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Effectiveness of a Mind Training and Positive Psychology Program on Coping Skills in Schoolchildren in Taiwan

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Abstract

Lack of effective coping skills for managing stress can increase the risk of negative psychological outcomes. However, to date little research has explored the effectiveness of interventions aimed at improving children's coping skills. The aim of this study was to investigate the effectiveness of a mind training and positive psychology program on coping skills for dealing with stress in elementary school students. Participants were 4th and 5th grade students from two primary schools in Taichung, Taiwan, with a total of 97 students in the intervention group and 90 in the control group with complete data. Children in the intervention group attended a four week mind training and positive psychology program while those in the control group maintained their routine class schedule. However, following completion of data collection, the control group was invited to attend the same intervention program due to ethical considerations. We used repeated measures ANOVA to assess the short-term and long-term effects of the intervention. The results showed that: (1) The program enhanced children's ability to use positive thinking to deal with stress, particularly in 5th graders (both short-term and long-term effects); (2) The program enhanced children's ability to use positive thinking and their overall coping skills, particularly in boys (long-term effect). (3) In terms of program evaluation, 73.19% of participants in the intervention group felt that the program had improved their ability to cope with stress. An effective mind training and positive psychology program may help children learn useful coping skills, improve their ability to cope with stress and increase their confidence in facing challenges.

Keywords: Coping; Emotional regulation; Positive thinking; Problem solving; Thought reframing

Introduction

There has been recent wide interest in positive psychology in the psychological and related literature [1]. In the past, psychology has focused on the treatment or 'fixing' of the negative psychological states of mental illness and trauma. However, focusing on the development of positive skills such as improved coping or problem-solving skills through a scientific approach would enable individuals to deal with a variety of different problems throughout their life [2]. Quality of life can be improved by the development and application of inner resources that help individuals respond to the different problems and challenges of complicated modern life. Increased problem-solving skills enable individuals to manage stress, difficulties or negative events without becoming frustrated or depressed [2].

Past research also points to the risks associated with a lack of coping skills [3] and that coping strategies can prevent negative reactions [3,4]. Children and adolescents may be particularly prone to feelings of frustration because of a lack of experience with stressful situations. However, if they have sufficient resources to cope with or adapt to traumatic situations, they may be protected against negative psychological outcomes such as self-destructive feelings or suicide. A Taiwanese qualitative study found that participants who had experienced suicidal ideation, trigger events and distressing situations were more likely to contemplate ending their own lives when they were in elementary school or junior high school [5]. A study using data from the CABLE project (the Child and Adolescent Behaviors in Long-term Evolution project), a longitudinal study in Taiwan from 2001 to 2015, also found that the prevalence of ever having suicidal ideation among 4th graders was 19.77% [6]. Furthermore, this study found that the proportion of students with suicidal ideation over one month was 2 to 3 times higher in the 7th grade (the first year of junior high school in Taiwan) compared to that in elementary school [7]. These

results emphasize the importance of improving stress management and problem-solving skills before the 7th grade. This study also showed that a higher total score for perceived stressors was significantly associated with experiencing suicidal ideation for the first time in grade 7 and that influential stressors may differ between urban and rural areas. Thus, interventions focused on coping skills for regional specific stressors and trigger factors could be beneficial during the transitional time of adolescence [7].

In Taiwan, suicide has been the second leading cause of death in those aged 15-24 years since 2003. In this age group, for every 100 deaths there are 10 deaths from suicide [8]. In 2009, deliberate self-harm (suicide) was the ninth leading cause of death in those aged 5-14 years, up from the tenth leading cause in 2008 [9,10]. In addition, the number of episodes of self-harm and suicide in elementary schools and junior high schools has shown a slowly increasing trend from 2009, and the frequency of these episodes has increased 1.6 fold in junior high schools between 2008 and 2009 [11-13]. A 2007 survey of Taiwanese elementary Schoolchildren in grades 3 to 6, found a prevalence of severe depression of 4.2% [14]. This indicates that the risk of suicide is high in Taiwan, even in younger age groups [7]. The results of these abovementioned studies have led to a heightened focus on suicide

prevention in young people worldwide [15]. As a result, this study is aimed at finding positive ways of reducing negative consequences such as suicide in teenagers in Taiwan.

Coping theory: conceptualization and application

Research has shown that knowing how to use appropriate coping strategies to deal with stress has a beneficial effect on children's emotions [16]. We can refer to The Transactional Model of Stress and Coping [17] to explain the mechanism of these dynamic processes. After evaluating the risk and ability to deal with a stressor, individuals strive to alter the stressful situation by problem management and emotional regulation. Through this changing process of continuous cognitive evaluation and investment of effort, individuals receive feedback from the outcomes of emotional well-being, health status, and health behaviors [18]. That is, positive cognitive and emotional coping skills are indispensable aspects of adapting to difficult situations. Under most circumstances, a positive inner transition is therefore a much better cure than medicine for an outer symptom that is resulting from an inner disturbance.

