Study of the Transfer and Maintenance of the Effects of the TPSR Model in Junior High School Physical Education Classes

Abstract.
The Teaching Personal and Social Responsibility Model (the TPSR model) is a method for teaching students about fulfillment of personal and social responsibilities through physical activities. A characteristic of this model is that it aims to transfer and maintain behavior acquired through physical activities. Past studies have revealed a number of challenges related to transfer and maintenance of the effects of the TPSR model. First, physical education classes in schools were not targeted. Second, the effects of the TPSR model were not examined using quantitative data. Third, maintenance of the effects of the TPSR model were not examined. One effective experimental design for examining maintenance of the effects of the TPSR model would probably be a case study in which changes in one group were measured for a certain period of time. Therefore, the aim of the present study was to examine whether the TPSR model would promote acquisition and maintenance of social skills in daily life using an experimental design and quantitative data targeting physical education in junior high schools in Japan. The results were as follows: First, the TPSR model promoted the acquisition of social skills that students could use outside of physical education classes, although it did not facilitate the maintenance of these social skills. Second, the TPSR model appeared to promote the acquisition of social skills by encouraging students to imagine scenes in their daily lives that were similar to scenarios in physical education classes, where they were encouraged to behave responsibly. Third, the TPSR model did not facilitate the maintenance of social skills because it did not incorporate methods for acquiring structural knowledge based on fundamental and procedural disciplines or allow students to gain structural understanding that would allow them to apply this knowledge to new scenarios.

Key words
Social skills, social behavior, science of learning

Study of the Transfer and Maintenance of the Effects of the TPSR Model in Junior High School Physical Education Classes

The Transfer and Maintenance of the Effects of the TPSR Model

Akemi Umegaki¹
Satoshi Otomo²
Eiko Minamishima³
Kenji Ueta²
Naohiro Fukada⁴,⁵
Takehito Yoshii⁴,⁶
Natsuki Miyao⁴

¹School of Health and Sport Sciences, Osaka University of Health and Sport Sciences
   1-1, Asashirodai, Kumatori, Sennan, Osaka, 590-0496, Japan
   E-mail: umegaki@ouhs.ac.jp
²College of Sport and Health Science, Ritsumeikan University
   1-1-1, Noji-higashi, Kusatsu, Shiga, 525-8577, Japan
³College of Education, Tamagawa University
   6-1-1, Tamagawagakuen, Machida, Tokyo, 194-8610, Japan
⁴Graduate School of Sport and Health Science, Ritsumeikan University
   1-1-1, Noji-higashi, Kusatsu, Shiga, 525-8577, Japan
⁵Shinmei Elementary School, Gunma
   1-3242, 2-chome, Hirosawa, Kiryu, Gunma, 376-0013
⁶Kasuga Junior High School, Gunma
   207, Kamisadori, Maebashi, Gunma, 371-0816

1. Introduction

1.1. Identification of problems

Physical education as a school subject provides a social behavior domain as one of the objectives of a class and develops the social behavior of students. The Teaching Personal and Social Responsibility Model (the TPSR model) that Hellison (2003) of the United States developed is one of instructional strategies that nurture social behavior in physical education classes. The TPSR model is an instructional strategy that teaches students to fulfill their personal and social responsibilities through physical activities. Specifically, it teaches students to fulfill personal and social responsibilities during physical activities while encouraging them to do so in other situations. That is, the characteristic of this model is to aim for the improvement of behavior during physical activities and to transfer the behavior that students learn in physical activities to other situations and maintain the behaviors.

Albert and Troutman define the transfer of behavior as “the onset of reactions that a person is trained by a specific instructor to engage in a specific situation when facing other situations or under other instructors” (Albert and Troutman, 1999/2004, p.303). Meanwhile, they define the maintenance as “the engagement of learned behavior after manipulations based on teaching programs are removed” (Albert and Troutman, 1999/2004, p.303), meaning the maintenance of a learned behavior.

If the TPSR model provides instructions to transfer behavior that students learn during physical activities and maintain them, the evaluation of the validity of the model requires the verification of the transfer and maintenance of the effects. Yet, extremely few studies have been done to verify them.

1.2. Examination of past studies and problems

Past studies on the TPSR model can be categorized into the following two types. The first type is studies that verify how the TPSR model affected students during physical activities. The second type is studies that verify how the TPSR model transfers and maintains the effects that students experience during physical activities.
There have been many type 1 studies that verified how the TPSR model had affected students during physical activities. These studies reported that the TPSR model had encouraged the improvement of awareness, such as self-restraint, self-direction, and efforts or the improvement of behavior (Balderson and Martin, 2011; Balderson and Sharpe, 2005; Cecchini et al., 2007; Hellison and Walsh, 2002; Watson et al., 2003).

Few type 2 studies have been done to verify the transfer and maintenance of the effects of the TPSR model. Takahashi states that a question concerning the development of social behavior through physical education is “whether social behavior and attitude are transferred to actual social lives outside of classes. Unfortunately, however, not enough studies have been done in Japan and internationally to answer this question” (Takahashi, 2012, pp.15-16). The author searched in SPORTDiscus with Full Text, a database of academic information in the field of sports and exercise science and found two overseas studies that verified the transfer of the effects of the TPSR model by Martinek et al. (2001) and Walsh et al. (2010) *. No study that verified the maintenance of the effect of the TPSR model was found.

