



Implementation of a Transdiagnostic Universal Prevention Program on Anxiety in Junior High School Students After School Closure During the COVID-19 Pandemic

Kohei Kishida^{1,2} · Noriko Hida¹ · Kohei Matsubara¹ · Mayuko Oguni¹ · Shin-ichi Ishikawa²

Accepted: 7 September 2022

© The Author(s), under exclusive licence to Springer Science+Business Media, LLC, part of Springer Nature 2022

Abstract

School closures due to the coronavirus disease 2019 (COVID-19) pandemic have worsened mental health problems for children and adolescents worldwide. We aimed to examine the follow-up effectiveness of a transdiagnostic universal prevention program for anxiety of junior high school students after a nationwide school closure during the COVID-19 outbreak in Japan. A total of 117 junior high school students were included in the analysis. We used the Unified Universal Prevention Program for Diverse Disorders (Up2-D2) program; the Up2-D2 comprises cognitive-behavioral and positive psychological interventions provided over twelve 45-minute sessions. The program was originally implemented between June and July 2020, immediately after pandemic-related school closures had ended in Japan. The program assessments were based on students' responses to a questionnaire incorporating five scales to measure indicators such as internalizing and externalizing problems. Assessments were carried out before, immediately after, two-month, and six-month after implementing the program. Mixed models for the whole sample showed small anxiety improvement effects immediately post-intervention and two-month, and six-month assessments ($g = -0.25$, $g = -0.44$, and $g = -0.30$, respectively). The anxiety reducing effects were even greater for the higher-anxiety group at the post-, 2-month, and 6-month assessments ($g = -1.48$; $g = -1.59$; $g = -1.06$, respectively). Although there was no control group, these results indicate that the transdiagnostic universal prevention intervention reduce only anxiety, but not other outcomes (depression, anger, and self-efficacy) in junior high students returning to school following school closures related to the COVID-19 pandemic in Japan.

Keywords Universal prevention · School closure · Anxiety · Adolescents

Extended author information available on the last page of the article

Introduction

The coronavirus disease 2019 (COVID-19) pandemic has caused mental health problems in children and adolescents worldwide (Berger et al., 2021; Panda et al., 2021; Samji et al., 2021). Many containment policies and quarantine measures, such as lockdown, school closures, and self-isolation, have been implemented worldwide to prevent the spread of COVID-19. A meta-analysis of the psychological and behavioral impacts of COVID-19 pandemic lockdown and quarantine measures on 22,996 children/adolescents revealed that 34.5%, 41.7%, 42.3%, and 30.8% of children were suffering from anxiety, depression, irritability, and inattention, respectively (Panda et al., 2021). Additionally, at least 22.5% of children have a significant fear of COVID-19 (Panda et al., 2021). Worsening children's mental health during this pandemic is evident, and appropriate preventions and treatments are needed.

In April 2020, 81.1% of schools worldwide were fully or partially closed owing to the COVID-19 pandemic (UNESCO, 2021). In Japan, the government requested the first nationwide school closure on March 2, 2020; 98% of schools in Japan were closed by March 16 (MEXT, 2020). Several studies have explored the impact of school closures on mental health problems among Japanese children and adolescents during the pandemic (Isumi et al., 2020; Kishida et al., 2021; Takahashi & Honda, 2021). One revealed a relationship between local school closures and mental health problems in 1,984 Japanese children and adolescents aged 6–15 years (Kishida et al., 2021); they found higher student scores in both internalizing problems (anxiety and depression) and externalizing problems (conduct problems and oppositionality) associated with school closures compared to when schools were fully open, and anxiety was affected most (Kishida et al., 2021). Therefore, appropriate and effective preventive interventions for anxiety and other mental health problems are required during and after school closures.

Preventive interventions in schools can be effective and useful for delivering psychological support to a large number of children and adolescents. Preventive interventions are categorized into universal, selective, and indicated prevention (Mrazek & Haggerty, 1994). Universal prevention, an approach designed for an entire population, eliminates unnecessary screening to detect high-risk children and adolescents, minimizes stigma from the screening procedure, and allows for the inclusion of children and adolescents who may develop mental health problems in the future (Horowitz & Garber, 2006; Werner-Seidler et al., 2017). Furthermore, several systematic reviews and meta-analyses have indicated that universal preventive interventions are effective in addressing both internalizing and externalizing problems in children and adolescents (Dray et al., 2017; Hendriks et al., 2018; Sanchez et al., 2018; Werner-Seidler et al., 2017). For example, according to a recent meta-analysis (Werner-Seidler et al., 2021) including 118 randomized controlled trials and 45,924 children and adolescents, small between-group effect sizes for depression ($g=0.21$) and anxiety ($g=0.18$) were detected immediately post-intervention. Additional analyses indicated that targeted prevention programs, such as selective and indicated prevention, were associated with significantly larger effect sizes compared to universal prevention programs for depression. Although many meta-analyses have shown the efficacy of school-based prevention programs for both internalizing and externalizing problems in children and adolescents, however, few studies have focused on

the strengths of children and adolescents, such as resilience and self-efficacy (Dray et al., 2017; Oka et al., 2021). These positive indicators are important and essential in universal prevention programs because most of students haven't had mental health problems when the programs are implemented. The current situation, wherein most children and adolescents are negatively affected by the pandemic-related school closures, calls for the implementation of such preventive interventions.

