

Co-design of an online teacher training program tailored for rural Japanese teachers to deliver neuroscience-informed mental health interventions to children

Yu Takizawa, Matthew Bambling, Hsien-Jin Teoh and
Sisira Edirippulige
(Author affiliations can be found at the end of the article)

Received 11 January 2024
Revised 16 September 2024
15 December 2024
Accepted 16 December 2024

Abstract

Purpose – This study aims to co-design a new online teacher training program tailored for rural Japanese teachers to deliver neuroscience-informed mental health interventions to children. The objective was to reduce the educational gap between Japanese teachers in rural and urban areas, effectively improving children’s mental health.

Design/methodology/approach – The online teacher training program was developed by incorporating insights gathered from teacher interviews in the authors’ needs-analysis study. Feedback from experts in neuroscience, clinical psychology, educational psychology, education and Japanese culture was integrated. A focus group was held to gauge the suitability of content and formats, building on input from a selection of five primary school teachers out of the 20 who participated in the authors’ research on needs-analysis.

Findings – The focus group findings supported the suitability of co-designed online training program, indicating that its content and format are mostly suited for Japanese educators in rural areas to acquire knowledge of neuroscience-informed mental health interventions. However, revisions were proposed, including the inclusion of more detailed intervention guidelines and the provision of worksheets for classroom utilization. These suggestions were integrated to revise the online teacher training program. Future research could investigate the impact of program on improving the mental health of Japanese children.

Originality/value – To the best of the authors’ knowledge, this study represents the first attempt to report on the co-design of an online teacher training program that incorporated opinions from Japanese primary school

© Yu Takizawa, Matthew Bambling, Hsien-Jin Teoh and Sisira Edirippulige. Published by Emerald Publishing Limited. This article is published under the Creative Commons Attribution (CC BY 4.0) licence. Anyone may reproduce, distribute, translate and create derivative works of this article (for both commercial and non-commercial purposes), subject to full attribution to the original publication and authors. The full terms of this licence may be seen at <http://creativecommons.org/licenses/by/4.0/legalcode>

Authors would like to thank the Japanese primary school teachers and students who provided the opportunity to conduct this research.

Funding: This research received no specific grant from any funding agency in the public, commercial or not-for-profit sectors.

Conflict of interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Author contributions: YT contributed to the design and implementation of the research, to the analysis of the results and to the writing of the manuscript. MB, HT and SE contributed to the design of the research, to the analysis of the results and to the writing of the manuscript.

Data availability statement. The raw data supporting the conclusions of this article will be made available by the corresponding author, YT, upon reasonable request.



teachers in rural areas, aiming to close the educational gap among Japanese teachers. It was designed to train teachers in providing neuroscience-informed mental health interventions.

Keywords Mental health, Intervention, Online education, Japanese, Neuroscience education, Children, Rural, Primary school

Paper type Research paper

Abbreviations

CBT	= Cognitive behaviour therapy;
COVID-19	= Corona virus disease of 2019;
F	= Females;
M	= Males or mean;
N-CBT	= Neuroscience-informed cognitive behaviour therapy;
NIMH	= Neuroscience-informed mental health intervention;
OECD	= The Organization for Economic Cooperation and Development;
PhD	= Doctor of Philosophy;
SEL	= Social emotional learning;
SST	= Social skills training; and
TARGET	= Trauma adaptive recovery group education and therapy.

Introduction

There is a pressing need for early interventions addressing the mental health of Japanese children. The mental health of school-aged children influences their development, impacting academic achievement, physical well-being and future socioeconomic status (Wolf *et al.*, 2021). Nevertheless, mental disorders among Japanese children have escalated, with diagnosed cases surging from 117,000 in 1999 to 329,000 in 2020, as reported by the Ministry of Health, Labour and Welfare (2021). Among Japanese children, emotional problems, especially depression and anxiety, are the most widespread mental health problems, as indicated by the Ministry of Education, Culture, Sports, Science and Technology Japan (2021). The number of suicides among Japanese children has seen an alarming rise, from 137 incidents in 2011 to 514 in 2022 (Ministry of Health, Labour and Welfare, 2023).