Martinek et al. (2001) applied the TPSR model for six months in instructions at a sports club for elementary school students and verified whether the behavior they learned would be transferred to their behaviors in class activities at their elementary schools. The study examined 16 elementary school students who exhibited problematic behaviors and low motivation to study. The data included weekly reports written by the instructors at the club, daily reports written by homeroom teachers, and records of interviews with the target students conducted after the instruction. This study found that efforts that the students acquired through the instructions at the sports club were transferred to classroom activities. Meanwhile, autonomy, self-restraint, and supportive behavior that students acquired through the instruction at the sports club were not transferred to classroom activities.

Walsh et al. (2010) applied the TPSR model to the instruction of a sports club for elementary school students for two years and examined whether the behavior that students acquired would transfer to school lives. This study targeted 13 fifth-grade students who had not received sufficient education. The data included records of
interviews with the students, their homeroom teachers, attendance records, and daily reports of the homeroom teachers and instructors at the club. This study found that the target-setting practice and autonomy that the students acquired through the instructions based on the TPSR model transferred to their school lives, while efforts that they acquired through the model did not transfer.

These two overseas studies on the transfer have the following problems. First, they were not examining physical education classes in schools. These two studies examined the transfer of the effects of the TPSR model targeting elementary school students attending a sports club. They did not examine whether the effects of the TPSR model transferred to physical education classes in which a greater variety of students participated compared to the sports club.

Second, they did not examine the effects of the TPSR model based on quantitative data. These two past studies did not exhibit consistent results, such as finding transfer in some cases and failing to find transfer in other cases in the same category. Balderson and Martin (2011, p.3) found it a problem that many past studies that had examined the effects of the TPSR model were qualitative researches. They argued the necessity of examining effects using quantitative researches. Studies can probably find clearer conclusions about the transfer and maintenance of the effects of the TPSR model if they examined them based on quantitative data, but no such study has been done.

Third, past studies did not mention the maintenance of the effects of the TPSR model. The TPSR model is intended to transfer the behaviors acquired during physical activities to other situations in the daily lives of the students and to maintain them. Thus, studies need to verify the maintenance of the effects of the model as well. A research design that measures changes in the same group for a certain period of time is also needed. A study reported the examination of the maintenance of the effects of the group contingency strategy targeting physical education classes in schools using single subject designs (Jung et al., 2005). Based on these studies, the single subject designs (Albert and Troutman, 1999/2004; Barlow and Hersen, 1984/2003) seem effective.

Studies have been done in Japan targeting physical education cases in schools and reported that the TPSR model encouraged the improvement of behaviors among
students during the classes. Examples include that Umegaki et al. (2011) applied the TPSR model to the physical education classes of third-year students in junior high schools. They reported that the students had acquired responsible behaviors through the TPSR model during physical education classes. Specifically, they exhibited behaviors, such as teaching or encouraging friends who could not perform well or inviting friends who did not participate in practices.

Human behaviors are commonly said to be associated with skills. For example, behaviors associated with personal relations are understood as a behavior using social skills to smoothly build personal relations (Kikuchi, 1988, pp.187-189). In other words, a person needs to have acquired social skills to execute a certain action in association with personal relations. According to this, if a student acquires responsible behavior in physical education classes thanks to the TPSR model, the TPSR model can be regarded as successful in making students acquire social skills in physical education to exhibit such behavior. Thus, the TPSR model is an effective instructional strategy to help students acquire social skills in physical education classes.

As discussed earlier, the effectiveness of the TPSR model cannot be evaluated only by examining the acquisition of responsible behavior and social skills in physical education. The evaluation also requires the examination of the following aspects: first, whether the model helps students acquire social skills in ordinary situations, and second, whether the effects can be maintained. Thus, this study is designed to verify these two aspects through the measurement of social skills in daily life.

1.3. Objective of this study

Based on the above, this study examined whether the TPSR model made the effects of physical education classes transfer and helped students acquire social skills for use in daily life, as well as whether the model induced the maintenance of social skills in the daily lives of students using single subject designs based on quantitative data targeting physical education classes in junior high schools in Japan.

To examine the transfer and maintenance of the effects of the TPSR model, this study used the research findings of cognitive science and learning science, specifically
the information provided by researchers including Bransford et al. (2000), Ichikawa (2011), and Shirozu (2012).

2. Methods

2.1. Participants

This study analyzed physical education classes of two homerooms taught by teacher F in F City Public Junior High School and physical education classes of one homeroom taught by teacher S in S City Public Junior High School. Table 1 describes the targeted schools, teachers, gender of teachers, grade of students, gender of students, homerooms, and the number of students.

Table 1 Insertion

Teacher F is a female teacher in her 30s. She taught physical education classes for homeroom X with 33 students and homeroom Y with 34 students. The students were female students in their first year of junior high school. Teacher S is a male teacher in his late 20s. He taught physical education classes of homeroom Z with 40 male students who were in their second year of junior high school. Both teacher F and teacher S prepared unit plans for all classes to which they were assigned.