The Universal Unified Prevention Program for Diverse Disorders (Up2-D2; Ishikawa et al., 2019; Hida et al., 2020; Kishida et al., 2022; Oka et al., 2021) is a newly developed school-based transdiagnostic universal preventive intervention program that addresses both internalizing and externalizing problems in children and adolescents. Moreover, the Up2-D2 aims not only to prevent children's mental health problems, but also to improve children's strengths and self-efficacy. The Up2-D2 consists of 12 sessions based on cognitive-behavioral and positive psychological interventions, and was designed to be implemented by teachers. The program mainly targeted grades 4–6, and the target age range was 9–12 years. Before the COVID-19 pandemic began, Oka et al., (2021) conducted a feasibility study from September 2016 to March 2017 using the Up2-D2. The 396 children who participated in the Up2-D2 exhibited increased self-efficacy and social skills and decreased general difficulties after receiving the program. After the pandemic began and the first nationwide school closure ended in Japan, the program was implemented for 120 junior high school students (Hida et al., 2020) and results showed an improvement in anxiety after the program. However, this study only reported the program results immediately after its implementation. Therefore, follow-up assessments are necessary to detect the effectiveness of the program because the COVID-19 pandemic has been spreading in waves, and mental health problems may deteriorate accordingly.

This study aimed to examine the follow-up effectiveness of the Up2-D2 (Ishikawa et al., 2019) for anxiety among junior high school students after the nationwide school closure during the COVID-19 pandemic in Japan. The only study that conducted the preventive intervention immediately after the school closure in Japan was the previous study of Hida et al., (2020). Therefore, we used the original data from the pre- and post-assessments of a previous study (Hida et al., 2020) and then performed two- and six-month follow-up assessments. We hypothesized that the anxiety improved by the implementation of the Up2-D2 post-assessment would be maintained at the two- and six-month follow-ups. In addition, the second purpose of the study was to determine whether the program would be effective for students with higher levels of anxiety symptoms.

Methods

Participants and Recruitment

The participants were 120 junior high school students from three classes at a public junior high school. The age of the participants was 12–13 years old. The school requires an entrance examination for applicants to enroll unlike the ordinary public schools in the prefecture. Therefore, a standardized academic achievement score in the

school is ranked as highest level among the school district. The school's principal, who had participated in a training workshop for the program in 2019, had requested that our research team implement the program in the principal's school before the spread of COVID-19 started in Japan. However, during the first wave of the COVID-19 pandemic, the school was closed in accordance with the government's request and reopened on May 7, 2020. The program was implemented in schools in June and July 2020. The each session of the program was conducted twice a week, and a total of 12 sessions were completed in two months. Assessments were carried out before, immediately after, two months, and six months after implementing the program. After the nationwide school closure, no closures were implemented in the participating school during the second (August 2020) and third waves (January 2021) of the pandemic in Japan. The study was conducted with the approval of the Institutional Review Board of the authors' university (approval no. 201,904). Written informed consent was obtained from school principals. Additionally, oral informed assent was obtained from all the students.

Intervention

The Up2-D2 (Ishikawa et al., 2019), a school-based universal prevention program for internalizing and externalizing problems in children, comprises 12 sessions based on cognitive-behavioral and positive psychological interventions: psychoeducation about emotion (session 1), behavioral activation (session 2), social skills training (sessions 3 and 4), relaxation (session 5), strength work (session 6), cognitive restructuring (sessions 7 and 8), exposure (sessions 9 and 10), problem-solving (session 11), and review and conclusion (session 12). Each session lasted 45min and was conducted using the following procedures: (a) introduction (i.e., reviewing the last session and explaining the goal and purpose of the session); (b) learning target skills (i.e., cognitive-behavioral or positive psychological skills); (c) practicing target skills (in both individual and group activities); and (d) conclusion (i.e., explaining the homework and summarizing the session). Worksheets were distributed in each session to assist the children in learning the program components. Furthermore, to run the program in their classes, teachers were provided with teaching plans that included specific program procedures in school settings. Although the program was originally designed for elementary school students (grades 4–6), we conducted this study with junior high school students (grade 7).

Program Implementation (Training, Supervision and follow-up Procedure)

The program was developed based on a user-centered design to reduce burden to introduce, enhance learnability for users, and exploit a preexisting context (see, Ishikawa et al., 2019). Specifically, a teacher manual (teaching plan) was created and distributed so that teachers could implement the program without intensive training and supervision by mental health experts. Kishida et al., (2022) confirmed that the program could be feasible when implemented without on-site training and ongoing supervision by mental health experts. However, the program has been shown to be more effective when training and supervision was provided by experts rather than

schoolteachers who have not been trained (Kishida et al., 2022). Therefore, the participating teachers received two hours of teacher training before implementing the program, which included an overview of the program, the flow of each session, and how to run the program in class. During the implementation, the second author, who had also provided the teacher training, provided three rounds of one-hour supervision. The supervisor discussed the contents and intervention rationales of each session with the teachers and answered their questions about implementing the program in their classes. Finally, to improve the lasting effectiveness of the program, we distributed a handout describing the skills acquired in the program, which included specific examples of how the learned skills can be used in daily life. The teachers had the students use their skills in their classes, schools, and homes based on this information.

Measures

Assessments were carried out before, immediately after, two months, and six months after implementing the program using student-reported questionnaires. The questionnaires comprised the items of the five scales described below.

Strengths and Difficulties Questionnaire (SDQ)

The Japanese version of the SDQ is a self-report questionnaire that measures children's emotional/behavioral difficulties and prosocial behavior (Goodman, 2001; Noda et al., 2013). The SDQ is a 25-item scale, each item requiring a three-point Likert scale. The SDQ has five subscales: emotional symptoms, conduct problems, hyperactivity/inattention, peer relationship problems, and prosocial behavior. The total score indicates general difficulties for all subscales except prosocial behavior. The SDQ items and how to calculate the scores are available on the website (<https://www.sdqinfo.org/a0.html>). The internal consistencies of the general difficulties of the SDQ for the whole sample were 0.77, 0.73, 0.77, and 0.70 at the pre-, post, two-month, and six-month assessments, respectively.

