volcanic disaster in elementary schools were involved in this study. The students' ages ranged from 7 to 15 years ($M = 10.3$ years, $SD = 1.09$ years). The intervention group comprised 266 students (110 females and 156 males; age: $M = 10.3$ years, $SD = 1.11$ years). The first control group had 214 students (105 females and 109 males; age: $M = 10.4$ years, $SD = 1.19$ years), while the second control group had 330 students (155 females and 175 males; age: $M = 10.3$ years, $SD = 0.99$ years). Table 1 shows the characteristics of the student participants.

Table 1. Characteristics of the student participants

| Characteristics | | Group | | |
|-----------------|-----|--------------|-----------|-----------|
| | | Intervention | Control 1 | Control 2 |
| Age (years) | M | 10.34 | 10.39 | 10.29 |
| | SD | 1.112 | 1.192 | 0.999 |
| Grade | 4th | 98 | 69 | 115 |
| | 5th | 87 | 63 | 116 |
| | 6th | 81 | 82 | 99 |
| Gender | F | 110 | 105 | 155 |
| | M | 156 | 109 | 175 |

Procedure

At the beginning of the study, we developed a unique PE and sports program with cooperative games for the intervention group and prepared a scale to assess children’s stress coping and problem-solving skills. On the other hand, the PE and sports programs designed for the first and second control groups based on the existing curricula in each school. To prepare program implementation, we conducted a special training for teachers of PE and sports assigned to the intervention group, whereas the PE and sports teachers in the first and second control groups were not provided any additional training. All programs conducted over 2 semesters (28 weeks). We administered the stress coping and problem-solving skills scale to all students before all PE and sports programs began and after they were completed. The implementation of the programs used the experimental study as shown as in Figure 1.

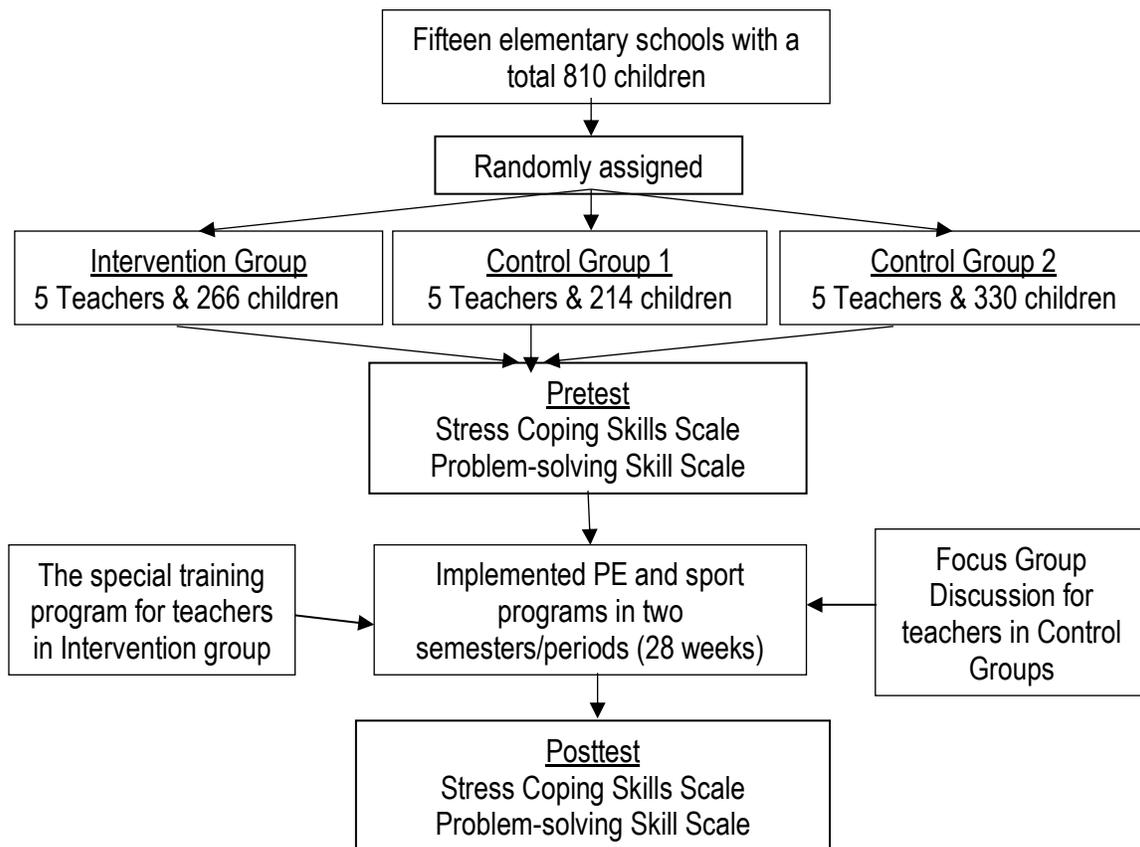


Figure 1. Field experimental design of the study

We made efforts to reduce the uncontrollable factors by using two control groups in the study. The two control groups used to detect latent bias of unobserved variables (Lu & Rosenbaum, 2004) like, social/living circumstances. The first and second control groups implemented PE and sports programs based on existing curricula in each school. It does not mean there is no difference in treatment conditions but there are three different principles in that. Firstly, the new curriculum used in the first control group the second control group implemented the former curriculum with normal procedures. Secondly, the program has differences in the content of subject matters. Third, a lesson time in the first control group performed differently from second control group.