Japanese schools are key providers of early mental health support for children, but their efforts are compromised by inadequate resources, notably limited availability of school counsellors. The Japanese government struggles to increase funding for enhancing children's education and healthcare, burdened by escalating healthcare and social welfare costs tied to an aging population (The Ministry of Education, Culture, Sports, Science and Technology, 2020). Consequently, a large proportion of Japanese schools allocate limited time for school counsellors, with 73.5% of primary schools, 30.1% of junior high schools and 56.9% of senior high schools providing less than 4 h of counselling services per week (Ministry of Health, Labour and Welfare, 2021). These conditions impose a significant responsibility on Japanese teachers to provide mental health support to their students. Unfortunately, teachers' limited training in mental health intervention exacerbates the difficulties they face in delivering sufficient support to students.

Mental health intervention training for pre-service teachers is often insufficient in Japanese universities (Yamaguchi *et al.*, 2021). In-service teacher training programs for mental health intervention are mostly available in major cities, such as Tokyo and Osaka, and are predominantly conducted face-to-face. Furthermore, Japanese teachers usually do not receive paid leave for professional development and are burdened with excessively heavy workloads, averaging 55 h per week, surpassing all other OECD countries (Deguchi *et al.*, 2018; OECD, 2021). Moreover, teachers with families have a commitment to take care of

children outside of work hours. These circumstances create extra challenges for teachers working in rural areas to access teacher training and develop adequate knowledge and skills in providing mental health intervention to children because they require more time and incur higher costs for travelling to major cities compared to those in urban and suburban areas. This situation creates an educational gap between teachers working in rural areas and those in urban/suburban areas, potentially causing difficulties in providing adequate mental health intervention to children.

Online teacher training program

A potential solution to address the educational gap in mental health intervention between teachers in diverse locations may be to provide online training program to teachers in rural areas. These programs require teachers to be proficient in internet and computer usage (Myhilli, 2019). However, online training provides geographical flexibility, allowing rural teachers greater accessibility compared to traditional face-to-face sessions, which are often concentrated in urban areas (Sheperis *et al.*, 2020).

A comprehensive search of major databases, including Google Scholar and PubMed, yielded no studies specifically assessing the effectiveness of online training for teaching mental health interventions to teachers. However, research comparing online and face-to-face training for other professionals, such as psychologists and counsellors, indicates that online training is equally effective in improving knowledge, skills and self-efficacy (Dimeff *et al.*, 2009; Snow *et al.*, 2018). A systematic review that synthesised the results from 11 randomised controlled trials and cohort studies that investigated the effectiveness of online teacher training in diverse topics found that online training that accommodates different learning styles by offering a combination of activities (e.g., reading, discussions and assignments), offers practical learning content and fosters engagement between peers, and that online program facilitators are particularly effective for promoting teachers' learning satisfaction and improving teachers' knowledge for practice (Bragg *et al.*, 2021).

Online training may suit rural Japanese teachers due to the nation's robust internet infrastructure, reaching even remote areas. (Nakabayashi, 2022). Hence, adopting an online format for teaching mental health intervention to Japanese teachers in rural areas would be helpful. There is a study that investigated the feasibility, learning needs and goals required to develop an online training program for teaching mental health intervention to Japanese mental health professionals (Takizawa *et al.*, 2022a). Notably, there is a research gap regarding the development of online training programs tailored for Japanese teachers, particularly those in rural areas, to provide mental health interventions for Japanese children. There is a pressing need for an online teacher training program that provides mental health interventions for Japanese children, bridging the educational divide between teachers in disparate locations and ultimately enhancing the mental health of children nationwide.

Teacher training for school-based mental health intervention for Japanese teachers

Online training might offer a solution to bridge educational gaps among teachers in diverse locations, yet a direct conversion of existing teacher programs to an online format may not be ideal due to limitations within current teacher training programs in Japan. Presently, Japanese teachers can access two main types of professional development training focused on mental health interventions for children: training programs that enhance mental health literacy and standardized group programs that provide structured mental health interventions (Harada and Watanabe, 2021; Yamaguchi *et al.*, 2021). Mental health literacy training aims to enhance teachers' abilities in identifying mental health problems, providing initial support to children and acquiring knowledge about risk factors, causes and attitudes that encourage

appropriate help-seeking (Ojio *et al.*, 2015; Yamaguchi *et al.*, 2020a, 2020b). Professional development initiatives for standardized group mental health programs focus on enhancing teachers' knowledge and skills, incorporating evidence-based approaches, such as group social skills training (group SST)(Harada and Watanabe, 2021), group cognitive behaviour therapy (group CBT)(Yamamoto *et al.*, 2017) and stress-management education (Tanaka *et al.*, 2014). These initiatives provide structured training in essential social-emotional competencies, including self-awareness, social awareness, emotional control, interpersonal skills and judicious decision-making, to foster optimal mental health outcomes in children (Urao *et al.*, 2021; Yamamoto *et al.*, 2017).