General Self-Efficacy Scale for Children-Revised (GSESC-R)

The GSESC-R is a self-report questionnaire for general self-efficacy in children (Fukui et al., 2009) with two subscales: 'sensitivity to failure experiences' and 'positive attitude'. In addition, the total score of the GSESC-R, which is 'general self-efficacy', is calculated from the total score of the two sub-scale. The GSESC-R is an 18-item scale with a 4-point scale for each item, consisting of 9 items for sensitivity to failure experiences and 9 items for positive attitude. Examples of the items for sensitivity to failure experiences are "I often worry more than others (reversal item)" and "I often worry that I will not be able to do something well (reversal item)". Examples of items for positive attitude are "I try my best even if I don't want to do something" and "I challenge myself more and more, no matter what it is". Higher scores indicate higher self-efficacy. The internal consistencies of the total score of the GSESC-R for the whole sample were 0.86, 0.89, 0.90, and 0.88 at the pre, post, two-month, and six-month assessments, respectively.

Short Version of the Spence Children's Anxiety Scale (Short CAS)

The Short CAS is a self-report questionnaire that assesses anxiety symptoms in children and adolescents (Spence et al., 2014). The Short CAS is an 8-item scale with each item rated on a 4-point scale. Examples of items include "I am worried about things" and "I feel afraid". The validity and reliability of the Japanese version of the Short CAS have been confirmed (Ishikawa et al., 2018). The total score of each item is calculated as anxiety symptoms. Higher scores indicated higher anxiety symptoms. The internal consistencies of the Short CAS for the whole sample were 0.87, 0.86, 0.88, and 0.90 at pre, post, two-month, and six-month assessments, respectively.

Depression Self-Rating Scale for Children (DSRS-C)

The DSRS-C (Birlleson, 1981) is a self-report questionnaire that assesses depressive symptoms in children and adolescents. The reliability and validity of the Japanese version of the DSRS-C have been confirmed (Denda et al., 2006). A short version of the DSRS-C developed by Namikawa et al., (2011) was used in this study. The short version of the DSRS-C is a 9-item scale, with each item rated using a 3-point scale. Example items include "I look forward to things as much as I used to (reversal item)" and "I feel so sad I can hardly stand it". After reversal items are reverse scored, the total score of each item is calculated as depressive symptoms. Higher scores indicated higher levels of depression. The internal consistencies of the DSRS-C for the whole sample were 0.77, 0.79, 0.82, and 0.79 at pre, post, two-month, and six-month assessments, respectively.

Anger Scale for Children and Adolescents (ASCA)

The ASCA is a self-report questionnaire for anger in children and adolescents (Takebe, Kishida, Sato, Takahash, & Sato, 2017). The ASCA is a 7-item with a 4-point scale for each item. Example items are "I am angry" and "I am irritated". The reliability and validity of the ASCA have been examined (Takebe et al., 2017). The total score of each item is calculated as anger. Higher scores indicated higher levels of anger. The internal consistencies of the ASCA for the whole sample were 0.93, 0.95, 0.94, and 0.96 at the pre, post, two-month, and six-month assessments, respectively.

Statistical Analysis

The hypotheses of this study are to examine whether the effects on anxiety identified in the previous study of Hida et al., (2020) maintained at both two- and six-month follow-up, and whether the same effects can be observed in students with higher anxiety symptoms (the mean + 1 *SD* on the Short CAS at pre-assessment). Therefore, analyses were conducted for all participant samples and separately for those with high anxiety. This study used mixed models of individuals and classes, as random effects, and time points (pre-assessment, post-assessment, two-month follow-up, and six-month follow-up) as fixed effects. Gender was entered as a covariate to control for gender differences in students. We used the Bonferroni method for post hoc tests

and Hedges' g for effect sizes of 0.20, 0.50, and 0.80, which are considered small, medium, and large, respectively.

Results

Overall, 117 students (45 boys, 72 girls; mean age was $M=12.28$, $SD=0.45$) were included for analyses in this study; three students who did not respond to the pre-assessment questionnaire were previously excluded. The total sample included 20 students (4 males and 16 females; mean age was $M=12.40$, $SD=0.50$) who scored more than the mean +1 SD (14 points) on the Short CAS at pre-assessment, indicating relatively high anxiety levels. The results of mixed models for the whole samples showed significant results for sensitivity of failure experience ($F=5.38$, $p<.01$), anxiety ($F=10.13$, $p<.001$), and anger ($F=3.19$, $p<.05$). No significant results were shown for the other indicators (the total score and each subscale of the SDQ, general self-efficacy, positive attitude, and depression). Post hoc tests for anxiety showed significant improvements at post-assessment, two-month follow-up, and six-month follow-up compared to pre-assessment (all $p<.05$). For sensitivity of failure experience, significant improvements at post-assessment and two-month follow-up compared to pre-assessment (all $p<.05$). However, post hoc tests for anger were not significant. Besides, anxiety decreased with small effects at post-assessment, two-month follow-up, and six-month follow-up ($g = -0.25$; $g = -0.44$; $g = -0.30$, respectively). Furthermore, sensitivity of failure experience increased with small effects at post-assessment and two-month follow-up ($g=0.20$; $g=0.22$, respectively). The results for the whole sample are shown in Tables 1 and 2.