2.2. Subjects and research design

Table 2 describes the periods, units, hours of lesson, intervention, and the implementation of the investigation.

Table 2 Insertion

The class taught by teacher F adopted the ABA design consisting of the unit without intervention (no-intervention unit) (A), unit with the intervention of the TPSR model (intervened unit) (B), and then the no-intervention unit. Specifically, this design consisted of the no-intervention unit with physical fitness, intervened unit with volleyball, and no-intervention unit with running long jump.

The class taught by teacher S adopted the ABABA design consisting of the repeated
no-intervention unit (A) and intervened unit (B) and then the no-intervention unit (A) at the end. Specifically, this design consisted of the no-intervention unit with physical fitness, intervened unit with short-distance races, no-intervention unit with swimming, summer vacation, no-intervention unit with apparatus gymnastics, intervened unit with judo, no-intervention unit with handball, winter vacation, and no-intervention unit with long-distance races.

2.3. TPSR model intervention

Specific instruction methods of the TPSR model are set based on Hellison (2003). First, a responsibility level chart was posted in the gymnasium and playground to make students understand the details of their personal responsibilities and social responsibilities. “The instruction of responsible behavior based on the responsibility chart” was set. The responsibility level chart indicated gradual action goals that students were going to work on. The teachers instructed students to work toward achieving the goals in the physical education classes. Table 3 shows the responsibility chart used in this study.

Table 3 Insertion

Level 0 is the level in which students engage in irresponsible behavior, such as side-talking or acting foolishly during classes. In level 1, students aim to become involved with respecting the rights and feelings of their friends, refrain from side-talking, and solve conflicting opinions with friends through discussions. In level 2, students aim to become involved with participation and making efforts, work toward achieving targets, and try to work on new challenges. In level 3, students aim to become involved with self-direction, know well about what they should do to solve problems, and advise friends to stop acting foolishly. In level 4, students aim to become involved with being considerate toward others, invite friends who are not participating to participate, and give advice to friends who cannot perform something well. In level 5, students aim to practice the actions they learned in levels 1 to 4 outside of the physical education classes, meaning that they aim to fulfill personal and
social responsibilities in the local communities.

Second, “the awareness talk” was set at the start of classes so that students could become aware of the action goals for the day. The teachers encouraged the students to understand specific action goals while pointing out the responsibility level chart and introducing short proverbs and talking to them about what they were experiencing.

Third, “the reflection time” was set at the end of a class so that students would be able to reflect on their actions. Hellison (2003) suggested methods to make students reflect on their actions, such as a method to make them raise their hands for categories they could achieve while a teacher pointed to the level chart, and the method to make them reflect on the actions of others in group discussions. This study prepared a self-evaluation card on which the same categories as the responsibility level chart were written. Students responded to categories of responsible behaviors in classes based on three levels: Yes, Neither, and No.

Fourth, “the counseling time” was set before and after the class to build trusting relationships with students. The assigned teachers actively talked to individual students based on the information on the self-evaluation cards for the responsibility levels. Specifically, the teachers gave advice to students to fill in any gaps between the self-evaluation of students on their responsible behaviors during classes and the perceptions of the teachers.

These four procedures were set for the intervened units. In the no-intervention units, the teachers talked to students as usual and gave the usual advice, but no self-evaluation card for the responsibility levels was used. Table 4 describes the difference in the procedures for the intervened unit and the no-intervention unit.

Table 4 Insertion

2.4. Data collection

This study used Kikuchi’s Scale of Social Skills: 18 items (KiSS-18)\textsuperscript{3} that evaluated skills to smoothly build personal relations that are needed in the daily lives of students (Kikuchi, 1988). The KiSS-18 consists of 18 categories based on self-reported scales using five levels, and the total score is usually of concern (Kikuchi,
The range of its applicability is students in junior high schools or older (Kikuchi, 2004, p.41).

2.5. Ethical considerations

This study was implemented after providing written and oral information to the principals of the schools and assigned teachers to describe the research plan and details of the investigation and receiving their consents. The assigned teachers conducted the investigation during physical education classes. They also explained to students about the purpose of the investigation, that the investigation was irrelevant to the grades for the class, and that it was up to students to participate in the investigation before the start of the investigation. The investigation was then started after receiving the consent of the students. This study was examined and approved by the research ethics committee of Ritsumeikan University (approval number: BKC-人-2014-003, BKC-人-2014-035, BKC-人-2014-038).

2.6. Data analysis

For the class taught by teacher F, two-way analysis of variance was conducted using the time of the investigation and the class as independent variables and the mean of the KiSS-18 dependent variables to examine whether the mean of the KiSS-18 varied depending on the difference in the class with or without the intervention of the TPSR model. In addition, for the class taught by teacher S, one-way analysis of variance was conducted using the time of the investigation as the independent variable and the mean of the KiSS-18 as the dependent variable to examine whether the mean of the KiSS-18 varied depending on the intervention of the TPSR model. The level of significance was 5% for these analyses. IBM SPSS 22.0 for Windows was used for the analysis.