International empirical research into the promotion of psychological health in children and adolescents has consistently found that following educational interventions children demonstrated that psychological health was improved, negative psychological states were lessened and behavioral and psychological problems were prevented [19]. A study carried out in 8-16 year olds in Australia found that school interventions can effectively increase students' positive attribution styles [20], coping skills [21], and decrease depression [20,22], anxiety [21,22] and internalizing behavioral problems [22]. A US study of 12-13 year olds found that a resiliency program can lower depression in students [23]. An Italian study of 14-15 year old senior high school students examined the effect of a school intervention program and found improved individual development and physical health and lower anxiety and psychosomatic symptoms in the intervention group compared to the control group. In addition, these effects lasted for six months [24]. In local research on school programs promoting psychological health in elementary schoolchildren, such programs were found to increase positive emotions in children [25] and boost confidence [26]. The abovementioned results emphasize that positive thinking skills and strategies for coping with stress can be learnt through educational interventions that enhance positive thinking in children and give their lives an improved sense of meaning. As Dr Seligman, the father of positive psychology, has said, if we can teach children to think positively and teach them the skills to overcome hardship, setbacks and failure, pessimism will be replaced by optimism [27].

Past research [28,29] has found that older children (age 8-10 years) and young adolescents (age 11-13 years) face increased challenges (such as stress from school work or interpersonal relations) which can lead to increased anxiety. Hampel [30] found that children in late childhood or early adolescence are more likely to use unhealthy coping models such as passive evasion or aggressive behavior. The use of unhealthy response strategies to manage stress in children is an important risk factor for future development of psychiatric illness [31]. Washington [32] found that the way children learn to manage stress leads to a model of stress management in adulthood. For example, those who respond to stress by giving up from an early age, will use this kind of approach to manage stress after reaching maturity. In other words, the way of responding to stressful stimuli that is learnt during late childhood (8-10 years) has a great impact on future coping styles. Because this is an important period in which to promote good psychological health and coping strategies, we chose elementary schoolchildren in the 4th and 5th grades as our study sample. We aimed to investigate the effect of a mind

training and positive thinking program on the ability of elementary schoolchildren to cope with stress, and to investigate any differences in program effectiveness by gender or grade.

Methods

Study sample

According to 2009 statistics from the Ministry of Health and Welfare [10], suicide is the 9th leading cause of death. Moreover, in the Taichung region suicide has become the 5th leading cause of death in Taiping city, the 6th leading cause of death in the Northern district and Daya district, and the 7th leading cause of death in Nantung, Dali and Waipu. Due to the higher rates of suicide in these regions compared to the rest of Taiwan, we chose these regions for our study and randomly selected two classes of 4th and 5th grade elementary school students from two public schools in the Nantun district of Taichung. We randomly assigned one class of each grade to the intervention and the other to the control in each school. The intervention program and questionnaire survey was commenced after obtaining signed informed consent from the children's parents or guardians (April to June 2011). The children who did not provide written informed consent from their parents or guardians still took the same programs as their classmates, but they did not have to answer the questionnaires. Study participants with complete data for all 3 assessments were included in the analysis. A total of 97 children in the intervention group and 90 in the control group completed the questionnaires giving a completion rate of 97.40% (Table 1).

Study design and procedures

We chose to have intervention and control groups in each school in order to compare the immediate and long-term effects of coping strategies without the influence of geographical differences. Because the participating schools would not permit the separation of a single class into an intervention group and a control group, instead we randomly selected two whole classes to be the intervention group and another two classes to be the control group in each school. We then carried out a pre-test questionnaire (during the week before commencement of the educational program), followed by a four week mind training and positive psychology education program in the intervention group. The education program was run by a single dedicated instructor to avoid any variability in program effects between different instructors. The effectiveness of the program was assessed by two post-intervention assessments in both the intervention and control groups. These occurred at one week after completion (post-test assessment), and one month after completion of the program (post post-test assessment) to examine both the short-term and long-term effects of the intervention. Following completion of the final questionnaire, the control group was

	Intervention group(n=97) n (%)	Control group(n=90) n (%)
School		
Elementary school A	**51 (52.58)**	**39 (43.33)**
Elementary school B	**46 (47.42)**	**51 (56.67)**
Sex		
Male	**52 (53.61)**	**45 (50.00)**
Female	**45 (46.39)**	**45 (50.00)**
Grade		
4th grade	**56 (57.73)**	**48 (53.33)**
5th grade	**41 (42.27)**	42 **(46.67)**

Table 1: Demographic characteristics.

offered the same educational program.

The educational program was designed based on the learning objectives. The program consisted of four modules with one module covered in each teaching session (40 minutes per session). Teaching materials included brief reports, student notebooks, charts, real life examples, short stories, short videos, and pictures. Teaching methods used to convey the central themes and objectives of each module included didactic explanations, interactive question and answer sessions, group discussion, brainstorming, and writing exercises, and each session applies different methods and materials based on the corresponding ability indicator. In each session, students were asked first to share what they had learned in the previous week to reinforce prior learning. Real life examples were used at the conclusion of each session. Before the end of each session, the main points of the session were summarized so that students would more readily translate the material learned in the sessions into coping skills that they could use in their daily life.