There are limitations with the effectiveness of these programs. A meta-analysis of 16 international studies found that mental health literacy training has a large effect on improving teachers' knowledge about mental health (Cohen $d = 0.8$) (Yamaguchi *et al.*, 2020a). Nevertheless, the program's scope is limited to instructing educators on teaching active listening skills to students, and there is insufficient evidence to substantiate its effectiveness in enhancing children's mental health outcomes. Additionally, a comprehensive systematic review of 85 studies revealed that standardized group-based mental health interventions, including group SST, group CBT and stress management education, yield modest effects in alleviating emotional problems (Hedges's $g = 0.22$) and conduct problems (Hedges's $g = 0.20$) in children (Takizawa *et al.*, 2023a). These findings suggest that adapting existing teacher training programs for mental health literacy and standardized group interventions into an online platform may help bridge the educational disparities among Japanese teachers across various regions. However, simply adapting existing programs may not adequately address the mental health needs of diverse Japanese children. A novel, tailored online teacher training program is necessary to effectively promote the mental health of Japanese children from diverse backgrounds.

Teacher training program for providing neuroscience-informed mental health intervention

Although it represents a novel approach, research suggests that a teacher training program focused on providing neuroscience-informed mental health interventions (NIMHI) may offer a valuable strategy for effectively enhancing the mental health and well-being of Japanese children. Operating as a biopsychosocial framework, NIMHI leverages neuroscientific research findings to inform a deeper understanding of mental health and develop tailored, evidence-based interventions. (Grawe, 2017). Although neuroscientific insights are essential for understanding mental health and developing interventions, NIMHI integrates therapeutic strategies from diverse psychotherapeutic approaches, including CBT and mindfulness-based interventions, to provide comprehensive support for individuals' mental health (Beeson and Field, 2017). The literature features various NIMHI models, including neuroscience-informed CBT (N-CBT) (Field *et al.*, 2015), neuropsychotherapy (Grawe, 2017) and trauma adaptive recovery group education and therapy (TARGET) (Ford, 2015). These models integrate techniques and therapeutic elements from CBT and other psychotherapeutic approaches, with the goal of promoting both bottom-up and top-down regulatory processes to enhance overall mental health.

Bottom-up regulation encompasses the modulation of subcortical brain regions, including the amygdala and hypothalamus, which govern the autonomic nervous system and regulate emotional and physiological responses, such as arousal and stress (Field *et al.*, 2019). This regulation enables better control over higher brain areas, notably the prefrontal cortex, facilitating the restoration of cognitive functions like learning, memory and executive functioning. In contrast, top-down regulation involves the prefrontal cortex and other higher brain regions, which oversee cognitive processes to modulate lower brain regions and manage emotional and physiological responses (Grawe, 2017). Research has identified various

strategies for promoting bottom-up regulation, including lifestyle modifications such as diet, hydration, sleep, physical activity, sun exposure, social interactions and relaxing baths. Additional strategies encompass diaphragmatic breathing, muscle relaxation, maintaining posture, imagery exercises, emotional expression, engaging in artistic activities, exposure to nature and environmental regulation techniques (Lohaus *et al.*, 2010; Wang *et al.*, 2022). Research has also shown that cognitive restructuring and mindfulness practices are effective strategies for enhancing top-down regulation, enabling individuals to better manage their cognitive and emotional responses (Clark, 2013; Seminowicz *et al.*, 2013). For instance, N-CBT (Field *et al.*, 2015) incorporates CBT techniques such as meditation, diaphragmatic breathing and cognitive restructuring, which collectively promote both bottom-up and top-down brain regulatory processes. Neuropsychotherapy (Grawe, 2017) integrates CBT techniques and techniques and highlights the significance of a positive therapeutic alliance in promoting clients' mental health, thereby facilitating regulation across both bottom-up and top-down neurobiological pathways. Similarly, TARGET model incorporates guided practices from diverse psychotherapeutic approaches, including CBT, mindfulness therapy, experiential therapy, psychodynamic therapy and art therapy, to address trauma and foster regulation across both bottom-up and top-down neurobiological pathways (Ford, 2015).