These analyses were targeted to students of whom all the investigation data were available. Specifically, the analyses targeted 31 students in class X and 33 in class Y who were taught by teacher F, except for students who missed any of the four investigations, and 27 students in classes taught by teacher S, except for students who missed any of the six investigations and those who failed to provide information on the card.
3. Results

3.1. The results of KiSS-18 in the classes taught by teacher F

Table 5 describes the means, standard deviations, and the result of the two-way analysis of variance of the KiSS-18 in the classes taught by teacher F. A variance analysis was conducted on the class taught by teacher F based on the time (4) × the class (2). Since the hypothesis of sphericity was not supported, the degree of freedom was corrected using the Greenhouse-Geisser estimate. As a result, the main effect of the time was significant (F[2.55, 157.94]=13.06, p<.001). Meanwhile, the main effect and interaction of the class were not significant.

Table 5 Insertion

Thus, the two classes taught by teacher F were combined and analyzed with the one-way analysis of variance. Table 6 describes the means, standard deviations, and the result one-way analysis of variance and multiple comparison of the KiSS-18 in the two classes taught by teacher F. Figure 1 shows the changes in the mean of the KiSS-18 in the two classes taught by teacher F. Since the hypothesis of sphericity was not supported, the degree of freedom was corrected using the Greenhouse-Geisser estimate. As a result, the main effect of the time was significant (F[2.55, 160.60]=13.23, p<.001). As a result of the multiple comparison using the Bonferroni method, the mean of the KiSS-18 was significantly higher after the class unit of volleyball (68.09 points<72.30 points) compared to before the class unit of physical fitness and after the class unit of volleyball (66.84 points<72.30 points) compared to after the class unit of physical fitness. Meanwhile, the mean was significantly low after the unit of running long jump (72.30 points>68.19 points) compared to after the unit of volleyball.

Table 6 Insertion

Figure 1 Insertion
3.2 The results of KiSS-18 in class taught by teacher S

Table 7 describes the means, standard deviations, and the result of one-way analysis of variance and multiple comparison of the KiSS-18 in the class taught by teacher S. Figure 2 shows the changes in the mean of the KiSS-18 in the class taught by teacher S. A one-way analysis of variance was conducted on the class taught by teacher S for the mean of KiSS-18. Since the hypothesis of sphericity was not supported, the degree of freedom was corrected using the Greenhouse-Geisser estimate. As a result, the main effect of the time was significant (F[3.48, 90.49]=5.52, p<.01). As a result of multiple comparison using the Bonferroni method, the mean of the KiSS-18 was significantly high after the class unit of short-distance races (58.48 points<62.81 points) compared to the class unit of physical fitness, after the class unit of judo (58.48 points<64.19 points) compared to the class unit of physical fitness and, and after the class unit of judo (58.48 points<64.19 points) compared to the class unit of apparatus gymnastics. Meanwhile, the mean was significantly low after the class unit of apparatus gymnastics (62.81 points>58.48 points) compared to after the class unit of short-distance races, and after the class unit of long-distance races (64.19 points>59.85 points) compared to the class unit of judo.

4. Discussion

The objective of this study was to examine whether the TPSR model would transfer the effects acquired in physical education classes and help students acquire social skills to be used in daily life and whether the social skills would be maintained in daily life by targeting physical education classes in junior high schools in Japan based on single subject designs using quantititative data.

This study found that the mean of the KiSS-18 significantly increased with the intervention of the TPSR model in the classes taught by teacher F and the class taught by teacher S. On the other hand, the mean of the KiSS-18 that significantly increased with the intervention of the TPSR model became significantly low in the
no-intervention unit. Based on the above, the TPSR model applied in physical education classes in a junior high school helped students acquire social skills to be used in daily life outside of the physical education classes, while the model did not help students maintain the social skills.

Past studies have demonstrated that the TPSR model helped students acquire responsible behavior in the exercises of physical education classes. Linking this to the result of this study and concluding that the TPSR model helped students acquire social skills to be used in daily life, the TPSR model could not only help students acquire responsible behavior and social skills in the exercises of physical education classes, but it also probably transferred the behavior and skills and helped students acquire social skills to be used in daily life.

The following section examines how the TPSR model helped students acquire social skills to be used in daily life outside of the physical education classes as well as the causes when it did not help students maintain the social skills.

First, the instruction method of responsible behavior that the TPSR model adopted was the reason that the TPSR model helped students acquire social skills to be used in daily life outside of physical education classes.

The instruction method of the TPSR model was based on the following steps: 1) present responsible behaviors to practice as action goals to students; 2) make students gradually work on the action goals in small steps from level 0 to level 5; 3) instruct students to practice the behavior they learned in the physical education classes in daily life, especially when at level 5; 4) introduce short proverbs at the start of the class to motivate students to practice responsible behaviors; 5) provide reflection time to help students reflect on their actions; 6) provide counseling time to give students feedback on self-evaluations concerning their actions in relation to responsibility level and encourage them to engage in desirable behavior; and 7) repeat the instructions from 1) to 6) in every class.