The objective of module 1 was to enable students to use the technique of thought reframing to buffer emotions, and to be able to demonstrate and maintain a positive optimistic attitude. The second module was aimed at changing thinking patterns. Children learnt about challenging negative thinking, thought reframing and association as a means of increasing diversity in explanatory styles. The objective of module 3 was to enable children to recognize sources and causes of stress and to enable them to use methods such as thought reframing, positive thinking and different explanatory styles to buffer emotions during stress. The objective of the 4th module was to enable children to demonstrate and maintain an optimistic attitude and self-confidence. The names of the learning activities in each module and the corresponding coping skill for managing stress are shown in Table 2.

Research instrument

Coping skills scale: The coping skills scale designed in this study was based on the transactional model of stress and coping proposed by Folkman and Lazarus [17] and the Attributional Style Questionnaire developed by Seligman et al. [27] with reference to positive psychology. Our instrument is suitable for use on elementary, junior high school and senior high school students and incorporates four domains which include: (1) Thought reframing: refers to the ability to change ideas or use multiple explanatory styles to reduce the negative impact of any stress or setbacks being experienced; (2) Positive thinking: refers to the ability to think from a positive viewpoint than enables the discovery of hidden inner capacity, strengthening of the mind, and positive attitudes that lead to a more proactive approach to face life challenges; (3) Emotional regulation: refers to the ability to ease negative emotions that arise from stress; (4) Problem solving: refers to the ability to use available resources to proactively manage and resolve sources of stress. We designed four statements based on these different domains of coping skills for five examples of hypothetical stressful situations commonly encountered by elementary, junior high and senior high school students (such as parents fighting, conflict with a close friend etc). Students were asked to complete the questionnaire based on their own circumstances and experiences. Possible responses to each statement were 1 = I have never thought like this; 2 = I sometimes think like this; 3 = I often think like this; and 4 = I almost always think like this. A higher score indicated that the child often used this particular coping skill to deal with stress. The reliability of the scale was assessed by a measure of internal consistency. The Cronbach's α for the three questionnaires were 0.70 (pre-test), 0.78 (post-test), and 0.84 (post post-test). In confirmatory factor analysis the GFI was 0.93 and the AGFI was 0.90. The RMSEA was 0.156 and the χ^2/

	Corresponding ability indicator	Teaching Methods
Module 1		
1.**Thought reframing - smiley faces**	Emotional regulation	Writing exercises
2.**Creating a home**	Thought reframing	Interactive questions Writing exercises
3.**Hidden sanctuary**	Emotional regulation	Interactive questions Writing exercises
Module 2		
1.**Changing your brain**	Thought reframing	Interactive questions
2.**You determine what happens**	Thought reframing	Brainstorming Writing exercises
3.**Happiness is easy**	Positive thinking	Interactive questions
Module 3		
1.**Finding help**	Problem solving	Group discussion Writing exercises
2.**You can avoid stress**	Emotional regulation Problem solving	Interactive questions Writing exercises
Module 4		
1.**Praising others**	Positive thinking	Writing exercises
2.**Accepting praise**	Positive thinking	Writing exercises
3.**Praising yourself**	Positive thinking	Writing exercises
4.**Happiness is with you**	Positive thinking	Interactive questions

Table 2: Content on each module by the intervention group.

df was 5.54 (χ^2 = 625.52, df = 113) which indicate acceptable validity.

Module feedback questionnaire: We asked participating children to self-assess how helpful they found the learning activities in each of the modules using a five point scale with responses scored as 1 = extremely unhelpful; 2 = not helpful; 3 = okay; 4 = helpful; and 5 = extremely helpful. A higher score indicated that children rated the learning activities as more helpful.

Data management and analysis: The reliability of each scale was assessed by measuring the internal consistency (Cronbach's α). The validity of the scales was assessed using confirmatory factor analysis. We tested for differences between the intervention and control groups in the pre-test, post-test and post post-test scale scores. We used repeated measures ANOVA to examine the short-term and long-term effects of the intervention. Apart from confirmatory factor analysis where we used LISREL 8.8 statistical software, all other statistical analyses were performed using SAS 9.2.

Results

Feedback about the program from children in the intervention group is shown in Table 3. The response of 'extremely helpful' was reported by the most students (59.79%) for the learning activity 'happiness is easy'. This was followed by 'hidden sanctuary' (47.42%), 'happiness is with you' (42.27%), and 'accepting praise' (41.24%). Responses of helpful or extremely helpful were reported by the greatest number of students for the learning activity 'happiness is with you' (76.29%), 'hidden sanctuary' (75.26%), 'happiness is easy' (72.16%) and 'accepting praise' (70.11%). The learning activities of 'happiness is easy', 'happiness is with you' and 'accepting praise' are all aimed at increasing positive thinking. Therefore, it appears that the learning activities aimed at positive thinking skills were considered most useful by students. In terms of the overall program, 73.19% of children found the program helpful or extremely helpful. Therefore, the majority of students considered the educational program beneficial in improving their coping skills for managing stress.