Measure

A stress coping skills scale developed by authors to assess the ability of elementary students to cope with stressful problems in their school and daily activities. The questionnaire comprises 10 items to which the students respond using a Likert-type scale that includes the following responses: not according to me (0), less suited to me (1), moderately according to me (2), and completely according to me (3). Total scores could range from zero (0) to 30 points. The questionnaire created in the Indonesian language, using simple statements, as an example "*Saya melakukan hobi/minat yang membantu saya tenang dan senang*" (I engage in a hobby/interest that helps me feel relaxed and happy). The stress coping skills scale developed by using seven steps in scale development (DeVilles, 2003). It administered to 745 students in the fourth through sixth grades in Yogyakarta schools before any PE and sports programs began. We evaluated the items of the scale in terms of their construct and internal validity, and internal consistency (reliability) for the students in our sample. A confirmatory factor analysis verified that the root mean square error of approximating (RMSEA) was 0.055, the goodness of fit index (GFI) index was 0.973, adjusted goodness of fit index (AGFI) index was 0.954, and comparative fit index (CFI) index is 0.936. Each index indicated a good model fit. The Cronbach's alpha of the stress coping skills scale for children in this study was 0.727, indicating that the internal consistency of the factors was acceptable for this sample. Additionally, a significant correlation between all items and total scores showed good internal validity ($df = 0.07$, $p = 0.000 < p = 0.025$).

A problem-solving skills scale developed to assess the problem-solving ability of elementary students in daily activities, using 10 Likert-type items. This scale developed and administered by authors in conjunction with the stress coping skills scale. An example of the item is "*Saya mencoba memilah masalah yang dihadapi mulai dari yang paling mudah sampai yang paling sulit*" (I try to sort the problems faced starting from the easiest to the most difficult). All items evaluated for construct and internal validity, and internal consistency (reliability). A good fit model indicated by the confirmatory factor analysis with the following values: RMSEA = 0.057, GFI = 0.966, AGFI = 0.947 and CFI = 0.953. In addition, the internal consistency (Cronbach's alpha 0.835) of the factors was acceptable for students in our sample. Simple statements and native Indonesian language used in the scale.

Statistical Analysis

Data analysis performed using SPSS Version 22.0 for Windows. A repeated measures analysis of variance (ANOVA) used to test for differences between the intervention and control groups before and after the PE and sports programs. Then, the one-way ANOVA used to compare the changes in problem-solving skills before and after the implementation of the PE and sports program across groups. Specifically, paired sample t-tests used to evaluate differences within groups.

RESULTS

A significant interaction was observed between the mean scores of the intervention and control groups ($F(2, 807) = 9.567, p = 0.000$), as shown in Figure 2, which indicates that the groups showed significantly different levels of change in their stress coping skills from pre- to post-intervention. The one-way ANOVA also showed significant differences in stress coping skills between groups. There were significant changes in stress coping skills from pre to post-test ($M=1.99$) in the intervention group. In contrast, there was no significant changes from pre to post-test in the first ($M=0.42$) and second ($M=0.02$) control groups. It also supported by a paired-samples t-test that indicated a significant improvement in the stress coping skills in the intervention group ($t(265) = -5.393; p = 0.000$). On the other hand, there was no significant enhancement in the stress coping skills in the first ($t(213) = -1.210; p = 0.228$) and second ($t(329) = -0.078; p = 0.938$) control groups.