In relation to the point that the TPSR model helped students acquire social skills in daily life outside of physical education classes, the instruction in the TPSR model practiced the following: [1] the teachers taught the importance of positively working
on new challenges, such as exercise skills, thereby teaching them the importance of positively working on presented challenges in other subjects, and [2] the teachers taught the importance of talking to friends who were not participating in practices during physical education classes, thereby teaching them the importance of talking to people in trouble at home or in society and helping them (Hellison, 2003, pp.34-36). As seen here, the TPSR model is designed to teach students to practice responsible behavior in physical education classes so that they would imagine similar situations and practice responsible behavior in daily life as well. Both teacher F and teacher S who participated in this study encouraged students to imagine situations in daily life similar to the situations in the physical education classes so that the students would practice the responsible behavior they practiced in the physical education classes in daily life as well.

The instruction method of the TPSR model can be interpreted by referring to the learning theory based on behaviorism, which was the mainstream in the field of learning psychology in the 1970s when this model was developed. Learning based on behaviorism is grounded on the belief that learning is to transform behavior and encourages the transformation of a series of behaviors by linking stimulus and reaction (Ichikawa, 2011, pp.37-39). Specific instruction methods include reinforcing desirable behavior for set goals by providing instructions to accumulate improvements in small steps, to motivate students with rewards and punishments, and to solidify the behavior through repeated practice (Akita, 2010, p.5). When trying to interpret the instruction method of the TPSR model by comparing it with the instruction methods based on behaviorism; 2) is applicable to the small-step and accumulative instructions; 3), 4), and 6) the reinforcement of desirable behavior for an already set goals; and 7) the solidification of behavior through repeated training.

As past studies have indicated, the fact that the TPSR model adopted many instruction methods that could be interpreted from learning theory based on behaviorism was one of the reasons that the TPSR model was an effective instructional strategy for helping students acquire responsible behavior in physical education classes. Similarly, the reason that the TPSR model helped students acquire social skills for use
in daily life outside of physical education classes could probably be explained from the perspective of behaviorism. Specifically, “the identical elements theory is advocated in behaviorism claiming that transfer is encouraged when there are many common elements between prior learning and the transfer of learning” (Shirozu, 2012, p.347). The TPSR model helps students imagine specific situations in daily life similar to the situations in physical education classes and encourages students to practice responsible behavior in daily life as well. That is, the TPSR model instructs students to practice responsible behavior that they learned in physical education classes in daily life by making them imagine similar situations, which is the transfer of learning, during the physical education classes, which is the prior learning.

Based on the above, the instruction for students to imagine situations similar to the situations in physical education classes during the class and to encourage them to practice the responsible behavior in daily life was probably the reason that the TPSR model successfully helped students acquire social skills for use in daily life outside of the physical education classes.

Second, there are the following reasons that the TPSR model failed to maintain the social skills in daily life.

[1] The intervened unit consisted of six or nine hours of classes, which were too short to provide opportunities to reinforce behavior through repetitive practice. [2] The no-intervention class did not continue the methods to reinforce the responsible behavior. [3] Teaching materials, contents of instruction, and student groups were changed in the no-intervention unit. This change required students to respond to learning challenges and personal relations that differed from the learning situations based on the TPSR model. The overlapping of these causes is probably the reason for the failure to facilitate the maintenance of the behavior.

The class units of six or nine hours, teaching materials, contents of instruction, and changes to student groups mentioned here are also seen in regular physical education classes as well. Then, what kinds of methods are effective for helping students maintain the social skills they acquire in such an environment?

Recent studies have pointed out that cognitive learning would be effective for
helping students transfer and maintain the social skills they acquire (Watanabe and Hoshi, 2009, p.37). Similar concepts have been advocated in the domain of learning sciences. Bransford et al. (2000) suggested the following four methods that would be effective for helping students transfer and maintain learning from the standpoint of cognitivism: a) to help students gain a deeper understanding to the level of conceptual knowledge rather than simply memorizing information (Bransford et al., 2000, pp.55-56); b) to broaden procedural knowledge to address the knowledge to be used in what types of situations (Bransford et al., 2000, p.65); c) to help students acquire a broad range of basic knowledge to structurally understand the knowledge based on a conceptual framework (Bransford et al., 2000, pp.16-17); and d) to help students monitor their abilities to see how much of the learned information they acquired or how well they can perform tasks to improve their metacognition abilities (Bransford et al., 2000, p.18). These can be organized into the following two procedures: i) provide structural knowledge, such as principle knowledge and procedural knowledge to students and help them structurally understand the information so that they can apply them to new situations and ii) improve metacognition skills.

Table 8 is the result of the comparison between the method suggested by Bransford et al. (2000) and the method used in the TPSR model.

Table 8 Insertion

The TPSR model adopted the method for improving metacognition skills among the four methods. Specifically, the TPSR model incorporated an instruction that provided reflection time at the end of every class to help students reflect on how well they acquired the responsible behavior they had learned in the physical education classes and their performance levels. Counseling time was additionally provided. The teachers gave feedback on the self-evaluations of students concerning responsibility levels to correct the self-evaluations of students on responsible behavior during physical education classes.