	Not helpful at all	Not helpful	Okay	Helpful	Very helpful
	n (%)	n (%)	n (%)	n (%)	n (%)
Module 1. Emotional regulation					
1. **Thought reframing - smiley faces**	6 (6.19)	8 (8.25)	36 (37.11)	18 (18.56)	29 (29.90)
2. **Creating a home**	6 (6.19)	8 (8.25)	42 (43.30)	18 (18.56)	23 (23.71)
3. **Hidden sanctuary**	2 (2.06)	3 (3.09)	19 (19.59)	27 (27.84)	46 (47.42)
Module 2. Thought reframing					
1. **Changing your brain**	3 (3.09)	8 (8.25)	25 (25.77)	25 (25.77)	36 (37.11)
2. **You determine what happens**	3 (3.09)	11 (11.34)	33 (34.02)	23 (23.71)	27 (27.84)
3. **Happiness is easy**	2 (2.06)	3 (3.09)	22 (22.68)	12 (12.37)	58 (59.79)
Module 3. Problem solving					
1. **Finding help**	8 (8.25)	4 (4.12)	36 (37.11)	22 (22.68)	27 (27.84)
2. **You can avoid stress**	3 (3.09)	7 (7.22)	34 (35.05)	26 (26.80)	27 (27.84)
Module 4. Positive thinking					
1. **Praising others**	2 (2.06)	3 (3.09)	33 (34.02)	28 (28.87)	31 (31.96)
2. **Accepting praise**	3 (3.09)	3 (3.09)	23 (23.71)	28 (28.87)	40 (41.24)
3. **Praising yourself**	8 (8.25)	3 (3.09)	31 (31.96)	28 (28.87)	27 (27.84)
4. **Happiness is with you**	4 (4.12)	2 (2.06)	17 (17.53)	33 (34.02)	41 (42.27)
Overall program	4 (4.12)	1 (1.03)	21 (21.65)	25 (25.77)	46 (47.42)

Table 3: Feedback on each module by the intervention group.

	Intervention group						Control group						Short-term effect	Long-term effect
	Pre-test		Post-test		Post post-test		Pre-test		Post-test		Post post-test			
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	F	F
Grade 4														
Thought reframing	11.71	(3.27)	12.20	(4.13)	12.20	(4.64)	11.35	(3.70)	11.31	(3.64)	11.38	(4.20)	0.70	0.45
Positive thinking	6.52	(2.12)	7.05	(2.60)	7.39	(2.67)	5.96	(2.10)	6.27	(2.52)	6.48	(2.21)	0.24	0.69
Emotional regulation	11.59	(3.00)	12.04	(3.71)	11.73	(4.30)	10.85	(2.84)	11.42	(3.68)	11.17	(3.41)	0.03	0.06
Problem solving	10.75	(2.89)	9.95	(3.18)	10.59	(3.47)	10.42	(2.99)	10.50	(3.16)	9.81	(3.25)	3.32†	0.66
Total score	40.57	(8.67)	41.23	(12.03)	41.91	(13.82)	38.58	(9.30)	39.50	(11.28)	38.83	(11.57)	0.02	0.35
Grade 5														
Thought reframing	11.78	(3.83)	11.54	(3.70)	11.80	(4.27)	12.33	(2.84)	11.60	(3.05)	11.57	(3.73)	0.53	1.13
Positive thinking	6.44	(2.55)	6.61	(2.47)	6.78	(2.50)	7.48	(2.50)	6.67	(2.37)	6.74	(2.63)	3.67†	4.30*
Emotional regulation	12.54	(3.38)	12.05	(3.35)	11.71	(4.18)	12.31	(2.82)	11.43	(3.19)	11.52	(4.06)	0.34	0.001
Problem solving	10.59	(3.02)	10.12	(3.21)	9.76	(3.40)	11.71	(2.70)	10.95	(2.89)	10.67	(2.97)	0.26	0.18
Total score	41.34	(10.64)	40.32	(10.82)	40.05	(13.17)	43.83	(8.53)	40.64	(9.57)	40.50	(11.94)	1.47	1.23

† $p < .10$, * $p < .05$
Short-term effect: Comparison between the intervention group (mean post-test – mean pre-test score) and the control group (mean post-test – mean pre-test score).
Long-term effect: Comparison between the intervention group (mean post post-test – mean pre-test score) and the control group (mean post post-test – mean pre-test score).

Table 4: Effect of intervention on coping skills by grade: Repeated measures ANOVA.

Table 4 shows the impact of the learning activities on coping skills by grade. The 5th graders in the intervention group demonstrated an increased post post-test mean score of 6.78 for positive thinking compared to the pre-test mean score of 6.44, whereas in the control group the mean score for positive thinking decreased from a pre-test score of 7.48 to a post post-test score of 6.74. Therefore, the intervention program demonstrated a statistically significant long-term effect on increasing positive thinking in fifth graders ($F=4.30$, $p < .05$). In addition, 5th graders in the intervention group also demonstrated an increase in positive thinking with a post-test mean score of 6.61 compared to a pre-test mean score of 6.44. In contrast, in the control group the mean score for positive thinking decreased during the study period from a pre-test mean score of 7.48 to a post-test mean score of 6.67. Therefore, the intervention program was able to increase positive thinking in 5th graders in the short-term with an effect that was marginal statistically significant ($F=3.67$, $p < .10$).

However, as illustrated in Table 4, the intervention program did not significantly increase all coping skills in the 4th graders. Apart from positive thinking, other coping skills (thought reframing, emotional regulation and problem solving) were not significantly different between the intervention and control groups at the end of the study, which will be discussed further in the discussion session.