The mixed models for the students with higher anxiety showed significant results for general difficulties ($F=6.32$, $p<.01$), emotional symptoms ($F=3.46$, $p<.05$), general self-efficacy ($F=3.23$, $p<.05$), and anxiety ($F=11.59$, $p<.001$). No significant results were shown for the other indicators (the other four subscales of the SDQ, sensitivity of failure experience, positive attitude, depression, and anger). Compared to pre-assessment, post hoc tests showed significant improvements (all $p<.05$) for: general difficulties at post-assessment and six-month follow-up; emotional symptoms at six-month follow-up; anxiety at post-assessment, two-month follow-up, and six-month follow-up. However, post hoc tests for general self-efficacy were not significant. Besides, anxiety decreased with large effects at post-assessment, two-month follow-up, and six-month follow-up ($g = -1.48$; $g = -1.59$; $g = -1.06$, respectively). General difficulties, emotional symptoms, conduct problems, and depression decreased with moderate effects at six-month follow-up ($g = -0.61$; $g = -0.49$; $g = -0.50$; $d = -0.64$, respectively). The results for the students with higher anxiety are shown in Tables 3 and 4.

Discussion

This study's aim was to examine the follow-up effectiveness of the Up2-D2 for anxiety among junior high school students returning to school following the COVID-19-related nationwide school closure in Japan. Although there was no control group and no control

Table 1 Mean scores and results of the mixed model for the total sample (Total sample $N=117$)

	Pre-assessment		Post-assessment		2-month FU		6-month FU		<i>F</i>				
	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>		<i>n</i>			
SDQ (Total difficulties)	9.97	4.56	113	10.18	4.08	106	10.27	4.50	103	9.92	3.85	106	0.68
Emotional symptoms	2.79	2.57	117	2.60	2.48	112	2.50	2.57	108	2.40	2.31	109	1.37
Conduct problems	1.69	1.27	116	1.72	1.36	107	1.81	1.41	106	1.51	1.03	108	2.25
Hyperactivity/inattention	3.51	2.27	116	3.60	2.30	111	3.53	2.30	107	3.76	2.03	109	1.63
Peer relationship problems	2.00	1.26	115	2.21	1.47	112	2.31	1.49	106	2.12	1.47	107	2.10
Prosocial behavior	5.29	2.20	116	5.28	2.19	110	5.44	2.39	107	5.64	2.30	108	1.65
General self-efficacy	47.25	9.16	116	48.38	10.30	108	48.22	10.61	104	47.05	10.04	107	2.62
Sensitivity of failure experience	23.68	4.67	117	24.83	6.77	109	25.03	7.40	107	23.90	6.88	109	5.38
Positive attitude	23.50	6.40	116	23.58	5.21	111	23.33	5.09	105	23.13	4.93	107	1.48
Anxiety	8.31	5.45	116	6.96	5.18	111	5.96	5.27	106	6.68	5.51	109	10.13
Depression	5.00	3.11	114	4.91	3.28	109	4.82	3.52	106	4.78	3.26	105	0.28
Anger	2.19	3.77	117	2.93	4.38	112	2.29	3.91	108	2.90	4.65	107	3.19

^a $p > .01$, Pre > Post, FU, and 2-month FU; ^b $p > .001$, Pre > Post, 2-month FU, and 6-month FU, and 6-month FU; ^c $p > .05$, Post hoc tests were not significant; FU = Follow-up; SDQ = Strengths and Difficulties Questionnaire

Table 2 Intervention effect sizes for the total sample compared to pre-intervention assessments (N=117)

	Post-assessment		2-month FU		6-month FU	
	g	95%CI	g	95%CI	g	95%CI
SDQ (Total difficulties)	0.05	[-0.22 , 0.31]	0.07	[-0.20 , 0.33]	-0.01	[-0.28 , 0.25]
Emotional symptoms	-0.07	[-0.33 , 0.19]	-0.11	[-0.37 , 0.15]	-0.16	[-0.42 , 0.11]
Conduct problems	0.02	[-0.24 , 0.29]	0.09	[-0.17 , 0.35]	-0.16	[-0.42 , 0.11]
Hyperactivity/inattention	0.04	[-0.22 , 0.30]	0.01	[-0.25 , 0.27]	0.12	[-0.14 , 0.38]
Peer relationship problems	0.15	[-0.11 , 0.41]	0.23	[-0.04 , 0.49]	0.09	[-0.17 , 0.35]
Prosocial behavior	-0.01	[-0.27 , 0.25]	0.06	[-0.20 , 0.33]	0.15	[-0.11 , 0.42]
General self-efficacy	0.12	[-0.15 , 0.38]	0.10	[-0.17 , 0.36]	-0.02	[-0.28 , 0.24]
Sensitivity of failure experience	0.20	[-0.06 , 0.46]	0.22	[-0.04 , 0.48]	0.04	[-0.22 , 0.30]
Positive attitude	0.01	[-0.25 , 0.27]	-0.03	[-0.29 , 0.24]	-0.06	[-0.33 , 0.20]
Anxiety	-0.25	[-0.51 , 0.01]	-0.44	[-0.70 , -0.17]	-0.30	[-0.56 , -0.03]
Depression	-0.03	[-0.29 , 0.23]	-0.05	[-0.32 , 0.21]	-0.07	[-0.33 , 0.20]
Anger	0.18	[-0.08 , 0.44]	0.03	[-0.24 , 0.29]	0.17	[-0.10 , 0.43]

FU = follow-up. SDQ = Strengths and Difficulties Questionnaire

Table 3 Mean scores and results of the mixed model for the samples with higher anxiety symptoms (N=20)