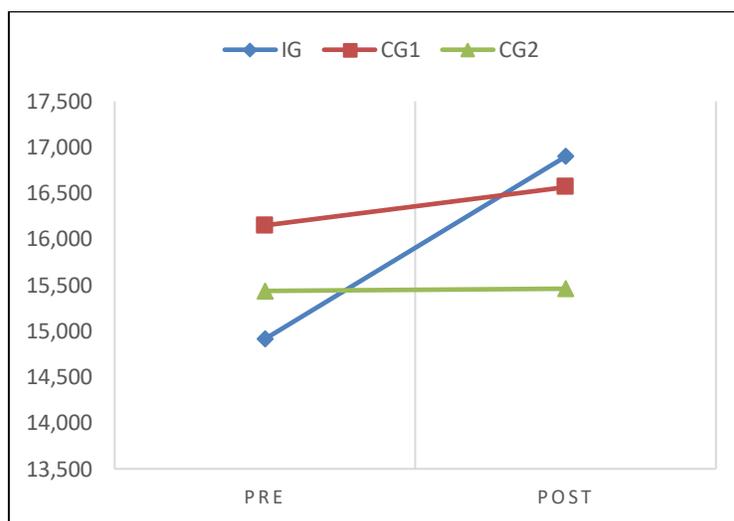


Figure 2. An interaction of stress coping skills means within and between groups

There was a significant interaction of mean scores on problem-solving skills between the intervention and control groups ($F(2, 807) = 4.151, p = 0.016$). It has plotted in Figure 3. The one-way ANOVA shows that the groups had significantly different changes in problem-solving skills from pre- to post-intervention. A significant change revealed from pre to post-test ($M=1.17$) in the intervention group, but the first ($M=0.25$) and second ($M=0.32$) control groups have not a significant changes from pre to post-test. Furthermore, we assessed the differences in problem-solving skills before and after the implementation of the PE and sports programs within groups by using a paired-samples t-test. There was a significant enhancement in problem-solving skills after the psychosocial PE and sports program for the intervention group ($t(265) = -2.953; p = 0.003$). However, there was no significant enhancement in the problem-solving skills of the first ($t(213) = -0.596; p = 0.552$) and second ($t(329) = 0.927; p = 0.355$) control groups.

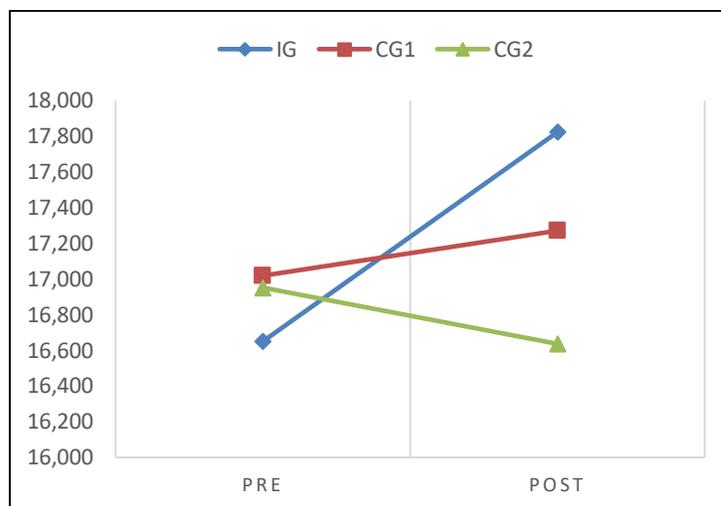


Figure 3. The interaction of problem-solving skills means within and between groups.

DISCUSSION AND CONCLUSION

The PE and sports program with the cooperative games that implemented in the intervention group presented a significant improvement in children's stress coping skills. It means that programs in the intervention group are greatly effective to increase the level of stress coping skills of children. It is appropriate that students could manage their stress by participating in regular physical activities in the PE context (Kumar and Bhukar, 2013). It is also supported by the finding that students involved in a PE program had various experiences that helped them respond their stress and learn all kinds of coping strategies (Lang, Feldmeth, Brand, Holsboer-Trachsler, Pühse & Gerber, 2016b). The children in the disaster-prone area who experienced stress states, can be over with the coping stress ability which developed by the program. A coping training program within PE classes can reduce stress among vocational students by improving their adaptive coping skills (Lang, Feldmeth, Brand, Holsboer-Trachsler, Pühse & Gerber, 2016a). The PE and sports will form a more complete stress coping skills of children in disaster-prone area who involvement in the program. Students have higher problem-based coping strategies that non-athletic students do (Azizi, 2011). Those actively engaged in physical exercise found to have better abilities in coping effectively through positive emotions, which improved their problem-focused coping (Kim & McKenzie, 2014).

In the current study, we also found that the problem-solving skills of the students in the intervention group showed a significant improvement after their participation in the PE and sports program. It suggest that the PE and sports programs in the intervention group have a high benefits in developing children's problem solving skills. In line with this, problem-solving skills improved through PE lessons that helped develop students' skills and creativity (Senduran & Amman, 2015). Students more easily to involve in independently problem solving after a PE lesson specifically (Wang and Sugiyama, 2014). In this program, we used games activities in groups and problem-based. Students developed the ability to use their decision-making skills to solve various problems in the game context (Dyson, 2001). With reference to cooperative games, students who participated in cooperative group PE lessons were happy to help their peers, which significantly improved their problem-solving skills (Gorucu, 2016). PE and sports training has a positive effect on high school students' problem-solving skills (Sozen, 2012). Overall, as an example of a real-life situation, sport affords a sense of responsibility and teaches problem-solving skills to students while they compete with each other (Yigiter, 2013).

The cooperative games in PE and sports lesson implemented in the intervention group led to a significant improvement in both stress coping and problem-solving skills of elementary school children in a volcano disaster-prone area. The program is an effective approach for simultaneously improving both skills through planned, executed, and appropriately assessed intervention programs. The different teaching abilities of teachers, school policies on the PE and sports curriculum, and school infrastructure deficiencies may be a weakness of this study. Therefore, controlling these factors would affect the present findings. More investigations to examine the relationship between the skills and mental health or other psychological aspects will need to derive more findings that are robust.

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DISCLOSURE STATEMENT

No potential conflict of interest was reported by authors.

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