Table 5 shows the comparison of the effects of the educational program on coping skills by gender. The results show that the mean score for positive thinking in boys in the intervention group increased from a pre-test score of 6.21 to a post post-test score of 7.00. In contrast, in the control group, the mean score for positive thinking in boys decreased from a pre-test score of 6.73 to a post post-test score of 6.38. Moreover, this long-term effect on increased positive thinking in boys was statistically significant ($F=4.96$, $p < 0.05$). In terms of the total

	Intervention group						Control group						Short-term effect	Long-term effect
	Pre-test		Post-test		Post post-test		Pre-test		Post-test		Post post-test			
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	F	F
Boys														
Thought reframing	11.85	(3.73)	12.17	(4.38)	12.21	(5.08)	11.80	(2.76)	11.11	(3.41)	10.98	(3.62)	2.45	2.41
Positive thinking	6.21	(2.30)	6.52	(2.59)	7.00	(2.63)	6.73	(2.45)	6.38	(2.42)	6.38	(2.17)	1.79	**4.96**[*]
Emotional regulation	11.90	(3.39)	12.15	(3.75)	11.94	(4.73)	11.87	(3.03)	11.02	(3.50)	10.98	(3.70)	2.31	1.55
Problem solving	10.40	(3.19)	9.77	(3.42)	10.17	(3.74)	11.13	(2.79)	10.49	(3.01)	10.11	(3.07)	<0.001	1.71
Total score	40.37	(10.05)	40.62	(12.65)	41.33	(15.06)	41.53	(8.54)	39.00	(10.46)	38.44	(10.85)	2.30	**4.01**[*]
Girls														
Thought reframing	11.62	(3.25)	11.62	(3.41)	11.82	(3.68)	11.82	(3.88)	11.78	(3.32)	11.96	(4.26)	<0.001	0.01
Positive thinking	6.80	(2.29)	7.27	(2.45)	7.29	(2.59)	6.60	(2.39)	6.53	(2.49)	6.82	(2.63)	1.22	0.39
Emotional regulation	12.09	(2.96)	11.91	(3.33)	11.47	(3.60)	11.20	(2.78)	11.82	(3.37)	11.69	(3.72)	1.87	**2.81**[†]
Problem solving	11.00	(2.58)	10.31	(2.88)	10.31	(3.12)	10.91	(3.06)	10.93	(3.06)	10.31	(3.23)	2.21	0.04
Total score	41.51	(8.91)	41.11	(10.11)	40.89	(11.64)	40.53	(10.03)	41.07	(10.51)	40.78	(12.52)	0.33	0.27

[†] $p < .10$, [*] $p < .05$

Short-term effect: Comparison between the intervention group (mean post-test – mean pre-test score) and the control group (mean post-test – mean pre-test score)

Long-term effect: Comparison between the intervention group (mean post post-test – mean pre-test score) and the control group (mean post post-test – mean pre-test score)

Table 5: Effect of intervention on stress coping skills by gender: Repeated measures ANOVA.

score, the mean total score in boys in the intervention group increased from a pre-test score of 40.37 to a post post-test score of 41.33, whereas the mean total score in boys in the control group decreased from a pre-test score of 41.53 to a post post-test score of 38.44. Moreover, this long-term effect of an increased total score for coping skills in boys following the intervention was statistically significant (F=4.01, $p < 0.05$). However, changes in scores for the other three coping skills (thought reframing, emotional regulation and problem solving) were not significantly different enough between groups to indicate a benefit of the intervention program in boys.

In girls, the mean score for emotional regulation in the intervention group decreased from a pre-test score of 12.09 to a post post-test score of 11.47. In contrast, in girls in the control group the mean score for emotional regulation increased from a pre-test score of 11.20 to a post post-test score of 11.69. Therefore, the intervention decreased emotional regulation in girls (only marginal statistical significance). On the other hand, the intervention program did not demonstrate a significant effect on the other three coping skills (thought reframing, positive thinking and problem solving) in girls, which will be discussed further in the discussion section.

Discussion

Partial effectiveness of the educational program on coping skills

Following the education program, the intervention group showed a statistically significant increase in positive thinking. This significant increase was observed when comparing post-test scores to pre-test scores (short-term effect) and when comparing post post-test scores to pre-test scores (long-term effect). In contrast, the control group demonstrated a decrease in post-test and post-post test scores compared to pre-test scores. These results confirm those found in other studies that effective educational programs can improve positive responses to stress in students including positive thinking [33], positive attribution styles [20], coping skills [21], the prevention of behavioral and psychological problems [19] and boosting self-confidence [26].

In terms of the other three coping skills (thought reframing, emotional regulation and problem solving), although no large change was observed in the intervention group between post-test and pre-test scores (short-term effect) or post post-test and pre-test scores (long-term effect), we still observed a non-significant trend towards increased scores in these other coping skills in the intervention group compared to the control group. Our study included the coping skill of thought reframing. This is a relatively new concept and hence there has been relatively little research conducted locally or internationally on this concept to date and further studies are needed to confirm the effect of school interventions on this coping skill. Studies have already confirmed that educational programs can improve emotional regulation [34] and problem solving skills in young people [19]. The lack of statistically significant improvement in emotional regulation or problem solving observed in our study could be due to the small number of educational sessions offered, the research instrument, or respondent factors as will be discussed below.