Currently, there is a scarcity of empirical research examining the efficacy of NIMHI in terms of treatment outcomes, particularly when compared to established interventions, such as CBT (Takizawa *et al.*, 2022b). Qualitative findings indicate that psychotherapists who have undergone training in N-CBT generally regard it as a credible approach and anticipate positive treatment outcomes (Field *et al.*, 2017, 2019). Neuropsychotherapy is supported by a collection of case studies demonstrating qualitative improvements in the treatment of depression and anxiety disorders, underscoring its potential therapeutic benefits (Rossouw, 2014). Research consistently suggests that incorporating neuroscientific knowledge enables therapists to better understand and address the complex needs of adult clients, facilitating personalized interventions. Furthermore, clinical trials have demonstrated that TARGET yields superior reductions in anxiety symptoms among both children and adults, outperforming relational supportive therapy and person-centred therapy (Ford *et al.*, 2012, 2018). These findings suggest that NIMHI models potentially hold promise in effectively enhancing the mental health of both children and adults.

Although research has yet to develop and assess teacher training programs specifically tailored for implementing NIMHI with children, international studies suggest that neuroscience education can enhance teachers' capacity to provide more effective mental health support to students (Brick *et al.*, 2021a; Dubinsky *et al.*, 2019). For example, a study by Dubinsky *et al.* (2019) investigated the impact of neuroscience education on 296 primary and high school teachers in the USA, covering topics such as the neuroscience of learning and memory, emotions, mirror neurons, the autonomic nervous system and stress management. Analysis of teacher interviews and classroom observations revealed that the training led to enhanced teaching confidence, increased social and emotional support for students and more effective teacher-student communication. These results indicate that neuroscience education focused on children's mental health and development can improve teachers' understanding of their students and the quality of mental health support provided, even in the absence of explicit intervention strategies. Thus, creating a novel online teacher training program tailored for rural Japanese educators to implement NIMHI with Japanese children may be a worthwhile pursuit.

Present study. This study focused on developing a tailored online training program to equip rural Japanese teachers with the necessary skills to effectively deliver NIMHI to Japanese children. This initiative aimed to bridge the educational gap between rural and urban teachers, aiming for enhanced mental health support across diverse regions. By

developing an online training program specifically for Japanese primary school teachers, this study aimed to capitalize on the critical window of early intervention, recognizing that providing mental health support to younger children is pivotal in mitigating the broader societal prevalence of mental health issues. Specifically, the study sought to co-design the program by integrating insights from prior needs-analysis research with rural Japanese teachers, expert input and feedback from a rural teacher focus group. Co-design involves active collaboration between developers and users, valuing users' expertise in their experiences. Studies have shown that this approach promotes a more nuanced understanding of user requirements, resulting in more engaging and effective services (Marín *et al.*, 2018). Moreover, incorporating expert feedback ensures that the program's design and content are well-suited to the needs of the intended audience (Skivington *et al.*, 2021).

Prior to the present study, the authors conducted a needs analysis study involving semi-structured interviews with 20 Japanese teachers (M = 11; F = 9) and surveys administered to 245 Japanese students (M = 133; F = 112) aged 8–12, in a rural public primary school in Western Japan (Takizawa *et al.*, 2023b). Aligning with the National Center for Child Health and Development's survey (2021), this study identified nearly 30% of students in the school having poor mental health with low subjective well-being and high emotional problems. Teacher interviews revealed around 80% of them expressing moderate/strong interest in learning NIMHI. Furthermore, the interviews revealed that inadequate teacher training in mental health interventions may be a critical factor contributing to the prevalence of poor mental health outcomes among children. These findings from the study supported the need of the online teacher training for delivering NIMHI to Japanese children. The study highlighted Japanese teachers' appreciation for self-paced learning, adaptable to their busy schedules. They also value live interactive content, allowing engagement with trainers and peers for deepening their learning experience, despite facing challenges attending full or half-day live interactive sessions. The interviews also highlighted the need for an easily accessible online training program catering to teachers with limited technological literacy. Many teachers in the study preferred learning from hardcopy materials over online resources. Moreover, Japanese teachers highly value training that offers practical materials usable in their classrooms.

