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A quasi-experimental controlled study of a school-based mental health programme to improve the self-esteem of primary school children

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Children's mental health problems are associated with a low self-esteem. Harter has proposed that recognising competence in personal importance and social support would improve students' self-esteem. However, to the best of our knowledge, no study has examined Harter's theory for primary school children. This study aimed to test the effectiveness of the Treasure File Programme for improving primary school children's self-esteem. The programme's effectiveness was evaluated regarding the students' self-esteem, physical well-being, emotional well-being, family relationships, friendships, and school performance. A total of 794 primary school students (aged 7–11 years) in the intervention group and 592 in the control group were recruited in a quasi-experimental study design. The intervention group indicated significant improvement in the self-esteem domain compared to the control group. However, no intervention effects were observed on physical well-being, emotional well-being, family, friends, and school. These findings indicate that this programme is effective in improving self-esteem in primary school students. Given the importance of self-esteem in children's mental health, this programme may be helpful as a primarily educational programme option to address mental health problems in primary school children.

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Introduction

Mental health problems and self-esteem. Children's mental health problems have been reported in several countries (Chester et al., 2015; Polanczyk et al., 2015). Globally, the prevalence of anxiety and depressive disorders in children and adolescents (6–18 years old) have been found to be 6.5% and 2.6%, respectively (Polanczyk et al., 2015). Self-esteem is a level of global regard that one has for their own self as a person (Harter, 1993), and is the evaluative and affective dimension of the self-concept (Harter, 1999). Self-concept is defined as the sum of an individual's beliefs and knowledge about their personal attributes and qualities (Mann et al., 2004). Self-esteem is related to mental health (Mann et al., 2004). Low self-esteem could lead to mental health issues, such as eating disorders (Button et al., 1996; Cervera et al., 2003), depressive symptoms (Orth et al., 2009; Sowislo and Orth, 2013), and anxiety disorders (Ginsburg et al., 1998; Lee and Hankin, 2009). Children's higher self-esteem was associated with lower bully victimisation (Folayan et al., 2020). Furthermore, children with low self-esteem suffer from higher physical and social problems, and mental health-related issues in adulthood, versus their peers with higher self-esteem (Trzesniewski et al., 2006). Conversely, positive self-esteem is associated with mental well-being, adjustment, happiness, success, and satisfaction (Mann et al., 2004). These findings indicate the necessity of a school-based mental health programmes aimed at improving children's self-esteem.

Previous self-esteem improvement programme. Studies guided by theoretical or empirical rationale, or both, are more effective than those not (Haney and Dorlak, 1998). A successful programme should be developed based on well-established theories (Bos et al., 2006). However, in a previous meta-analysis of 116 running programmes aiming to improve self-esteem, only six were theory-based (Haney and Dorlak, 1998). Those programmes include 'Enhancing Self-Esteem (Frey and Carlock's, 1989)' and 'Comparison of self-esteem enhancement programmes (Pope, McHale and Craighead, 1988)'. These programmes were based on cognitive theory, in which the cognitive concepts of 'self-talk' and self-fulfilling prophecies are considered central routes to changing self-esteem (Frey and Carlock, 1989). The latter stemmed from social learning theory that change occurs based on general and specific learning principles that apply to all ages (Pope et al., 1988). Bednar et al. incorporated concepts from information-processing psychology and psychopathology, which combines cognitive and existential thought, describing self-esteem as a dynamic phenomenon that develops because of feedback and cyclical and self-regulatory cognitive processes (Bednar et al., 1989). Their model provided practical guidance for clinicians in marital and family therapy (Bednar and Peterson, 1995). These theories are beneficial in that the steps and procedures are systematic (Mruk, 2006). However, the programmes had several limitations; for example, no experimental studies were included to evaluate their overall effectiveness, and they used highly skilled and experienced therapists, which makes the routine application of this programme difficult. At present, there seems to be an increase in the number of theory-driven self-esteem programmes. However, to the best of our knowledge, there are no meta-analysis studies in this arena.

Harter's model of self-esteem enhancement theory. According to Harter, two factors play important roles in developing and maintaining self-esteem in children and adolescents (Harter, 1993). The first is perceived competence in personally important areas (e.g., looks, social appeal, and athletic ability) (Harter, 1993). If children lack competence in personally important areas, they should enhance relevant skills or reduce the dominance of this area (Harter, 1993). The second factor is the level of social support children provide and receive from important people in their lives, particularly their parents, peers, and teachers (Harter, 1993). Multiple studies have shown that receiving positive feedback and praise improve self-esteem (Felson and Zielinski, 1989; O'Dea and Abraham, 2000). Additionally, Harter suggests that building inner qualities, such as kindness and morality, helps children recognise their inner self as worthy (Harter and Bukowski, 2012). To the best of our knowledge, Harter's theory of self-esteem enhancement has only been used in prevention programmes for eating disorders. These programmes aim to prevent eating disorders by improving self-esteem, and experimental studies evaluate the programmes' effectiveness as a whole. For example, Everybody is Different (O'Dea and Abraham, 2000), Every Body is a Somebody (McVey et al., 2004), Straight Talking About Self-esteem and Resilience (Poller, 2008), and Beautiful from the Inside Out (Norwood et al., 2011). Apart from Straight Talking About Self-esteem and Resilience, the other programmes were found to be effective in preventing eating disorders and improving self-esteem (Supplementary Table S1). However, the programmes had limitations. Specifically, one programme was ineffective when other researchers tested it among 11-year-old students (Ghaderi et al., 2005), one was only offered to girls (McVey et al., 2004), and another had no control group (Norwood et al., 2011). The improving perceptions in areas of personal importance approach was included in all the programmes; however, the social support approach was only available in the Everybody is Different programme. Finally, these programmes were conducted among secondary school students, instead of primary school students (Supplementary Table S1). Trzesniewski et al. examined children's self-esteem from age 11 and found that low self-esteem during adolescence predicts poor health, criminal behaviour, and limited economic prospects during adulthood (Trzesniewski et al., 2006). The results suggest that intervention programmes to improve self-esteem in primary school before adolescence are needed. However, to our knowledge, no previous programmes had been effective with pupils under the age of 11. The transition from primary school to secondary school involves a different curriculum and pedagogy (Topping, 2011). Therefore, we developed an entirely new intervention programme rather than improving on the existing intervention.