Effectiveness of the program in increasing positive thinking in fifth graders

Following the intervention, the fifth grade intervention group demonstrated both a short-term and long-term increase in positive thinking. However, problem solving skills showed a decline in fourth graders. According to Piaget's cognitive development theory, fourth graders are in the concrete operational stage of development [35]. Problem solving is a higher level thought process, and at this stage of their development, children would not be able to comprehensively use such higher level cognitive skills. We recommend that future content include a wider range of situational applications, that would strengthen the effective use of students' short-term memory allowing them to accumulate sufficient experience with the content that a higher cognitive stage is developed and problem solving is increased [36].

Partial increase in coping skills in boys

Much past research has investigated differences in coping strategies by gender [16,37]. However, it is uncommon for research to investigate

differences in effects of interventions aimed at improving coping skills by gender. We found that the effect of our intervention did differ by gender. The educational program increased both positive thinking and overall coping skills in boys. In addition, the intervention had a statistically significant long-term effect in boys. However, in girls emotional regulation decreased following the intervention. We speculate that this could be due to the teaching methods used in our study. Many of the learning activities in the program involved interactive question and answer sessions. Boys more actively raised their hand and participated in these sessions whereas the girls were more likely to be introverted and were less willing to express their opinion. There were several girls who prior to the sessions expressed that they didn't feel comfortable raising their hand and sharing their opinions or way of thinking. In contrast, when writing exercises were used as learning activities, girls were more conscientious than boys in writing in their notebooks.

Girls are more likely than boys to express internalizing behavioral problems such as withdrawal, anxiety, depression and loneliness [38,39]. There was no statistically significant increase in emotional regulation in girls following the intervention. In the future the situational application of the scale could be strengthened and a domain of psychological health could be added so that the impact of the educational program on negative emotional states in children could also be examined.

Effect of teaching methods used

In the module feedback questionnaire, 73.19% of students reported that they found the program helpful or extremely helpful overall. This indicates that students were able to identify with the learning activities and felt that these activities helped improve their coping skills for managing stressful situations. Learning activities were rigorously designed and used materials and approaches such as drawing, role plays, stories, pictures, movies, posters, stickers and student notebooks to create an interesting and engaging learning environment. A variety of activities were used to engage the students and encourage active participation, leading to frequent interaction between students and the instructor during the activities and small group discussions. Students were attracted by the preparation put into the activities by the instructor and this interest made them more likely to actively participate. This could be the main reason why the majority of students rated the learning activities as helpful or extremely helpful.

Based on the teaching feedback questionnaire (including the four domains of question and answer sessions, brainstorming, small group discussion and writing exercises), between 58.76% and 67.01% of students found these four kinds of teaching methods useful. More than half of students expressed that the teaching methods used helped them to learn coping skills. Writing exercises was the activity that was reported as extremely helpful by the largest proportion (38.14%) of students. Question and answer sessions was the activity reported as helpful or extremely helpful by the largest proportion of students (67.01%). Traditional teaching methods mainly involve didactic unidirectional explanations by the teacher with students passively listening or taking notes. In this traditional approach, teachers use oral narrative or explanations as the means of transferring knowledge [40]. However, a more interactive learning approach can increase effective student learning [41]. In this study we used different teaching methods interspersed throughout the sessions to help students to practice independent thinking, express their opinions, and to have the opportunity to experience their ideas being contradicted and hear other people's ideas. If students were not willing to express their opinions, they could use their notebooks to write about the content themselves.

Then activity tasks were completed through group discussion to create an engaging and fun learning environment. In this approach to teaching, the instructor and the students experience multiple levels of interaction and sharing.

Learning activities in each session used different teaching materials that were developed to aid understanding of the particular learning outcomes. The vocabulary and leadership style of the instructor are quite important. Past research [42] has found that when teachers interact well with students, they use more direct closeness and self-disclosure to help students learn. During the activities in this study students were encouraged to reflect, share opinions, give confirmation and encouragement, and explain the content of the sessions. We speculated that revising each session, using real life examples, and summarizing the main points at the end of each session would strengthen the impact of the session. This could be an important reason why 73.19% of students found the sessions helpful or extremely helpful.

Study limitations and future directions

Despite the above contributions, our study was limited by considerations of personnel, time and cost, so several limitations in this study remain and as a result there are several potential directions for future research.

Intervention program for children in Taiwan

Our study sample only consisted of fourth and fifth grade students in two public elementary schools in Taichung and the results may not be generalizable to other locations. In addition, the response rate in the intervention group was only 76% and we have no way of knowing the effect of the intervention in the non-respondents.

However, this study extends prior research on intervention programs in coping skills from the elderly to a children's setting where cognition-processing is thought to operate differently [43]. Our results showed that a stress-managing program can work well in those at an early stage of life like children. It would be worth collecting similar data on young people from more varied teaching contexts in a future study.

Student circumstances during questionnaire completion need to be considered

It is possible that student and environmental factors could impact on questionnaire responses such as different levels of understanding among students, and environmental circumstances (such as cleaning having just finished, children having just woken up after a lunch-time nap etc). The same questionnaires were used three times for the pre-test, post-test an post post-test assessments (only the intervention group had an additional module evaluation and teaching evaluation questionnaire following completion of the program). This could have impacted on children's responses to the questionnaire such as a small number of students questioning why they had to complete the same questionnaire again.