Building on the feedback from teachers gathered during the needs analysis, this study aimed to co-design an online training program that integrates a self-paced learning booklet, comprising 6–10 concise modules (15–20 min each), with a concise live online session (1–2 h) requiring basic technological proficiency. The present study also aimed to integrate the opinions from Japanese teachers in the needs-analysis to develop an online teacher training program that is easy to understand and designed in a highly practical manner and providing ready-to-use intervention material.

This study aimed to explore answers to the following two research questions:

- RQ1. Is the content of the prototype online teacher training program suitable for Japanese school teachers?
- RQ2. Is the format of the online teacher training program prototype suitable for Japanese school teachers?

Methods

Design

The present study co-designed an online teacher training program for rural Japanese teachers to deliver neuroscience-informed mental health intervention. This process involved integrating feedback from Japanese teachers, who are potential participants of the training

program, and incorporating insights from experts in the field. Initially, a prototype was created, incorporating insights gleaned from the authors' needs analysis study, which included self-paced learning materials and slides for a live interactive session. This prototype was presented to experts for feedback and subsequent revisions. Furthermore, a focus group comprising primary school teachers offered valuable insights and feedback on the program's appropriateness, informing subsequent refinements and ultimately leading to the completion of the online teacher training program.

Participants

Five of the 20 primary school teachers from the authors' needs analysis study participated in the focus group interviews. These participants, homeroom teachers from grades 3–6, ranged in age from 34 to 55 years old ($M = 46.5$ years) and possessed teaching experience spanning 10–33 years ($M = 20.4$ years). All held a bachelor's degree in education but lacked prior education in neuroscience. The panel of experts contributing to the study comprised five professionals from diverse fields: neuroscience, clinical psychology, educational psychology, education and Japanese culture. These experts were drawn from the researcher's professional network in Japan. They included a neuroscientist and professor specializing in molecular biogenetics at Osaka University's Graduate School of Medicine. Another panellist, a professor at Tokushima Bunri University's School of Early Childhood Education, held a bachelor's degree in teaching and psychology and a PhD in educational psychology. Additionally, a Japanese certified psychologist and associate professor at Tottori University's Teacher Training Centre participated. Another certified psychologist, an associate professor at Kobe University's Graduate School of Human Development and Environment, contributed expertise in clinical psychology. Finally, an expert in Japanese education and culture, possessing a teaching bachelor's degree and a PhD in medicine, shared insights gained from over 30 years of experience as a primary school teacher in Wakayama prefecture, Japan.

Development of teacher training program

Development of prototype teacher training program material. Following receipt of ethical clearance from the University of Queensland Ethics Committees (Approval Number: 2022/HE000833), the researcher created a comprehensive 90-page self-paced learning booklet and a corresponding set of 45 PowerPoint slides designed for interactive online delivery. The booklet aimed to equip teachers with knowledge and skills necessary for delivering neuroscience-informed mental health interventions. The booklet's content encompassed a range of topics, including the neurobiological underpinnings of mental health concerns, methods for assessing student mental health and approaches to fostering both bottom-up and top-down regulation to prevent and address issues such as depression and anxiety (Table 1).

The booklet outlined a range of evidence-based bottom-up regulation strategies, including lifestyle modifications (such as balanced diet, hydration, sleep, exercise, sunlight exposure, social connections and warm baths), as well as techniques like diaphragmatic breathing, muscle relaxation, posture awareness, visualization, emotional release, creative expression, nature immersion and environmental adjustments (Lohaus *et al.*, 2010; Wang *et al.*, 2022). Top-down regulation strategies included cognitive restructuring and mindfulness techniques (Clark, 2013; Seminowicz *et al.*, 2013). The booklet was structured into seven chapters, each requiring 15–20 min for completion, drawing from previously developed neuroscience education programs for teachers (Brick *et al.*, 2021b; Dubinsky *et al.*, 2019), existing school-based mental health interventions in Japan (e.g., SST, group CBT programs, stress management education) (Matsumoto and Shimizu, 2016) and relevant literature in neuroscience-informed mental health intervention, neuroscience, psychotherapy and psychology (Grawe, 2017). The researcher