The research question of this study. The research question is: Does the intervention increase the self-esteem of children with low self-esteem? It was hypothesised that the TFP could be effective for primary school-age children with low self-esteem. The main aim of our study was to test our hypothesis. Secondary aims were to understand whether the TFP has any side effects on other children and the way in which it affects other self-concepts, such as physical well-being, emotional well-being, friends, family, and school domains. In Japan, self-esteem has been reported to decline from primary to junior high school and then increase from high school to adulthood, similar to the developmental trajectories observed in other countries (Ogihara, 2016). However, despite this similar developmental trajectory, Japan's college students have lower self-esteem than students in other countries (Schmitt and Allik, 2005). This is because neutral or negative self-evaluation has higher frequency among collective Eastern cultures (Schmitt and Allik, 2005). Furthermore, the self-esteem of students in primary school and middle school in Japan has been decreasing (Oshio et al., 2014; Ogihara et al., 2016) in contrast to the United States, where self-esteem has risen over time along with the cultural shift towards greater individualism. This may be

because the Japanese culture has been less individualistic throughout history, and thus people have had difficulties adapting to the global shift towards individualism (Ogihara et al., 2016). In Japan, pilot sessions of the TFP were held in several classes. However, the TFP was not quantitatively analysed yet. Therefore, the effectiveness of the TFP was quantitatively evaluated in this study.

Methods

Research design. A quasi-experimental design with intervention and control groups was used. Quasi-experimental methods that involve the creation of a comparison group are most often used when it is not possible to randomise individuals or groups to intervention and control groups (White and Sabarwal, 2014). This design was chosen because it was difficult to conduct a randomised controlled trial (RCT) due to the lack of consent from the headteachers. Headteachers chose whether to participate in the intervention or control group. The intervention group participants received the full programme, while the control group participants received the regular school curriculum. The main assessments were conducted both before (baseline) and after (after intervention) the programme to both groups. A wait-list design was not implemented because TFP is a 1-year programme.

Participants. Figure 1 presents a flowchart describing the participant recruitment process. The participants to be surveyed were recruited through the Board of Education of six cities (Fukui City, Sabae City, Katsuyama City, Sakai City, Komatsu City, and Shimizu City) in the central region of Japan. A total of 2297 students from nine public primary schools participated. The headteachers of five of the nine schools chose to participate in the intervention group, which comprised 1151 students. Further, written consent from the headteachers, teachers, and parents of 954 students were obtained. The 954 students received the TFP and participated in a KINDL-R questionnaire survey (see 'Measurement' for details). The headteachers of four of the nine schools chose to participate in the control group, which comprised 1146 students. Written consent was obtained from the headteachers, teachers, and parents of 766 of these students, to whom the KINDL-R questionnaire survey was then administered. No school in the intervention group dropped out during the study, while one school from the control group withdrew during the intervention process. A drop-out notice from the headteacher because of the school's circumstances unrelated to the TFP was received. Absent participants and those who did not complete the KINDL-R were excluded. The analysis included 794 participants (387 boys and 407 girls) in the intervention group, and 592 participants (299 boys and 293 girls) in the control group (Fig. 1). The students who were analysed were in the second, third, fourth, fifth, and sixth grades of primary school (Table 1). The mean age at the baseline was 9.04 and 9.27 years in the intervention and control groups, respectively. In Japan, primary school runs from grade 1 to grade 6, and children who have their sixth birthday on or before 1 April enter the first grade of the primary school of that year (i.e., the school year starts in April and ends in March). At the beginning of April, the second graders are 7 years old, and the sixth graders are 11 years old. Grades 2 to 6 were chosen because the TFP includes writing activities that the 1st graders have not yet learned.

Procedure. This study was conducted from April 2016 to March 2017. Six years at primary school and 3 years at junior high school are compulsory in Japan. The children in the intervention group completed seven sessions (Table 2) conducted by the homeroom teachers. Sessions 1 to 3 were held once a month from May to July. Then, after the summer holidays, Sessions 4 to 6