Number and length of educational sessions could have limited program effectiveness

In previous studies [25,26,34] school-based intervention programs included 10-22 sessions and were run fairly autonomously by instructors who were teachers at the school. However, in the present study our aim was first to develop a program and assess the effectiveness of the research instrument, after which we would expand the program to other schools. As the instructor used in this study was not a teacher at the selected schools, they were limited by difficulties in cooperating

with the schools and the resulting need to concentrate the program into only four sessions. Students may have felt unsure, unfamiliar and curious about the instructors the first time that they met them. This could have led to some students not obeying instructions and the need to waste time managing the class and establishing a relationship with the students, impacting on the progress and effectiveness of the educational program.

Students responded enthusiastically to the teaching sessions, however, time constraints meant that there was a need to move students onto the next activity resulting in some rushing in learning. In addition, students were not all at the same level. If the program was longer, students would have had more opportunities to practice and think about their learning which could have led to a more effective program. Further research is needed to confirm the required content and length of sessions to produce an effective program.

Our self-developed coping skills scale requires further revision

In this study we developed a coping skills scale. Scale items consisted of hypothetical stressful situations in the lives of junior high school students where students self-appraised how they would respond to these situations. It is possible that some students had never experienced particular situations or responded in ways that were not included in the listed responses (e.g. for the situation of "I forgot to bring my homework", the response that represented problem solving was the answer "I could phone home to get someone to bring my homework to school". However, it's possible that students could have chosen another way of solving this problem.). If the listed responses were ones that students could not understand or agree with, they may have selected "I have never thought this way". This response is scored as demonstrating a lack of problem solving skills. However, in reality such a response given for the reasons above would not necessarily mean that the student was not actively trying to solve problems. Therefore, the content of the scale could be improved in future to better capture the effect of an educational program on students' coping skills.

The scale was designed based on the definition of four kinds of coping skills. The Cronbach's α for the whole scale was 0.82 which indicates acceptable internal consistency. However, when looking at each subscale the Cronbach's αs were all lower than 0.70, which indicates lower internal consistency. We recommend that in the future, further items be added to the scale and preliminary and item analysis conducted before revising the scale to create an instrument with higher internal consistency.

Conclusion

The gradual focus on positive psychology over the last decade has contributed to a growing body of research on theoretical advancement, identification of context, boundary conditions, processes and outcomes.

Our study explored the benefit of an intervention to enhance coping skills in children and found that positive thinking was increased in 5th grade children (both short-term and long-term effects) and in boys (long-term effects) following the intervention program. The effectiveness of the program was examined through assessment of four separate domains of coping. We applied the transactional model of stress and coping to demonstrate the link between coping skills training and positive psychological thinking and behavior. Over half of the participants in the intervention group gave positive feedback about the intervention program. It is hoped that future research can help to advance our understanding of the benefits of coping skill programs for children in younger age groups and under different teaching contexts.

References

1. Seligman MEP (2003) Positive psychological assessment: a handbook of models and measures. In Lopez SJ, Snyder CR (Eds.) Positive psychology, positive prevention, and positive therapy. American psychological Association, Washington DC 3-8.

2. Seligman ME, Csikszentmihalyi M (2000) Positive psychology. An introduction. Am Psychol 55: 5-14.

3. Gould MS, Greenberg T, Velting DM, Shaffer D (2003) Youth suicide risk and preventive interventions: a review of the past 10 years. J Am Acad Child Adolesc Psychiatry 42: 386-405.

4. Orbach I, Bar-Joseph H (1993) The impact of a suicide prevention program for adolescents on suicidal tendencies, hopelessness, ego identity, and coping. Suicide Life Threat Behav 23: 120-129.

5. Ou S, Yu AH (1997) The unbearable burden in life-the suicidal ideation among the adolescents in Taiwan. The NCCU Journal of Sociology 27: 148-180.

6. Chiang YC, Wu SC, Yen LL (2005) Ever having suicide ideation among the 4th graders in northern Taiwan and its correlates. Taiwan Journal of Public Health 24: 471-482.

7. Chiang YC, Lee TS, Yen LL, Wu CC, Lin DC, et al. (2013) Influence of stressors and possible pathways of onset of seventh graders' suicidal ideation in urban and rural areas in Taiwan. BMC Public Health 13: 1233.

8. Ministry of Health and Welfare (2010) 2003 Statistics of causes of death in Taiwan.

9. Ministry of Health and Welfare (2010) Summary of causes of death classified according to ICD-10 in Taiwan.

10. Ministry of Health and Welfare (2010c) Summary of life table in Taiwan.

11. Ministry of Education (2010a) 2007 Campus Security Report.

12. Ministry of Education (2010b) 2008 Campus Security Report.

13. Ministry of Education (2010c) 2009 Campus Security Report.

14. Chang KP, Chen MJ, Lien TC (2007) A Survey Study of the Prevalence of Child Depression in Taiwan. NTTU Educational Research Journal 18: 29-72.