The TPSR model, however, did not incorporate methods to provide structural knowledge, such as principle knowledge and procedural knowledge, to students and
help them structurally understand so that they could apply them to new situations. The TPSR model provided the following knowledge concerning responsible behavior: [1] specifically the kind of behavior that would fulfill personal and social behavior, and [2] personal and social behaviors were available at different levels from basic to advanced social skills. These are within the scope of superficial knowledge as Sawyer (2006) argued and not regarded as structural knowledge, such as principle knowledge and procedural knowledge. In addition, the method to help students understand knowledge concerning responsible behavior in the TPSR model was to present specific behavior and make students repeatedly practice the behaviors and then to help students reflect on their actions to see whether they were able to practice the behavior. This method shows some ideas to improve metacognition ability, but the method to make students structurally understand new knowledge provided by the TPSR model to new situations is insufficient.

In summary, a reason that the TPSR model did not help students maintain social skills was that the model did not incorporate a method to provide structural knowledge, such as principle knowledge and procedural knowledge, and to help students structurally understand so that they could apply the knowledge to new situations.

5. Conclusion

The objective of this study was to examine whether the TPSR model would transfer the effects of physical education classes and help students acquire social skills for use in daily life, as well as whether the model would help students maintain the social skills in daily life using single subject designs based on quantitative data targeting physical education classes in junior high schools in Japan.

This study found the following three points as a result. First, the TPSR model helped students acquire social skills for use in daily life outside of physical education classes. On the other hand, the students did not maintain the social skills.

Second, the reason that the TPSR model helped students acquire social skills for use in daily life outside of physical education classes was that the model made students imagine situations in daily life that were similar to the situations in physical education
classes during the class and instructed them to practice the responsible behavior in daily life as well.

Third, the reason that the TPSR failed to help students maintain the social skills was that the model did not incorporate a method to provide structural knowledge, such as principle knowledge and procedural knowledge, to students and help them structurally understand so that they would be able to apply it to new situations.

Future studies to be done are discussed at the end. The first study to be done is to make sure that the TPSR model helps the transfer of behavior and clearly demonstrates the mechanism of the transfer. Past studies have demonstrated that the TPSR model can help students acquire responsible behavior for use in physical education exercises during physical education classes. Thus, this study did not measure responsible behavior and social skills in physical education. To clearly demonstrate that the TPSR model helps the transfer and how it occurs, it is necessary to measure whether the TPSR model helps students acquire the following aspects targeting specific physical education classes and clarify the relationships among them based on empirical data: 1) responsible behavior in physical education, 2) social skills in physical education, 3) social skills in daily life, and 4) responsible behavior in daily life.

The second type of study to be done is to develop a new instructional strategy that helps students transfer the social skills they acquire during physical education classes to be practiced in physical education exercises, learn social skills to be used in daily life, and help students maintain the skills.

One of the methods to develop these new instructional strategies is to provide structural knowledge, such as principle knowledge and procedural knowledge, to students and help them structurally understand so that they can apply it to new situations.

Notes
1. The search results of past studies that examined the transfer and maintenance of the effects of the TPSR model in the SPORTDiscus with Full Text, the academic database of sports and exercise science, is described below. Specifically, this study selected
studies found using the search condition, “Hellison’s model OR teaching personal and social responsibility OR personal and social responsibility OR TPSR model” in any of the search fields, including the title, keyword, abstract, and full text. These studies were then narrowed down using the search condition, “transfer OR transferring OR transference OR maintenance OR retention.” Thirteen studies published in academic journals were found as a result. One of them was removed from the selection, for it was a review of Sport Education Model. Among the 12 studies, only two examined the transfer of the effects of the TPSR model. The search on SPORTDiscus with Full Text was conducted on December 14, 2015.

2. Sasaki saw social skills in physical education separately from social skills in daily life and defined the social skill in physical education as “cognitive and behavioral manipulation of personal relations that are embedded in the learning process of exercises and sports and should be learned and acquired (Sasaki, 2004, p.425). Based on Sasaki, this study regards skills associated with responsible behavior that students learn in physical education classes as the social skill in physical education, and skills associated with responsible behavior in daily life outside of physical education classes as the social skills in daily life.

3. The KiSS-18 is a scale that Kikuchi developed based on social skills proposed by Goldstein et al., the group of clinical psychologists (Kikuchi, 1988, pp.199-200). The category of social skills proposed by Goldstein et al. consists of 18 categories by generating three categories each of the following six fields: introductory skills, more advanced skills, emotional management skills, skills that replace attacks, stress management skills, and planning skills (Kikuchi, 1988, pp.199-200).

4. To help students acquire a broad basic skill and structurally understand knowledge based on a conceptual framework means to help students understand the characteristics of the information, their relationships, and patterns based on the framework of concepts concerning subjects in addition to as the knowledge that can be applied to new situations (Bransford et al., 2000, pp.16-17).