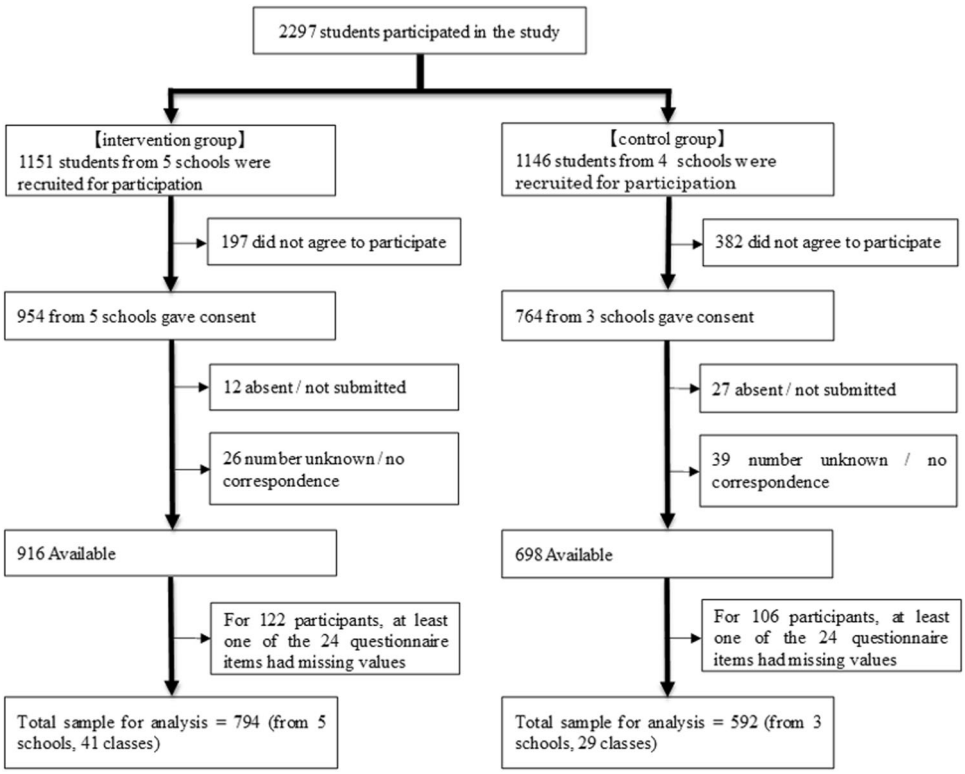

Fig. 1 Trial profile. A total of 2297 subjects were screened. 1151 students were recruited for intervention group sequence and 1146 students were recruited for control group sequence. Some students have dropped out during the study for the indicated reasons. Finally, the analysis included 794 participants (387 boys and 407 girls) in the intervention group, and 592 participants (299 boys and 293 girls) in the control group.

Table 1 Descriptive statistics for participants ($N = 1386$).

		Total	2nd grade	3rd grade	4th grade	5th grade	6th grade
Intervention group	Total	794	151	161	158	153	171
	Male	387 (48.7)	74 (49.0)	87 (54.0)	70 (44.3)	77 (50.3)	79 (46.2)
	Female	407 (51.3)	77 (51.0)	74 (46.0)	88 (55.7)	76 (49.7)	92 (53.8)
Control group	Total	592	81	118	106	131	156
	Male	299 (50.5)	31 (38.3)*1	65 (55.1)	56 (52.8)*2	68 (51.9)	79 (50.6)
	Female	293 (49.5)	50 (61.7)	53 (44.9)	50 (47.2)*3	63 (48.1)	77 (49.4)*4

Values in parenthesis indicate percentages.
*1 Including one Indonesian student.
*2 Including one Philipino student.
*3 Including one Chinese student.
*4 Including one American student.

Table 2 Overview of the treasure file programme.

Session	Contents	Activities	Hours
Session 1	Introduction and the formation and acceptance of realistic goals	1 Hear the story of 'Yu-chan and the treasure file'. 2 Discuss the impressions of the story. 3 Understand the purpose of the TFP. 4 Write the purpose of the TFP. 5 Write goals in personally important areas. 6 Place written goals in the file folder.	1
Session 2	What are my strengths and virtues? (First session)	1 Discuss strengths and virtues. 2 Write positive self-evaluations and place them in the file folder.	1
Session 3	My treasure file	1 Confirm goals. 2 Think of words that symbolise goals. 3 Create a cover for the file folder that symbolises goals. 4 Draw a picture of the cover of one's own file folder using one's creativity.	1
Session 4	Positive messages to and from classmates	1 Write positive messages to classmates. 2 Receive positive messages from classmates. 3 Place the positive messages received from classmates in the file folder.	2
Session 5	Family members' strengths and virtues	1 Write positive messages to family members.	1
Session 6	What are my strengths and virtues? (Second session)	1 Reread the positive messages from classmates, family members, and homeroom teachers. 2 Write a positive self-evaluation and place it in the file folder.	1
Session 7	Confirmation of goal achievement	1 Look back at the documents created during the TFP and the file folder contents. 2 See if the goals were achieved.	1

1 school hour = 45 min. Children are free to put school records, writings, photos of their treasures, etc. into their file folders. After the end of Session 4, children receive positive messages on their strengths and virtues from their homeroom teacher and family members.

were held once a month from October to December. Session 7 was held in March, the last month of the school year. Between these periods, children were working on their goals. The KINDL-R was administered twice. In the intervention group, the questionnaire was administered in April 2016 before the TFP session 1 at the baseline, and in March 2017 after the TFP session 7 at the after intervention of the TFP sessions (Supplementary Fig. S2). The questionnaire was administered with the same schedule for the control group. The gap between the baseline and after intervention is 11 months. All questionnaires were completed at school. Each homeroom teacher in the intervention group received a written explanation of the TFP protocol. All teachers who participated in the TFP in the intervention group received the same training. Owing to the busy schedule of Japanese teachers, it was conducted in two parts, each of which took 2 h. The first part that covers up to Session 3 was completed before the start of the programme. The rest was done before Session 4 started. The programme was manualised in detail, and all teachers implemented the TFP curriculum according to standardised texts (Supplementary Text S3) to ensure the reproducibility of the programme. We randomly selected teachers and video-recorded two of their sessions to ensure that the programme ran according to the standardised text. At the end of each session, teachers were asked to record and give comments on the children's performance of the session and the TFP as a whole, if any.