	Pre-assessment			Post-assessment			2-month FU			6-month FU			F	
	M	SD	n	M	SD	n	M	SD	n	M	SD	n		
SDQ (Total difficulties)	15.06	6.24	18	13.06	4.63	17	14.18	4.38	17	11.78	4.07	18	6.32	a
Emotional symptoms	5.60	2.62	20	4.67	3.20	18	5.47	2.85	17	4.22	2.86	18	3.46	b
Conduct problems	2.42	2.01	19	2.24	1.64	17	2.18	1.55	17	1.61	0.92	18	1.70	
Hyperactivity/inattention	3.95	2.19	20	3.17	1.92	18	3.76	2.17	17	3.44	2.18	18	1.52	
Peer relationship problems	2.84	1.57	19	3.06	1.66	18	2.76	1.89	17	2.50	1.76	18	0.84	
Prosocial behavior	4.95	1.99	20	5.00	2.09	18	4.76	2.11	17	5.44	1.92	18	0.14	
General self-efficacy	38.90	6.97	20	42.33	8.83	18	37.50	7.54	16	40.67	8.88	18	3.23	c
Sensitivity of failure experience	17.10	4.61	20	19.56	6.35	18	16.65	5.05	17	18.83	6.91	18	2.64	
Positive attitude	21.80	4.37	20	22.78	4.56	18	20.50	4.40	16	21.83	4.37	18	1.86	
Anxiety	17.65	2.78	20	11.72	4.88	18	11.88	4.27	17	12.44	6.33	18	11.59	d
Depression	8.21	3.10	19	7.24	2.93	17	7.13	3.10	16	6.13	3.28	16	2.64	
Anger	3.70	4.91	20	4.17	4.69	18	4.29	4.21	17	5.65	6.63	17	2.17	

^a $p < .01$, Pre > Post and 6-month FU; ^b $p < .05$, Pre > 6-month FU; ^c $p > .05$, Post hoc tests were not significant; ^d $p < .001$, Pre > Post, 2-month FU, and 6-month FU; FU = Follow-up; SDQ = Strengths and Difficulties Questionnaire

Table 4 Effect sizes compared to pre-intervention assessments for students with high anxiety symptoms (N = 20)

	Post-assessment			2-month FU			6-month FU		
	g	95%CI		g	95%CI		g	95%CI	
SDQ (Total difficulties)	-0.35	[-1.02 , 0.31]		-0.16	[-0.82 , 0.51]		-0.61	[-1.28 , 0.06]	
Emotional symptoms	-0.31	[-0.95 , 0.33]		-0.05	[-0.69 , 0.60]		-0.49	[-1.14 , 0.15]	
Conduct problems	-0.10	[-0.75 , 0.56]		-0.13	[-0.79 , 0.52]		-0.50	[-1.16 , 0.15]	
Hyperactivity/inattention	-0.37	[-1.01 , 0.27]		-0.08	[-0.73 , 0.56]		-0.23	[-0.87 , 0.41]	
Peer relationship problems	0.13	[-0.52 , 0.77]		-0.04	[-0.70 , 0.61]		-0.20	[-0.85 , 0.45]	
Prosocial behavior	0.02	[-0.61 , 0.66]		-0.09	[-0.74 , 0.56]		0.25	[-0.39 , 0.89]	
General self-efficacy	0.43	[-0.22 , 1.07]		-0.19	[-0.85 , 0.47]		0.22	[-0.42 , 0.86]	
Sensitivity of failure experience	0.44	[-0.21 , 1.08]		-0.09	[-0.74 , 0.55]		0.29	[-0.35 , 0.93]	
Positive attitude	0.21	[-0.42 , 0.85]		-0.29	[-0.95 , 0.37]		0.01	[-0.63 , 0.64]	
Anxiety	-1.48	[-2.20 , -0.76]		-1.59	[-2.34 , -0.85]		-1.06	[-1.74 , -0.38]	
Depression	-0.32	[-0.97 , 0.34]		-0.34	[-1.01 , 0.33]		-0.64	[-1.32 , 0.04]	
Anger	0.09	[-0.54 , 0.73]		0.13	[-0.52 , 0.77]		0.33	[-0.32 , 0.98]	

FU = Follow-up; SDQ = Strengths and Difficulties Questionnaire

variables re rated to COVID-19 due to practical limitation, the results indicated that the Up2-D2 effectively improved anxiety at all measurement time points (post-assessment, two-month follow-up, and six-month follow-up). The effects were relatively small for the whole sample but greater for those with higher anxiety. Therefore, the Up2-D2 could be an effective intervention, especially for anxiety after school closure during the COVID-19 pandemic.

Pandemic-related school closures exacerbated both internalizing and externalizing problems in children and adolescents worldwide (Chaabane et al., 2021; Panda et al., 2021). Furthermore, research indicates that school closures might especially increase anxiety compared to other mental health problems for children and adolescents in Japan (Kishida et al., 2021). In this study, we implemented the Up2-D2 when children returned to school following nationwide closures in Japan. We found that while anxiety for the whole sample decreased and was maintained for at least six months, no significant improvement was observed for other mental health problems, such as depression and anger. The participants in this study showed relatively higher scores for anxiety ($M=8.31$, $SD=5.45$) compared to the average score before the pandemic ($M=6.99$, $SD=5.72$; Ishikawa et al., 2018) while there were no obvious differences for depression and anger (see, Ishikawa et al., 2018; Takebe et al., 2017). Therefore, students came back to school after school closure might have more anxiety at the moment and it might be associated with the outcome of this study. Besides, Kishida et al.'s (2022) analysis of feasibility studies using the Up2-D2 for whole students in elementary schools indicated significant improvements for general difficulties which include both internalizing and externalizing problems, but no significant improvements in anxiety, depression, and anger. Although this program was developed to aim preventive effects for anxiety, depression, and anger as a transdiagnostic intervention, pragmatic trials in schools supported that anxiety or general difficulties might be highly likely to be improved.