References


Name: Akemi Umegaki

Affiliation: School of Health and Sport Sciences, Osaka University of Health and Sport Sciences

Address: 1-1, Asashirodai, Kumatori, Sennan, Osaka, 590-0496, Japan

Brief Biographical History:
2017 Received PH. D. at Ritsumeikan University
2011-Present Professor, School of Health and Sport Sciences, Osaka University of Health and Sport Sciences
2007-2011 Associate Professor, School of Health and Sport Sciences, Osaka University of Health and Sport Sciences
2004-2007 Lecture, Hokkaido Asai Gakuen College, Hokkaido Asai Gakuen University

Main Works:

Membership in Learned Societies:
・Japan Society of Physical Education, Health, and Sport Sciences
・Japan Society for the Philosophy of Sport and Physical Education
• Japan Society of Sport Education
• Japan Society for the Pedagogy of Physical Education
• The Japan Society of Sport History
Table 1 Targeted schools, teachers, gender of teachers, grade of students, gender of students, homerooms, and the number of students

<table>
<thead>
<tr>
<th></th>
<th>F City Public Junior High School</th>
<th>S City Public Junior High School</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Teachers</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender of teachers</td>
<td>Female</td>
<td>Male</td>
</tr>
<tr>
<td><strong>Grade</strong></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><strong>Students</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>Female</td>
<td>Female</td>
</tr>
<tr>
<td>Homeroom</td>
<td>X</td>
<td>Y</td>
</tr>
<tr>
<td>Number</td>
<td>33</td>
<td>34</td>
</tr>
</tbody>
</table>

1. Table 1 Targeted schools, teachers, gender of teachers, grade of students, gender of students, homerooms, and the number of students
2. Table 2 Periods, units, hours of lesson, intervention, and the implementation of the investigation

Table 2 Periods, units, hours of lesson, intervention, and the implementation of the investigation

**Table 2.1 Periods, units, hours of lesson, intervention, and the implementation of the investigation (Teacher F)**

<table>
<thead>
<tr>
<th>Periods</th>
<th>Mid April 2014</th>
<th>Mid April - Early May 2014</th>
<th>Early May 2014</th>
<th>Early May - Early June 2014</th>
<th>Early June 2014</th>
<th>Early June - Early July 2014</th>
<th>Mid July 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Units</td>
<td>Physical fitness</td>
<td>Volleyball</td>
<td>Running long jump</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hours of lesson</td>
<td>7</td>
<td>9</td>
<td>9</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intervention</td>
<td>No intervention</td>
<td>TPSR model</td>
<td>No intervention</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The implementation of the investigation</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 2.2 Periods, units, hours of lesson, intervention, and the implementation of the investigation (Teacher S)**

<table>
<thead>
<tr>
<th>Periods</th>
<th>Mid April 2014</th>
<th>Mid April - Early June 2014</th>
<th>Early June 2014</th>
<th>Early June - Late June 2014</th>
<th>Late June 2014</th>
<th>Late June - Early October 2014</th>
<th>Early October 2014</th>
<th>Early November 2014 - Early November 2014</th>
<th>Early November 2014 - Early February 2015</th>
<th>Early February 2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Units</td>
<td>Physical fitness</td>
<td>Short-distance races</td>
<td>Apparatus gymnastics</td>
<td>Judo</td>
<td>Handball</td>
<td>Long-distance races</td>
<td>Numen</td>
<td>TPSR model</td>
<td>No intervention</td>
<td>TPSR model</td>
</tr>
<tr>
<td>Hours of lesson</td>
<td>14</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>8</td>
<td>7</td>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intervention</td>
<td>No intervention</td>
<td>TPSR model</td>
<td>No intervention</td>
<td>TPSR model</td>
<td>No intervention</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The implementation of the investigation</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*It was summer vacation from late July 2014 until the end of August 2014.
††It was a winter vacation from late December 2014 until the beginning of January 2015
### Table 3 Responsibility level chart

<table>
<thead>
<tr>
<th>Level</th>
<th>Level content</th>
<th>Behavior example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 0</td>
<td>Irresponsible</td>
<td>When teachers and friends were talking, I chatted.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>I did not take responsibility for my behavior.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Failure to blame others. I was warned but did not reflect on me.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>I did not actively participate in today’s activities.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>I hurt others or playfully.</td>
</tr>
<tr>
<td>Level 1</td>
<td>Respecting the rights and feelings of others</td>
<td>I did not chat when teachers and friends were talking.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>I did not say bad things or make fun of my friends.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Even though I had a different opinion from my friends, I solved it by talks.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>I acted, thinking that everyone was part of an irreplaceable group.</td>
</tr>
<tr>
<td>Level 2</td>
<td>Participation and making effort</td>
<td>I worked ambitiously.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>I tried to achieve the task.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>I positively challenged the new task.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>I did not give up and tackled the task until the end.</td>
</tr>
<tr>
<td>Level 2</td>
<td>Self-direction</td>
<td>Even though it was not instructed, I worked on the task.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>I found out what to do to solve the problem</td>
</tr>
<tr>
<td></td>
<td></td>
<td>I did not talk anything other than the subject of the lesson.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>I warned playful friends.</td>
</tr>
<tr>
<td>Level 4</td>
<td>Caring</td>
<td>I encouraged and taught my friends who can not do it well.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>I invited members who do not participate and let them join.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>When my friend succeeded, I was pleased and praised together.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>I followed my teacher's instructions and group decisions.</td>
</tr>
<tr>
<td>Level 5</td>
<td>Taking responsible behavior even outside PE classes</td>
<td>I took responsible behavior even outside PE classes</td>
</tr>
</tbody>
</table>
### Table 4 Difference in the procedures for the intervened unit and the no-intervention unit