Characteristics of the treasure file programme. To overcome the three main limitations of the previous studies, the treasure file programme (TFP) was developed as a mental health improvement programme, incorporating Harter's theory with a particular focus on raising self-esteem. This intervention approach was designed by not being limited to eating disorders, supplementing sufficient social support (positive messages from all classmates, family, and teachers), and targeting primary school children. The TFP programme was not limited to eating disorders because there are several areas of personal importance to children, such as scholastic competence, arts, and athletic competence, etc., as well as appearance. Existing programmes with a priori determined areas thus far have had limited effects on children whose important areas are different from appearance. In previous programmes, the field was limited to change the cognition with content appropriate to that field, as in "prevention of eating disorders". However, there are several areas of personal importance to children, which makes

it difficult to address all of them in a limited time frame. It can only affect the personally important areas in which lacking competence coincides with the areas of the programme implemented. The disadvantage of such an approach is that it can only reach fewer children than a skill-building approach. Meanwhile, the TFP has chosen to use the skill-building approach. This is because even if children have a wide range of goals in important areas, that is, linguistics, mathematics, or building friendships, each child can improve their skills in classes and school life. Consequently, the gap between their goals and their perception of themselves is narrowed, and their self-esteem is improved. It was expected that this would contribute to improved self-esteem in many children versus the cognitive changes approach. The second major improvement of the TFP is that sufficient social support, especially from parents, peers, and teachers have been incorporated, so that the programme can focus more directly on self-esteem (Harter, 1993). Under the TFP, children receive social support by writing and sharing positive messages about the strengths and virtues of their classmates and family members, as well as receiving these messages from their classmates and family members and homeroom teachers. The third major improvement of the TFP is that it was conducted with primary school children. It is known that low self-esteem at the age of 11 causes physical, social, and mental health-related issues in adulthood (Trzesniewski et al., 2006). Therefore, it was hoped to apply our programme of improving self-esteem to primary school children under the age of 11 to help prevent problems from occurring later in adulthood. In addition, positive self-evaluation is also important to prevent the development of negative self-esteem and to increase self-esteem (Mann et al., 2004). For this reason, the TFP introduces positive self-evaluation content.

Programme sessions. Each programme session is designed to be incorporated into the annual instruction plan. Further, the purpose of each TFP session is consistent with the objectives of the existing curriculum in Japan. Therefore, the activities in each session were carried out in the order of their number in Table 2 (Table 2). The complete TFP instructional text is included in the supplementary text (Supplementary Text S3).

In Session 1, 'Yu-chan and a treasure file' is a story to explain the concept of this programme; it is a story about a primary school boy who runs the TFP and becomes happy (Supplementary Text S4). In this session 1, children formulate and write down their goals in areas that are relevant to them, such as 'I want to learn a lot of Kanji (Chinese characters),' 'I want to do well in math', 'I want to make more friends'. This priming operation activates goals without the participants' awareness (Bargh et al., 2001). For example, if students have two different disciplines, Math and Art, they would work towards their own goals in Math and Art classes. The teacher would provide them the idea to keep a record of this in their file folder. This makes it easier for the students to evaluate how close they are to their goals in their focus areas. Harter suggests that children must compare their achievements to their own past performance in regular classroom settings to increase their perceived competence, rather than comparing themselves to other gifted children (Harter and Bukowski, 2012). Therefore, children also kept their performance records in a personal file folder; their achievements can be easily compared with their own past performance. Additionally, according to their intrinsic motives, the students include records of past positive performance in the file folder. This file folder is named the 'Treasure File' because it contains positive entities for the child.

In Session 2, first, the children discuss what their strengths and virtues are. Next, the children write down their strengths and virtues as positive self-assessments. The teacher emphasises the importance of focusing on internal qualities and instructs them not to minimise their qualities, but encourages them to identify something, even if it seems minor.

In Session 3, the students create covers for their file folders. The file folder used in the TFP has a transparent cover. Therefore, the contents of the first file pocket can be used as the cover of the file folder. Specifically, children reflect on the contents of their personal file folder and give it a name that symbolises their goals. Then, they draw a picture on paper to use as the cover and place it in the first file pocket of the folder. By creating an original cover for their file folder, children develop an attachment to it.

In Session 4, students give their classmates positive messages about their strengths and virtues and receive positive messages from their classmates about their strengths and virtues. This form of social support aims to improve self-esteem by improving relationships with classmates. This session takes two school hours, because the children write positive messages to all of their classmates. After Session 4, the children's teachers and family members give the children positive messages about their strengths and virtues.

In Session 5, as a form of social support, children give their family members positive messages about their strengths and virtues. This type of social support aims to improve self-esteem by improving children's relationships with their family members.

In Session 6, children again conduct a positive self-evaluation. Harter and Bukowski (2012) suggests that the construction of a self that is too highly dependent on internalising the opinions of others can lead to the creation of a false self that does not reflect the person's authentic experience. Therefore, to avoid this, in the TFP, children record their authentic experiences in their personal file folders to connect them to create a true self. Thus, in this session, children make positive self-evaluations of themselves based on the positive messages received from others and on their own records.