Table 1. Content of the self-paced learning booklet for online training

	Title	Contents	Exercises
1	Introduction	Describing the importance of school-based mental health intervention by describing that children’s mental health predicts their social-emotional development, future academic performance, physical and psychological health and socioeconomic status in adulthood. Describing that teachers can provide effective mental health intervention if they develop appropriate knowledge and skills	Pick a student in your classroom and complete the attached checklist for identifying the activities of the student that may be neurobiologically influencing their mental health conditions
2	Top-down and bottom-up regulation	Describing the biopsychosocial model of human functioning. Describing the bottom-up and top-down regulation of the brain by describing brain structure and function, autonomic nervous system, endocrine system, immune system and emotional processing. Describing the symptoms of mental health problems, such as depression and anxiety	Reflect on your experience over the last month and identify situations involving either bottom-up or top-down regulation of the brain
3	Autonomic nervous system	Describing how bottom-up and top-down regulation of the brain are involved in the onset, maintenance and improvement of mental health problems by describing the relationship of mental health with the autonomic nervous system, endocrine system, immune system and inflammation	Reflect on the behaviours of the student you picked in the exercise in the first chapter and identify situations involving the brain's top-down and bottom-up regulation
4	The powerful role of emotion	Describing the significance of promoting bottom-up regulation, followed by fostering top-down regulation for promoting children’s mental health. Describing the impact of chronic/excessive stress on cognitive functioning	Reflect on the behaviours of the student you picked in the exercise in the first chapter and identify situations in which either emotion or cognition was taking control over the student’s behaviours
5	Bottom-up and top-down regulation strategies	Describing a range of bottom-up regulation strategies and top-down regulation strategies for promoting students’ mental health	Reflect on teachers’ own experiences and identify situations in which they could successfully improve the bottom-up and top-down regulation of the brain for improving their own mental health conditions

(continued)

Table 1. Continued

	Title	Contents	Exercises
6	Learning and memory	Describing the importance of regularly implementing bottom-up and top-down regulation strategies for reinforcing the adaptive emotional, cognitive, behavioural and physiological pattern by describing the learning and memory, neural network and neuroplasticity	Using the checklist completed in the first chapter, plan intervention for improving the bottom-up and/or top-down regulation of the student you picked in the first exercise
7	Summary	The summary of each chapter	Reflecting and writing about the most critical learning after completing the self-paced learning booklet

Notes: Table 1 was reproduced from the authors' own work, "Evaluation of co-designed online teacher training program for providing neuroscience-informed mental health intervention to Japanese children", by Takizawa *et al.* (2024), *Frontiers in Education*, 9, p. 5

Source: Authors' own work

devised a checklist to complement the self-paced learning booklet, encompassing various activities and environmental factors aligned with the intervention strategies introduced in the booklet. These factors included lifestyle habits, diaphragm breathing, posture, muscle relaxation, imagery, emotional expression, artistic engagement, positive interaction with animals, nature exposure, environmental elements, cognitive restructuring and mindfulness (Lohaus *et al.*, 2010; Wang *et al.*, 2022). This checklist aimed to assist teachers in pinpointing specific activities and environmental aspects that might be lacking or insufficient in children, enabling the implementation of tailored intervention strategies to address these deficiencies and regulate the associated environmental factors. Ultimately, the objective of this approach was to effectively promote and support the mental health of children within the familiar and supportive environment of their classroom.

The researcher created a set of PowerPoint slides to support a 90-min live interactive online session. These slides were designed to provide a concise overview of the booklet's key takeaways, while also facilitating group discussions and the sharing of insights gleaned from the booklet's exercises. The inclusion of an interactive session was influenced by the findings of the needs-analysis study, which highlighted the value that Japanese teachers place on interactive learning opportunities with the facilitator and other teachers for deepening their learning experience. The 90-min duration of the interactive session was determined based on advice from the school principal of the participating school, who suggested that this would be the maximum time that could be allocated for busy Japanese teachers.