15. WHO (2009) Suicide risk high for young people.

16. Sugimura N, Rudolph KD, Agoston AM (2014) Depressive symptoms following coping with peer aggression: the moderating role of negative emotionality. J Abnorm Child Psychol 42: 563-575.

17. Folkman S, Lazarus RS (1984) Stress, appraisal and coping. Springer Publishing Company, New York.

18. Glanz K, Schwartz MD (2008) Stress, Coping, and Health Behavior. In: Glanz K, Rimer BK, Viswanath K (Edn.) Health Behavior and Health Education: Theory, Research, and Practice. John Wiley & Sons Inc, San Francisco, CA: 211-236.

19. O'Hearn TC, Gatz M (2002) Going for the goal: Improving youths' problem-solving skills through a school-based intervention. Journal of Community Psychology 30: 281-303.

20. Rooney R, Roberts C, Kane R, Pike L, Winsor A, et al. (2006) The prevention of depression in 8- to 9-year-old children: A pilot study. Australian Journal of Guidance and Counselling 16: 76-90.

21. Lock S, Barrett PM (2003) A longitudinal study of developmental differences in universal preventive intervention for child anxiety. Behaviour Change 20: 183-199.

22. Hannan AP, Rapee RM, Hudson JL (2000) The prevention of depression in children: A pilot study. Behaviour Change 17: 78-83.

23. Gillham JE, Reivich KJ, Freres DR, Chaplin TM, Shatté AJ, et al. (2007) School-based prevention of depressive symptoms: A randomized controlled study of the effectiveness and specificity of the Penn Resiliency Program. J Consult Clin Psychol 75: 9-19.

24. Ruini C, Ottolini F, Tomba E, Belaise C, Albieri E, et al. (2009) School intervention for promoting psychological well-being in adolescence. J Behav Ther Exp Psychiatry 40: 522-532.

25. Chuang YJ, Mao KN (2006) The Construction of an "Affective Education" Curriculum for Fourth-Grade Taiwanese Students. Journal of Taiwan Normal University 51: 121-146.

26. Wu HY, Chen HC, Chiu FC, Hsu CC, Hsu YF (2008) Effects of an Optimism Training Program on the Optimistic Thinking of 5th Grade Students. Journal of Taiwan Normal University 53: 193-221.

27. Seligman MEP, Reivich K, Jaycox L, Gillham J (2007) The optimistic child: A proven program to safeguard children against depression and build lifelong resilience. Houghton Mifflin Harcourt, New York.

28. Donaldson D, Prinstein MJ, Danovsky M, Spirito A (2000) Patterns of children's coping with life stress: implications for clinicians. Am J Orthopsychiatry 70: 351-359.

29. Brown SL, Teufel JA, Birch DA, Kancherla V (2006) Gender, age, and behavior differences in early adolescent worry. J Sch Health 76: 430-437.

30. Hampel P (2007) Brief report: Coping among Austrian children and adolescents. J Adolesc 30: 885-890.

31. Compas BE, Boyer MC (2001) Coping and attention: implications for child health and pediatric conditions. J Dev Behav Pediatr 22: 323-333.

32. Washington TD (2009) Psychological stress and anxiety in middle to late childhood and early adolescence: manifestations and management. J Pediatr Nurs 24: 302-313.

33. Last BF, Stam H, Onland-van Nieuwenhuizen AM, Grootenhuis MA (2007) Positive effects of a psycho-educational group intervention for children with a chronic disease: first results. Patient Educ Couns 65: 101-112.

34. Lin WF, Hsiu CB (2009) The Effects of Positive Emotional Intervention on Emotional Intelligence, Life-adjustment and Well-being in Elementary School Students. Chinese Journal of Guidance and Counseling 25: 131-178.

35. Piaget J (1929) The child's conception of the world. Routledge and Kegan Paul, London.

36. Hsu YS, Hong JC (2003) Reinterpretation of Piaget's cognitive development. Science Education Monthly 260: 2-9.

37. Al-Bahrani M, Aldhafri S, Alkharusi H, Kazem A, Alzubiadi A (2013) Age and gender differences in coping style across various problems: Omani adolescents' perspective. J Adolesc 36: 303-309.

38. Lee SH, Yen LL, Chen LT (2004) Children's behavioral problems, inter-parental conflict, and maternal psychological distress. Journal of Medical Sciences 24: 185-190.

39. Lee TSH, Chang HC, Yen LL, Wu WC (2006) Social capital of family and school-its relationship with elementary Schoolchildren's internalizing behavioral problems. Formosa Journal of Mental Health 19: 231-254.

40. Yen HW, Yen LL (2010) Health teaching methods. In Yen HW, Yen LL, Chen FL, Luh DL, Wu WC, Chiang YC. Health Behavior and Health Education. Chuliu Publisher, Taipei 285-297.

41. Weiss J, Matzkin E, Flippin M, Pallis M, Rankin M (2013) Get up, get out, get moving: an interactive tool for education at your local school. Clin Orthop Relat Res 471: 1226-1229.

42. Dobransky ND, Frymier AB (2004) Developing teacher-student relationships through out of class communication. Communication Quarterly 52: 211-223.

43. Folkman S, Lazarus RS, Pimley S, Novacek J (1987) Age differences in stress and coping processes. Psychol Aging 2: 171-184.