In Session 7, children confirm whether they have achieved or approached the goal they set in Session 1, based on their performance records. Session 7 is implemented in March, the last month of the school year in Japan. Children are more likely to develop their abilities and approach their goals if the period between goal setting and goal achievement is longer.

Measurement. The KINDL-R questionnaire was used to assess the effectiveness of the TFP. The KINDL-R is a self-report questionnaire developed by Bullinger and Ravens in 1998 as a quality-of-life scale for children; it has been used in over 20 countries (Bullinger et al., 2008; Jozefiak et al., 2008; Ravens-Sieberer and Bullinger, 2000). The primary school version of the KINDL-R questionnaire used in this study has been tested for reliability and validity from second to sixth grades (Shibata et al., 2003). Detailed information on the KINDL-R questionnaire can be found at the official website (https://www.kindl.org/english/information/). The KINDL-R was used for two main reasons. First, the KINDL-R is the only questionnaire in Japan confirmed to be reliable and effective as an assessment tool for measuring self-esteem in children. Shibata et al. (2003) confirmed the reliability and validity of the Japanese primary school version of the scale with 382 participants (boys $n = 204$, girls $n = 178$: valid response rate 91%). Reliability was confirmed by internal consistency and retesting methods. Validity was confirmed by the association with psychological scales, and the ability to discriminate between three groups with different mental and physical states (Shibata et al., 2003). Second, in addition to the self-esteem domain, the KINDL-R includes domains that assess relationships with physical well-being, emotional well-being,

Table 3 Baseline, after intervention scores in the TFP intervention and control groups.

	Baseline			After intervention		
	Mean	SD	(95% CI)	Mean	SD	(95% CI)
Physical_well_being						
TFP intervention	79.14	16.44	(78.00,80.28)	79.99	15.94	(78.88,81.10)
Control	78.76	17.59	(77.34,80.18)	80.38	16.33	(79.07,81.70)
Emotional_well_being						
TFP intervention	82.30	16.99	(81.12,83.49)	83.75	16.38	(82.61,84.88)
Control	81.36	18.42	(79.87,82.84)	82.69	16.98	(81.32,84.05)
Self-esteem						
TFP intervention	52.99	25.56	(51.21,54.77)	58.16	24.68	(56.45,59,88)
Control	54.58	24.39	(52.62,56.55)	54.27	25.43	(52.22,56.31)
Family						
TFP intervention	72.57	18.97	(71.25,73.89)	75.28	18.64	(73.99,76.58)
Control	69.76	21.01	(68.07,71.46)	73.23	20.13	(71.60,74.85)
Friends						
TFP intervention	73.46	19.31	(72.11,74.80)	76.59	17.73	(75.36,77.82)
Control	77.34	18.98	(75.82,78,87)	77.68	17.57	(76.27,79.10)
School						
TFP intervention	66.97	20.17	(65.57,68.37)	68.21	19.87	(66.82,69.59)
Control	66.54	21.41	(64.82,68.27)	66.44	20.49	(64.79,68.09)
Total						
TFP intervention	71.24	13.15	(70.33,72.15)	73.66	13.19	(72.75,74.28)
Control	71.35	14.18	(70.20,72.49)	72.45	13.53	(71.36,73.54)

family, friends and school, and each domain can be evaluated independently (Bullinger et al., 2008; Hosogi et al., 2012).

According to Harter, self-concept is multidimensional. Therefore, it is highly important to use a multidimensional scale to determine which domains will be affected or not affected by the intervention (Harter and Bukowski, 2012). Therefore, students in all domains were assessed and the effect of the TFP on each domain were examined. There are six domains: physical well-being, emotional well-being, self-esteem, family, friends, and school; and each domain contains four items, respectively. Therefore, there are 24 items in the Kindle-R questionnaire (Supplementary Text S5). All items were rated on a five-point scale ranging from 1 (never) to 5 (all the time). The scores for each domain were summed up and converted into 100 points using the following formula: {(Sub-scale score) – (lowest possible score)}/(possible range of raw score) × 100 (Supplementary Text S5). The total score was the sum of the scores for the six domains, which was further converted into 100 points using the following formula: {(Total score) – (lowest possible Total score)}/(possible range of raw Total score) × 100 (Supplementary Text S5). The minimum and maximum scores for scores of each domain and the sum total score of all the six domains were 0 and 100 points, respectively. Higher scores indicate a higher level in all scores.

Statistical analysis. In order to examine the effects of the TFP on children with low self-esteem and its secondary effects on children with other levels of self-esteem, all student participants were divided into three groups based on the baseline scores. The mean ± one standard deviation (SD) self-esteem score was used as cut points to investigate the effect of the TFP intervention for students with different levels of basal self-esteem (Pinquart et al., 2006). Three baseline groups were distinguished from the intervention and control groups by designating them as low-level children, middle-level children, and high-level children (low-level children—intervention group: $n = 137$, control group: $n = 94$; middle-level children—intervention group: $n = 516$, control group: $n = 394$; high-level children—intervention group: $n = 141$, control group: $n = 104$). A repeated-measures analysis of covariance (ANCOVA) was used to examine the interaction between group and assessment period for each level. ANCOVA is a statistical approach used to control for the effect of potential confounding variables. In our preliminary analysis using ANOVA, significant effects of grade, gender, schools, and baseline (Supplementary Tables S6–9) was found. Grade, gender, school, and baseline scores were used as covariates to reduce their impact on the outcome variables. The threshold for significance was set at $p < 0.05$. The effect size was assessed using partial η^2, in which small, medium, and large effects were operationalised as 0.010, 0.059, and 0.138 (Richardson, 2011).