The students with higher anxiety showed improvements in both internalizing and externalizing problems. Another transdiagnostic universal prevention program based on cognitive-behavioral interventions was effective for children with greater baseline emotional symptoms (García-Escalera et al., 2020). Previous trials for target-type transdiagnostic prevention programs (i.e., selective and indicated prevention programs) consistently showed significant improvements in both internalizing and externalizing problems in children and adolescents with emotional problems such as anxiety and depression (Essau et al., 2014, 2019; Martinsen et al., 2019; Loevaas et al., 2020). Therefore, target-type transdiagnostic universal prevention programs for students at risk of emotional problems or who have higher symptoms might ameliorate their emotional symptoms more effectively.

In addition, this program aimed not only at preventing mental health problems, but also at improving general self-efficacy which has two sub-scales: 'sensitivity to failure experiences' and 'positive attitude'. However, although sensitivity of failure experience was improved, general self-efficacy and positive attitude were not improved in the study. On the other hand, in the previous trial using the Up2-D2 for elementally children (Oka et al., 2021), positive attitude was improved at immediately and 3 months after the interven-

tion. Although the previous study measured only positive attitudes and did not measure sensitivity of failure experience, these results indicated that younger children might be more likely to make changes for positive attitude. In the future, more research is needed to examine the efficacy of universal prevention interventions on self-efficacy and positive indicators.

We implemented a school-based transdiagnostic universal prevention program after nationwide school closures were implemented in Japan. Regarding the COVID-19 pandemic, the Up2-D2 had two main strengths. First, it is a universal prevention program applicable for all children and adolescents. During the pandemic and school closures, most children and adolescents have been exposed to the risk of deteriorating mental health problems, especially anxiety. However, a systematic review (Samji et al., 2021) reported that several researchers have noted a decrease in the utilization of mental health services during the COVID-19 pandemic. Therefore, a universal preventive intervention for schools can significantly improve access to mental health support for children and adolescents. Second, this program has a transdiagnostic perspective on both internalizing and externalizing problems, both of which have been affected during lockdowns and pandemic-related school closures (Kishida et al., 2021; Panda et al., 2021). Although previous transdiagnostic prevention programs have primarily focused on internalizing problems such as anxiety and depression (Essau et al., 2014, 2019; Martinsen et al., 2019; Loevaas et al., 2020), the Up2-D2 can be applied to both internalizing and externalizing problems, and its effectiveness has been confirmed, especially in children who show higher anxiety symptoms. However, its universal effectiveness has been indicated only for anxiety, but not for depression and anger in this study. The range of mental health outcomes for which the transdiagnostic universal intervention program could be effective needs to be examined and discussed in the future.

This study had several limitations. First, we did not measure fear of the pandemic or school closure; thus, their association with the anxiety measured in this study is unclear. The use of a scale specific to COVID-19-related anxiety should be considered. Second, we did not include a control group in this study due to a practical limitation (i.e., immediately after nationwide school closure), and the possibility of spontaneous recovery of symptoms could not be denied. Third, only self-reported questionnaires were used. A wide range of indicators, such as diagnostic interviews, parent ratings, teacher ratings, and behavioral indicators, is needed in future studies. Fourth, we did not receive information on the extent to which teachers guided children based on the handouts we provided. In the future, it is necessary to measure the procedures implemented during follow-up using countable indicators.

Despite the limitations, this is the first study to demonstrate the effectiveness of a school-based transdiagnostic universal prevention intervention for mental health problems immediately after the nationwide school closure in Japan. Although future rigorous controlled trials are warranted, this study found that the program was effective for anxiety, and its effects were maintained at follow-ups. Especially, adolescents who showed high anxiety symptoms immediately after the nation-wide school closure decreased their anxiety and reached the normative level after the implementation of a universal prevention program. The pandemic has negatively affected various mental health problems in many children and adolescents worldwide. Thus, the

implementation of a transdiagnostic universal prevention program in schools should be considered as an avenue to support children, adolescents, and teachers during the COVID-19 era.

Acknowledgements The authors would like to thank students and teachers who participated to the project.

Author Contributions All authors contributed to the manuscript. KK wrote the first draft of the manuscript. NH collected data and co-wrote the manuscript. KM and MO contributed to the revision of the manuscript. SI was a supervisor and a principal investigator of this project.

Funding This study was funded by The Research Institute of Science and Technology for Society of the Japan Science and Technology Agency (JPMJRX17A1, JPMJRX20IA).

Declarations

Conflict of Interest The authors declare that they have no conflict of interest.

Ethics Approval The study was conducted with the approval of the Institutional Review Board of Doshisha University (approval no. 201904), in accordance with the 1964 Helsinki Declaration or comparable standards.

Consent to Participate Written informed consent was obtained from school principals. In addition, oral informed consent was obtained from all the students.