<table>
<thead>
<tr>
<th>Procedures</th>
<th>Intervened unit</th>
<th>No-intervention unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instruction of responsible behavior based on the responsibility chart</td>
<td>○†</td>
<td>✗††</td>
</tr>
<tr>
<td>Awareness talk</td>
<td>○</td>
<td>✗</td>
</tr>
<tr>
<td>Reflection time</td>
<td>○</td>
<td>✗</td>
</tr>
<tr>
<td>Counseling time</td>
<td>○</td>
<td>✗</td>
</tr>
</tbody>
</table>

*○* indicates that the procedures were implemented  
*††* indicates that the procedures were not implemented
5. Table 5 Means, standard deviations, and the result of the two-way analysis of variance of the KiSS-18 in the classes taught by teacher F

Table 5 Means, standard deviations, and the result of the two-way analysis of variance of the KiSS-18 in the classes taught by teacher F

<table>
<thead>
<tr>
<th></th>
<th>Pre Physical fitness</th>
<th>Post Physical fitness</th>
<th>Post Volleyball</th>
<th>Post Running long jump</th>
<th>Time</th>
<th>Class</th>
<th>Time × Class</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>X</td>
<td>31</td>
<td>68.48</td>
<td>11.25</td>
<td>67.26</td>
<td>11.46</td>
<td>72.77</td>
<td>12.19</td>
</tr>
<tr>
<td>Y</td>
<td>33</td>
<td>67.73</td>
<td>12.62</td>
<td>66.45</td>
<td>12.73</td>
<td>71.85</td>
<td>12.50</td>
</tr>
</tbody>
</table>

***p < 0.001
6. Table 6 Means, standard deviations, and the result one-way analysis of variance and multiple comparison of the KiSS-18 in the two classes taught by teacher F

Table 6 Means, standard deviations, and the result one-way analysis of variance and multiple comparison of the KiSS-18 in the two classes taught by teacher F

<table>
<thead>
<tr>
<th></th>
<th>Pre Physical fitness</th>
<th>Post Physical fitness</th>
<th>Post Volleyball</th>
<th>Post Running long jump</th>
<th>F</th>
<th>multiple comparison (Bonferroni)</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>64</td>
<td>68.09</td>
<td>68.84</td>
<td>72.30</td>
<td>12.04</td>
<td>12.26</td>
</tr>
<tr>
<td>M</td>
<td>68.09</td>
<td>11.88</td>
<td>12.04</td>
<td>12.26</td>
<td>68.19</td>
<td>12.80</td>
</tr>
<tr>
<td>SD</td>
<td>11.88</td>
<td>12.04</td>
<td>12.26</td>
<td>68.19</td>
<td>12.80</td>
<td>13.23</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*** 1&lt;2&lt;3 ; 3&gt;4</td>
</tr>
</tbody>
</table>

***p<.001
7. Fig 1 Changes in the mean of the KiSS-18 in the two classes taught by teacher F

![Graph showing changes in KiSS-18 mean](image)

Fig 1 Changes in the mean of the KiSS-18 in the two classes taught by teacher F
Table 7 Means, standard deviations, and the result of one-way analysis of variance and multiple comparison of the KiSS-18 in the class taught by teacher S

<table>
<thead>
<tr>
<th>N</th>
<th>M</th>
<th>SD</th>
<th>M</th>
<th>SD</th>
<th>M</th>
<th>SD</th>
<th>M</th>
<th>SD</th>
<th>M</th>
<th>SD</th>
<th>F</th>
<th>multiple comparison (Bonferroni) (p &lt; 0.05)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre Physical fitness</td>
<td>27</td>
<td>59.93</td>
<td>10.14</td>
<td>58.48</td>
<td>12.48</td>
<td>62.81</td>
<td>10.52</td>
<td>64.19</td>
<td>11.05</td>
<td>59.85</td>
<td>12.53</td>
</tr>
</tbody>
</table>

*p<.01
9. Fig 2 Changes in the mean of the KiSS-18 in the class taught by teacher S

![Graph showing changes in the mean of the KiSS-18](image)

Fig 2 Changes in the mean of the KiSS-18 in the class taught by teacher S
10. Table 8 Comparison between the method suggested by Bransford et al. (2000) and the method used in the TPSR model

Table 8 Comparison between the method suggested by Bransford et al. (2000) and the method used in the TPSR model

<table>
<thead>
<tr>
<th>the method suggested by Bransford et al. (2000)</th>
<th>the method used in the TPSR model</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) To help students gain a deeper understanding to the level of conceptual knowledge rather than simply memorizing information</td>
<td>✗</td>
</tr>
<tr>
<td>b) To broaden procedural knowledge to address the knowledge to be used in what types of situations</td>
<td>✗</td>
</tr>
<tr>
<td>c) To help students acquire a broad range of basic knowledge to structurally understand the knowledge based on a conceptual framework</td>
<td>✗</td>
</tr>
<tr>
<td>d) To help students monitor their abilities to see how much of the learned information they acquired or how well they can perform tasks to improve their metacognition abilities</td>
<td>☐</td>
</tr>
</tbody>
</table>

○ indicates that the TPSR model clearly adopted the method. ✗ indicates that the TPSR model did not clearly adopted the method.