Next, a multilevel analysis was performed to examine the effects of the TFP on self-esteem and its secondary effects on other self-concepts. Multilevel models are designed to bridge micro and macro perspectives and are defined as specifying the relationships between phenomena at higher and lower levels of analysis (e.g., individual and group, group and organisation) (Kozlowski and Klein, 2000). The data had a school-class-student nesting structure. Class was used as a random effect. The fixed-effect was used to address school clustering. Before conducting multilevel analysis, the intraclass correlation coefficient (ICC) was presented to examine the proportion of variance due to inter-cluster between classes and individuals, and the design effect (Deff) was presented to examine the effect of the number of people in the group on the ICC. ICC indicates the proportion of between-group variance in all error variances, and Deff is an indicator of the adequacy of the sample size of the data. ICC and Deff are indicators of whether a multilevel model is necessary. The reliability thresholds were set at ICC < 0.1 and Deff < 2.0. In addition, *t*-tests were used to examine the differences and confidence intervals (CIs) between changes in the mean scores of the intervention and control groups at baseline and after intervention. All statistical analyses were conducted using IBM SPSS, Version 27.0 and R, Version 4.1.0.

Results

A total of 794 participants in the intervention group and 592 participants in the control group completed the KINDL-R questionnaire (Tables 1 and 3). The Cronbach's coefficient alpha for the questionnaire was 0.772 in this sample (physical

Table 4 Baseline and after intervention scores by self-esteem level in the TFP intervention and control groups.

	Baseline			After intervention			F- value	p-value	Partial η^2
	Mean	SD	(95% CI)	Mean	SD	(95% CI)			
Low_level_group									
TFP intervention	14.10	10.31	(12.05,16.14)	40.28	25.27	(36.51,44.05)	7.618	0.006**	0.033
Control	15.82	9.51	(13.35,18.30)	30.45	23.80	(25.90,35.00)			
Middle_level_group									
TFP intervention	53.27	13.79	(54.22,54.33)	58.58	21.56	(56.63,60.52)	8.919	0.003**	0.010
Control	54.70	13.47	(53.49,55.90)	55.16	22.38	(52.93,57.38)			
High_level_group									
TFP intervention	89.76	7.41	(87.74,91.78)	74.03	23.52	(70.31,77,74)	0.634	0.427	0.003
Control	89.18	7.70	(86.83,91.53)	72.42	20.84	(68.79,76.74)			

**$p < 0.01$ in model of ANCOVA.

Table 5 ICC values, design effect and multilevel models in the TFP.

	Baseline		After intervention		Multilevel models		
	ICC	Deff	ICC	Deff	F-value	p-value	Partial η^2
Physical_well_being	0.047	1.897	0.034	1.658	0.281	0.598	<0.001
Emotional_well_being	0.057	2.087	0.057	2.087	1.034	0.313	0.001
Self_esteem	0.077	2.476	0.099	2.881	8.148	0.006**	0.005
Family	0.085	2.628	0.061	2.163	0.934	0.337	0.001
Friends	0.066	2.262	0.056	2.077	0.162	0.689	<0.001
School	0.083	2.586	0.073	2.391	1.508	0.224	0.001
Total	0.086	2.640	0.102	2.942	2.176	0.145	0.001

**$p < 0.01$ in Multilevel models.

well-being: 0.740, emotional well-being: 0.707, self-esteem: 0.746, family: 0.741, friends: 0.721, school: 0.71). At baseline, the physical well-being, emotional well-being, self-esteem, and school scores did not differ significantly between the intervention and control groups (physical well-being, $p = 0.678$; emotional well-being, $p = 0.321$; self-esteem, $p = 0.243$; school, $p = 0.704$). Conversely, the family and friends scores showed significant differences between the intervention and control groups (family, $p = 0.011$; friends, $p < 0.001$). The difference in the baseline family and friends scores were attributed to the low score observed in some schools, which lowered the mean. It could not address why these schools had low scores, but this study removed the effect by setting school as a covariate.

It was hypothesised that the TFP could be effective for primary school-age children with low self-esteem. The results confirmed the hypothesis. It was further examined whether the effects of the TFP differ according to the children's baseline score levels of self-esteem. ANCOVA showed that it was effective with the low-level children ($p = 0.006$). In terms of secondary effects, it had an effect on middle-level children ($p = 0.003$) but not on the high-level children ($p = 0.427$) (Table 4). In the high-level children, both the TFP intervention and control groups showed a reduction in self-esteem from baseline to the end of the study (Table 4).