References

- Berger, E., Jamshidi, N., Reupert, A., Jobson, L., & Miko, A. (2021). The mental health implications for children and adolescents impacted by infectious outbreaks—a systematic review. *Child and Adolescent Mental Health*, 26(2), 157–166. <https://doi.org/10.1111/camh.12453>
- Birleson, P. (1981). The validity of depressive disorder in childhood and the development of a self-rating scale: A research report. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, 22(1), 73–88. <https://doi.org/10.1111/j.1469-7610.1981.tb00533.x>
- Chaabane, S., Doraiswamy, S., Chaabna, K., Mamtani, R., & Cheema, S. (2021). The impact of COVID-19 school closure on child and adolescent health: A rapid systematic review. *Children*, 8(5), 415. <https://doi.org/10.3390/children8050415>
- Denda, K., Kako, Y., Kitagawa, N., & Koyama, T. (2006). Assessment of depressive symptoms in Japanese school children and adolescents using the Birleson Depression Self-Rating Scale. *International Journal of Psychiatry in Medicine*, 36(2), 231–241. <https://doi.org/10.2190/3YCX-H0MT-49DK-C61Q>
- Dray, J., Bowman, J., Campbell, E., Freund, M., Wolfenden, L., Hodder, R. K., & Wiggers, J. (2017). Systematic review of universal resilience-focused interventions targeting child and adolescent mental health in the school setting. *Journal of the American Academy of Child and Adolescent Psychiatry*, 56(10), 813–824. <https://doi.org/10.1016/j.jaac.2017.07.780>
- Essau, C. A., Olaya, B., Sasagawa, S., Pithia, J., Bray, D., & Ollendick, T. H. (2014). Integrating video-feedback and cognitive preparation, social skills training and behavioural activation in a cognitive behavioural therapy in the treatment of childhood anxiety. *Journal of Affective Disorders*, 167, 261–267. <https://doi.org/10.1016/j.jad.2014.05.056>
- Essau, C. A., Sasagawa, S., Jones, G., Fernandes, B., & Ollendick, T. H. (2019). Evaluating the real-world effectiveness of a cognitive behavior therapy-based transdiagnostic program for emotional problems in children in a regular school setting. *Journal of Affective Disorders*, 253, 357–365. <https://doi.org/10.1016/j.jad.2019.04.036>
- Fukui, I., Iijima, M., Oyama, M., Nakayama, H., Komatsu, C., Oda, M., & Sakano, Y. (2009). *The general self-efficacy scale for children-revised: Manual Tokyo: Kokoro-Net*

- García-Escalera, J., Valiente, R. M., Sandín, B., Ehrenreich-May, J., Prieto, A., & Chorot, P. (2020). The unified protocol for transdiagnostic treatment of emotional disorders in adolescents (UP-A) adapted as a school-based anxiety and depression prevention program: An initial cluster randomized wait-list-controlled trial. *Behavior Therapy, 51*(3), 461–473. <https://doi.org/10.1016/j.beth.2019.08.003>
- Goodman, R. (2001). Psychometric properties of the strengths and difficulties questionnaire. *Journal of the American Academy of Child and Adolescent Psychiatry, 40*(11), 1337–1345. <https://doi.org/10.1097/00004583-200111000-00015>
- Hendriks, A. M., Bartels, M., Collins, O. F., & Finkenauer, C. (2018). Childhood aggression: A synthesis of reviews and meta-analyses to reveal patterns and opportunities for prevention and intervention strategies. *Neuroscience and Biobehavioral Reviews, 91*, 278–291. <https://doi.org/10.1016/j.neubiorev.2018.03.021>
- Hida, N., Ishikawa, S., Murasawa, T., & Oguni, M. (2020). Effect of universal unified prevention program for diverse disorders for junior high school students. *Doshisha Clinical Psychology: Therapy and Research, 10*, 3–13. <https://doi.org/10.14988/00027868>
- Horowitz, J. L., & Garber, J. (2006). The prevention of depressive symptoms in children and adolescents: A meta-analytic review. *Journal of Consulting and Clinical Psychology, 74*(3), 401–415. <https://doi.org/10.1037/0022-006X.74.3.401>
- Ishikawa, S. I., Kishida, K., Oka, T., Saito, A., Shimotsu, S., Watanabe, N., & Kamio, Y. (2019). Developing the universal unified prevention program for diverse disorders for school-aged children. *Child and Adolescent Psychiatry and Mental Health, 13*, 44. <https://doi.org/10.1186/s13034-019-0303-2>
- Ishikawa, S., Ishii, R., Fukuzumi, N., Murayama, K., Ohtani, K., Sakaki, M., & Tanaka, A. (2018). Development, reliability, and validity of the Japanese short version of the Spence Children's Anxiety Scale for Adolescents. *Anxiety Disorder Research, 10*(1), 64–73. https://doi.org/10.14389/jsad.10.1_64
- Isumi, A., Doi, S., Yamaoka, Y., Takahashi, K., & Fujiwara, T. (2020). Do suicide rates in children and adolescents change during school closure in Japan? The acute effect of the first wave of COVID-19 pandemic on child and adolescent mental health. *Child Abuse and Neglect, 110*(2), 104680. <https://doi.org/10.1016/j.chiabu.2020.104680>
- Kishida, K., Hida, N., & Ishikawa, S. (2022). Evaluating the effectiveness of a transdiagnostic universal prevention program for both internalizing and externalizing problems in children: Two feasibility studies. *Child and Adolescent Psychiatry and Mental Health, 16*, 1–10. <https://doi.org/10.1186/s13034-022-00445-2>
- Kishida, K., Tsuda, M., Waite, P., Creswell, C., & Ishikawa, S. I. (2021). Relationships between local school closures due to the COVID-19 and mental health problems of children, adolescents, and parents in Japan. *Psychiatry Research, 306*, 114276. <https://doi.org/10.1016/j.psychres.2021.114276>
- Loevaas, M. E. S., Lydersen, S., Sund, A. M., Neumer, S. P., Martinsen, K. D., Holen, S., & Reinfjell, T. (2020). A 12-month follow-up of a transdiagnostic indicated prevention of internalizing symptoms in school-aged children: The results from the EMOTION study. *Child and Adolescent Psychiatry and Mental Health, 14*, 15. <https://doi.org/10.1186/s13034-020-00322-w>
- Martinsen, K. D., Rasmussen, L. M. P., Wentzel-Larsen, T., Holen, S., Sund, A. M., Løvaas, M. E. S., & Neumer, S. P. (2019). Prevention of anxiety and depression in school children: Effectiveness of the transdiagnostic EMOTION program. *Journal of Consulting and Clinical Psychology, 87*(2), 212–219. <https://doi.org/10.1037/ccp0000360>
- Ministry of Education, Culture, Sports, Science and Technology (MEXT) (2020). Retrieved November 17, 2021, Retrieved from <https://www.mext.go.jp/>
- Mrazek, P. J., & Haggerty, R. J. (Eds.). (1994). *Reducing risks for mental disorders: Frontiers for preventive intervention research*. National Academy Press
- Namikawa, T., Tani, I., Wakita, T., Kumagai, R., Nakane, I., Noguchi, H., & Tujii, M. (2011). Development of a short-form Birleson depression self-rating scale for children. *Clinical Psychiatry, 53*, 489–496
- Noda, W., Ito, H., & Harada, S. (2013). Examining the reliability and validity of the Japanese version of the Strengths and Difficulties Questionnaire Self Ratings Form Using the entire cohort data in one suburban city in Japan. *Japanese Journal of Clinical Psychiatry, 42*, 119–127
- Oka, T., Ishikawa, S. I., Shioiri, T., Maruo, K., Stickle, A., Saito, A., & Kamio, Y. (2021). Changes in self-efficacy in Japanese school-age children with and without high autistic traits after the universal unified prevention program: A single-group pilot study. *Child and Adolescent Psychiatry and Mental Health, 15*(1), 42. <https://doi.org/10.1186/s13034-021-00398-y>