Consultations with a panel of experts. The researcher presented the self-paced learning booklet and presentation slides for an online interactive session to the five experts. The neuroscience expert reviewed the accuracy and language of the neuroscientific information presented in the booklet, providing feedback and suggestions for improvement. The researcher incorporated the feedback, for example, adding a more detailed description of the neuroscientific functioning of sleep and vitamin D synthesis from sunlight. Two experts specializing in clinical and educational psychology assessed the appropriateness of intervention strategies for fostering bottom-up and top-down regulation in Japanese children, ensuring cultural relevance and effectiveness. The researcher, for example, revised the pace of diaphragm

breathing based on feedback, ensuring it was appropriate for Japanese primary school-aged children. Two experts in Japanese education and culture reviewed the contents and formats of the booklet to ensure suitability for Japanese primary school teachers. The researcher incorporated their feedback, such as adding a summary of key points at the beginning of each chapter and more diagrams and images to improve comprehension. After incorporating feedback and revising the contents and formats of the booklet based on the insights provided by the experts, the researcher finalized a prototype of the teacher training program material.

Focus group procedure. The researcher contacted Japanese primary school teachers who participated in the needs-analysis study to recruit participants who can participate in an online focus group and provide feedback for the prototype teacher training material developed. The researcher scheduled a date for a 1-hour online focus group with five Japanese teachers who agreed to participate via emails and phone calls. The researcher obtained a consent from teachers for an audio recording of the focus group session. During the focus group, the researcher provided a concise overview of the self-paced learning booklet and PowerPoint slides for the live online session, and then facilitated an online discussion to gather feedback on the suitability and format of the online teacher training program, as well as suggestions for enhancing its content and delivery. The researcher transcribed the focus group recording for qualitative analysis.

Data-analysis. The qualitative analysis used phenomenological approach and explored the subjective, lived experiences and perspectives of participants (Sundler *et al.*, 2019). The primary author performed a thematic analysis to examine the qualitative data gathered from the teacher group, assessing the suitability of the prototype teacher training materials' content and format and identifying teachers' recommendations for refinement and enhancement (Braun and Clarke, 2006). The thematic analysis entailed an iterative process of data immersion, coding and theme identification and refinement, enabling a systematic and rigorous examination of the data through ongoing interrogation and engagement (Braun *et al.*, 2019). Among various qualitative analysis methodologies, thematic analysis stands out as a particularly popular and robust approach for systematically uncovering meaningful patterns within qualitative data and providing insightful answers to research questions (Howitt, 2019). The transcribed focus group data was organised by the NVivo version 12 (Lumivero, 2020) for thematic analysis.

The primary author used NVivo version 14 (QSR International, 2023), a qualitative data analysis computer software package, to conduct a thorough analysis. After reading and becoming familiar with the entire data set, the author manually coded excerpts from the focus group data and identified a set of potential themes for each focus group topic by sorting different codes and collating all relevant coded data extracts within identified themes. Thematic maps were constructed for each topic and refined to categorize codes into themes. The primary author then iteratively reviewed and refined a set of preliminary themes by examining the compiled extracts for each theme, identifying coherent patterns and verifying the validity of individual themes to ensure they accurately reflected the data's meaning. Once a satisfactory set of themes was established for each topic, the primary author defined and labelled each set. The co-authors reviewed and confirmed the appropriateness of the identified themes. Any discrepancies were discussed, revised and refined until a consensus was reached.

Results

Overview of thematic analysis

Thematic analysis identified themes regarding the suitability of learning contents, suitability of learning format and suggestions for improvement (Table 2).

Table 2. Summary of themes from the focus group

Interview topic	Themes	Illustrative quote
Suitability of contents	Interesting and relevant	“It is empowering for teachers to learn that they can implement the intervention in the classroom for promoting students’ mental health”
	Easy to understand	“Contents are easy to understand because it does not use complex technical terms that are difficult to understand”
	Require more detailed guidelines for intervention	“It is challenging for teachers to provide intervention in the classroom with just some tips and protocols”
Suitability of format	Volume is adequate	“Teachers would not have difficulty completing the reading and exercises in the booklet for two weeks”
	A simple learning format will be most suitable	“Simple learning format for self-paced learning booklet and online live interactive session without technological complexity will be useful because any difficulty in completing a booklet and joining live interactive session can demotivate teachers from learning”
	Difficult to read	“Words in the booklet and PowerPoint slides are small and a bit wordy”
Suggestions for improvement	Include detailed guidelines for providing intervention	“To effectively provide intervention learnt in training, teachers must have a detailed guideline that provides exactly how they can provide intervention”
	Provide material that teachers can readily use for providing intervention	“It will help provide intervention if the training could provide intervention worksheet that teachers can use in the classroom”
	Increase font size, reduce the words and increase images in the booklet and PowerPoint presentation slides	“It will be useful to increase the font size, reduce words and increase images, diagrams and tables in the booklet and PowerPoint slides”