Next, a multilevel analysis was performed to examine the effects of the TFP on self-esteem and its secondary effects on other self-concepts. Before conducting multilevel analysis, the ICC and Deff was presented. In the self-esteem domain, there was no difference in the variability between classes and between individuals, but Deff was above the threshold (baseline ICC = 0.077, Deff = 2.476; post-intervention ICC = 0.099, Deff = 2.881; Table 5). Therefore, a multilevel model was applied. In the self-esteem domain, the results indicated a significant difference but a very low effect size (F-value = 8.148, $p = 0.006$, $\eta^2_p = 0.005$; Table 5). In other domains, there were no significant effect in physical well-being ($p = 0.598$), emotional well-being ($p = 0.313$), family ($p = 0.337$), friends ($p = 0.689$), and school ($p = 0.224$) domains between the two groups (Table 5). In addition, a *t*-test was conducted. The results were significant for the intervention group (F [1.1384] = 32.76, $p < 0.001$, $\eta^2_p = 0.023$), but not for the control group (F [1.1384] = 0.092, $p = 0.762$, $\eta^2_p < 0.001$). The score of after intervention increased by 5.17 points in the intervention group (95% CI 3.35, 6.99) and decreased by 0.32 points in the control group (95% CI −2.28, 1.66), compared to the baseline scores. The difference in mean change between the two groups in the after intervention was significant (Difference in change = 5.49, SE = 1.38, (95% CI 2.78–8.20), $p < 0.001$; Table 6).

Discussion

The present study investigated the effect of the TFP based on Harter's theory for primary school-age children with low self-esteem. Secondary effects on children at other levels were investigated. We divided the children into three groups based on the baseline self-esteem values (low, middle and high-level children). We examined the effect of the TFP on each group (Table 4). The results showed that the low and middle self-esteem level children were affected, but the TFP was no effect on the high-level children.

There are several possible reasons why the TFP was effective in improving the self-esteem of low- and middle-level children. First, the TFP provided social support. It has been demonstrated that positive feedback and praise are associated with self-esteem (Felson and Zielinski, 1989; O'Dea and Abraham, 2000). Positive messages from family members, classmates and homeroom teachers may have created awareness among children with low self-esteem regarding their strengths and virtues they were unaware of, contributing to their self-esteem.

Table 6 Primary outcome change in the TFP intervention and control groups.

	Mean change	SD	(95% CI)	Difference in change	SE	(95% CI)	*p*-value
				Physical_well_being			
TFP intervention	0.85	18.99	(−0.47,2.17)	−0.78	1.04	(−2.82,1.27)	0.457
Control	1.63	19.45	(0.05,3.19)				
Emotional_well_being							
TFP intervention	1.44	19.05	(0.12,2,77)	0.11	1.02	(−1.89,2.11)	0.914
Control	1.33	18.32	(−0.15,2.81)				
Self-esteem							
TFP intervention	5.17	26.19	(3.35,6.99)	5.49	1.38	(2.78,8.20)	<0.001***
Control	−0.32	24.44	(−2.28,1.66)				
Family							
TFP intervention	2.72	19.69	(1.35,4.09)	−0.75	1.07	(−2.85,1.36)	0.487
Control	3.46	19.9	(1.86,5.07)				
Friends							
TFP intervention	3.13	20.77	(1.69,4.58)	2.80	1.07	(0.70,4.89)	0.009**
Control	0.34	18.73	(−1.17,1.85)				
School							
TFP intervention	1.24	20.87	(−0.22,2.69)	1.34	1.14	(−0.89,3.57)	0.238
Control	−0.11	21.01	(−1.80,1.59)				
Total							
TFP intervention	2.42	12.7	(1.54,3.31)	1.32	0.86	(−0.45,3.10)	0.123
Control	1.1	19.11	(−0.44,2.64)				

**$p < 0.01$, ***$p < 0.001$ in model of *t*-test.

Second, the TFP does not limit the areas in which children develop their skills, which possibly led to an increase in self-esteem in a higher number of children compared to the previous programmes, which incorporated Harter's theory focusing on self-esteem. The 'Everybody is Different' effectively improved self-esteem in a study of pupils aged 11–14 (O'Dea and Abraham, 2000), but not in another study targeting 11-year-olds. This suggests that the effect of Everybody is Different may be limited to children with pupils aged 12 years and over (Ghaderi et al., 2005). The 'Beautiful from the Inside Out' was adequate, but the study did not have a control group (Norwood et al., 2011). The incidence of eating disorders is higher among 14 to 18-year-olds (Javaras et al., 2015). Compared with that age group, not many 11-year-olds may consider appearance to be important. Therefore, the TFP may be more effective for primary school children, as it does not limit the areas in which they can develop their abilities.

Third, during the TFP, children in the intervention group kept a personal file folder of what they had written in each session. Further, they kept a record of their skill development and the positive feedback they had received from classmates, family and teachers so that they could revisit them any time. The frequent access to sources of support may have enhanced the effectiveness of the programme. To the best of our knowledge, this technique has not been used in any other programmes. A low self-esteem is associated with various problems (e.g., mental health problems, physical problems, social problems) (Mann et al., 2004). The TFP may therefore help to bring about improvements in these areas. It may also reduce the problems (e.g., poorer mental and physical health, worse economic prospects) of adulthood caused by a low self-esteem (Trzesniewski et al., 2006).