- Panda, P. K., Gupta, J., Chowdhury, S. R., Kumar, R., Meena, A. K., Madaan, P., & Gulati, S. (2021). Psychological and behavioral impact of lockdown and quarantine measures for COVID-19 pandemic on children, adolescents and caregivers: A systematic review and meta-analysis. *Journal of Tropical Pediatrics*, 67(1), 122. <https://doi.org/10.1093/tropej/fmaa122>
- Samji, H., Wu, J., Ladak, A., Vossen, C., Stewart, E., Dove, N., & Snell, G. (2021). Mental health impacts of the COVID-19 pandemic on children and youth—a systematic review. *Child and Adolescent Mental Health*. <https://doi.org/10.1111/camh.12501>
- Sanchez, A. L., Cornacchio, D., Poznanski, B., Golik, A. M., Chou, T., & Comer, J. S. (2018). The effectiveness of school-based mental health services for elementary-aged children: A meta-analysis. *Journal of the American Academy of Child and Adolescent Psychiatry*, 57(3), 153–165. <https://doi.org/10.1016/j.jaac.2017.11.022>
- Spence, S. H., Sawyer, M. G., Sheffield, J., Patton, G., Bond, L., Graetz, B., & Kay, D. (2014). Does the absence of a supportive family environment influence the outcome of a universal intervention for the prevention of depression? *International Journal of Environmental Research and Public Health*, 11(5), 5113–5132. <https://doi.org/10.3390/ijerph110505113>
- Takahashi, F., & Honda, H. (2021). Prevalence of clinical-level emotional/behavioral problems in school-children during the coronavirus disease 2019 pandemic in Japan: A prospective cohort study. *JCPP Advances*, 1(1), e12007. <https://doi.org/10.1111/jcv2.12007>
- Takebe, M., Kishida, K., Sato, M., Takahashi, F., & Sato, H. (2017). Development of an anger scale for children and adolescents and examination of its reliability and validity. *Japanese Journal of Behavior Therapy*, 43, 169–179. <https://doi.org/10.24468/jjbt.16-180>
- United Nations Educational, Scientific and Cultural Organization (UNESCO). Global monitoring of school closures caused by COVID-19. Retrieved November 17 (2021). Retrieved from <https://en.unesco.org/covid19/educationresponse#schoolclosures>
- Werner-Seidler, A., Perry, Y., Callear, A. L., Newby, J. M., & Christensen, H. (2017). School-based depression and anxiety prevention programs for young people: A systematic review and meta-analysis. *Clinical Psychology Review*, 51, 30–47. <https://doi.org/10.1016/j.cpr.2016.10.005>
- Werner-Seidler, A., Spanos, S., Callear, A. L., Perry, Y., Torok, M., O'Dea, B., & Newby, J. M. (2021). School-based depression and anxiety prevention programs: An updated systematic review and meta-analysis. *Clinical Psychology Review*, 89, 102079. <https://doi.org/10.1016/j.cpr.2021.102079>

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Springer Nature or its licensor holds exclusive rights to this article under a publishing agreement with the author(s) or other rightsholder(s); author self-archiving of the accepted manuscript version of this article is solely governed by the terms of such publishing agreement and applicable law.

Authors and Affiliations

Kohei Kishida^{1,2} · Noriko Hida¹ · Kohei Matsubara¹ · Mayuko Oguni¹ · Shin-ichi Ishikawa²

✉ Kohei Kishida
kkishida@mail.doshisha.ac.jp

¹ Organization for Research Initiatives and Development, Doshisha University, 1-3, Tataro Miyakodani, Kyotanabe-shi, Kyoto, Japan

² Faculty of Psychology, Doshisha University, 1-3, Tataro Miyakodani, Kyotanabe-shi, Kyoto, Japan