In contrast, the TFP did not affect the high-level children. Children with a high-level self-esteem had decreased self-esteem scores in both the intervention and control groups (Table 4). The hostility scale is known to decrease as self-esteem becomes high and stable, and people with high but unstable self-esteem recorded a high score (Kernis et al., 1989). Notably, high and unstable self-esteem is a characteristic of a narcissist (Rhodewalt et al., 1998) and often causes self-defensive behaviour (Paulhus, 1998). This is in line with the findings that children with narcissism and high self-esteem become aggressive when humiliated (Thomas et al., 2008). Thus, it is important to develop high and stable self-esteem that does not lead to narcissism from childhood. Narcissism interacted with everyday events, and compared to those with low narcissism, negative interpersonal events increased self-esteem instability, and positive interpersonal events reduced self-esteem instability (Rhodewalt et al., 1998). Parental over-valuing leads to narcissism (believing that their child is more special and entitled than others) but parental warmth (love, appreciation, positive emotions) towards children enhances self-esteem without inducing narcissism (Brummelman et al., 2015). Moreover, it is known that increased self-esteem due to peer approval does not lead to narcissism (Thomaes et al., 2010). In the TFP, children received positive messages from their parents and classmates, which helped them gain parental warmth toward their children and approval from their friends. Therefore, the TFP may enhance self-esteem without inducing narcissism. However, this is only a speculation as this study did not measure narcissism. In future research, we hope to conduct an RCT using a scale of narcissism to clarify the relationship between narcissism and the TFP.

It remains as future work to assess how self-esteem improvements will have a meaningful impact on their lives. In this study, the TFP significantly increased the self-esteem scores of the low-level children. The comments from the teachers were positive. One of them said, "Before we started the programme, there were some harsh words from the girls to one of the boys, but it has reduced a lot." This suggests that the TFP may reduce negative language children use towards their classmates. However, children with low self-esteem levels, on whom the TFP was implemented, need to be carefully assessed for real-life effects since the effect size is small even if baseline scores are significantly higher than after intervention scores.

Limitations. Despite these positive results, this research has several limitations. First, our study contained non-randomised assignments of schools to the intervention and control groups based on the selection of headteachers. This assignment strategy

may have caused a bias that schools with low students' self-esteem (based on the headteachers' perception) joined the intervention group. Although we found no significant differences in most parameters, including self-esteem between schools before the intervention (Supplementary Table S6), only one of the five schools in the intervention group had a high score. In comparison, the remaining four schools had low scores (Supplementary Table S7). Although we removed the school effect by employing ANCOVA, we cannot completely rule out the possibility that headteachers who chose the intervention group may have had high expectations of the programme, which may have caused another bias in the effect of the TFP. An RCT would have been useful to reduce these biases. Although the lack of consent from the headmasters made it difficult to conduct an RCT, in future research, we will follow up the present study by conducting an RCT by close communication with schools. Second, students and headteachers knew the group (intervention or control) and what the TFP programme intended to do, which may have caused a bias in our results. However, this is an unavoidable limitation when implementing a school education programme (Martin et al., 2016; McVey et al., 2004), even in an RCT. Third, we were unable to obtain consent from the headteachers of the schools participating in our study to control for personal information, such as parental education and income, or information about anxiety and depression that was not intended for the programme. Japanese people are very sensitive to providing personal information, even in research questionnaires. In future studies, we hope to explain the TFP and gain a complete control for the variables described. Fourth, for a 1-year programme, the pre-post assessment was quite limited. In future studies, we would aim to conduct mid-term evaluations as well. Fifth, we did not revisit the data of children whose responses had missing values on the KINDL-R. The number of children with missing values in at least one of the 24 items was 122 and 106 in the intervention and control groups, corresponding to 13.32% and 15.19% of the total numbers, respectively. We have looked at the mean and mean change in scores for the children with missing values and differences in change. The results showed that similar to the sample data, the intervention group scored higher self-esteem post-intervention. Conversely, the control group scored lower (Supplementary Table S10). However, these attempts could not eliminate the bias due to missing values. In future studies, it may be helpful to ask homeroom teachers and school counsellors to question the children who do not participate in the programme. This information may lead to a better accurate sampling because children with missing values on the KINDL-R may have problems with adaptation. Sixth, we were not able to fully eliminate bias due to teaching competence. We trained teachers using the standardised text to reduce the impact of the variation in teachers' competence on the programme's effectiveness. We watched a video of one of the sessions with randomly selected teacher to ensure that the programme ran according to the standardised text. However, these attempts have not eliminated the bias due to teachers' competence. In future research, we would like to standardise teachers' competence based on the number of years of experience to evaluate the influence of teacher competence. Furthermore, we would prefer more than one video evaluator to evaluate the results statistically. Seventh, the comments from teachers on the overall TFP was 100% positive, but this evaluation was given from only a few teachers. In future follow-up studies, we hope to use a questionnaire for all teachers. This will allow us to measure the programme's impact using the changes in children's behaviour as one of the indicators to assess whether the TFP programme has a meaningful impact on children's life.

Conclusion

The findings of this study suggest that the TFP can improve the self-esteem for primary school children with low and middle self-esteem. The TFP may contribute to the promotion of mental health among primary school children. However, it is important to note that this trial was performed using non-randomised interventions. Therefore, the positive results must be interpreted with caution because of the study's limitations. RCTs are necessary to validate the programme, along with a greater rigorous research plan.

Data availability

The datasets generated during and/or analysed during the current study are available in the repository of University of Fukui and are available from the corresponding author on reasonable request.

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Competing interests

The authors declare no competing interests.

Ethical approval

This study was undertaken entirely in Japan, and received ethical approval from the Research Ethics Committee of University of Fukui (Approval No. 20150107). This study has been performed in accordance with the Declaration of Helsinki and Ethical Guidelines for Medical and Health Research involving Human subjects (Ministry of Health, Labour and Welfare, Japan).

Informed consent

Informed consent was obtained from all participants and their legal guardians.

Additional information

Supplementary information The online version contains supplementary material available at https://doi.org/10.1057/s41599-022-01156-x.

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