Source: Authors’ own work

Suitability of learning contents

The results provided a response to *RQ1*: “Is the content of the prototype online teacher training program suitable for Japanese school teachers?” All teachers agreed that the contents of neuroscience-informed mental health intervention presented in the booklet and PowerPoint slides are interesting and relevant for Japanese teachers. Three teachers also reported that it is empowering for them to learn intervention strategies based on scientific evidence because many Japanese teachers currently try to support students primarily based on their instinct from their experience. Four teachers also reported that the checklist included in the booklet would be helpful in the classroom because Japanese teachers currently do not know how to effectively assess and understand what type of intervention may be needed for students. All teachers also reported that the contents of the booklet and PowerPoint slides are easy to understand for Japanese teachers.

Four teachers reported that while some tips and protocols for implementing different bottom-up and top-down regulation strategies are described in the booklet, these descriptions would not be sufficient for enabling Japanese teachers to implement the intervention in the classroom and that they would need more detailed guidelines that inform them precisely

what they need to do for implementing each intervention strategies for promoting bottom-up and top-down regulation. One teacher explained that Japanese teachers are busy and have limited time for planning mental health interventions for students.

Suitability of learning format

The results provided a response to RQ2: “Is the format of the online teacher training program prototype suitable for Japanese school teachers?” All teachers agreed that the volume of the self-paced learning booklet (90 pages) and the number of slides (45 slides) for the online live interactive sessions are mostly appropriate. Four teachers agreed they could easily complete reading and exercise in the self-paced learning booklet by findings small times (15–20 min) for learning if they have two weeks. Four teachers also agreed that the volume of PowerPoint slides would be suitable for 90 min live interactive online session because it allows teachers to focus on the contents of learning on each slide and provide opportunities for questions and discussions without rushing through contents. All teachers also agreed that simple online live interactive session that only involves listening and speaking with headphone will be suitable for Japanese teachers because Japanese teachers became familiar with attending online training and meeting that involve listening and speaking with a speaker and microphone under the COVID-19 pandemic but they are still not used to using online technologies for online training. All teachers also agreed that the booklet for the online teacher training program has a suitable format. One teacher explained that the booklet included diagrams and photo images that helped them understand the neurobiological mechanisms of mental health issues more clearly. Another teacher explained that the booklet included exercises with case studies, effectively allowing them to practice applying the knowledge learned in the workshop to themselves for improving their own mental health, as well as to their students’ mental health in the classroom.

While all teachers were mostly satisfied with the booklet and PowerPoint slides format for online live interactive sessions, teachers also reported that it is difficult to read words on the booklet and PowerPoint slides because of the small font size and the crowdy words. Furthermore, three teachers reported that difficulty in reading because of small font size and wordiness could demotivate Japanese teachers from learning and potentially reduce the effectiveness of training.

Suggestions for improvement

Four teachers recommended that the training include a concise summary of guidelines, offering step-by-step instructions for implementing various intervention strategies that support both bottom-up and top-down regulation, to facilitate easier application in the classroom. One teacher explained that a summary of guidelines for implementing different intervention strategies would be helpful because it can inform teachers precisely what they need to do to provide intervention without hassles, and it would increase the adaptation of intervention strategies learnt in training. Furthermore, three teachers suggested that it would be valuable to have follow-up consultations by email, telephone and online video chat after attending online live interactive sessions because they feel that they require additional guidance for providing assessments with a checklist to students and implementing bottom-up and top-down regulation strategies for individual and group students in the classroom.

Four teachers also proposed that the training include a practical worksheet that teachers can use directly with students in the classroom to implement various intervention strategies, acknowledging that teachers’ time is limited and preparation time for interventions is often scarce. All teachers suggested that to help teachers more easily understand the learning contents,

improving the readability of the booklet and PowerPoint presentation slides will be helpful by increasing font size, decreasing the number of words and increasing images and diagrams. Quality Education for All

Revisions made to the contents of the teacher training program

Integrating the suggestions made by teachers, the researcher created a summary of guideline sheet that inform protocol for teachers to implement intervention strategies for promoting bottom-up and top-down regulation of children. In addition, the researcher also created intervention worksheets that teachers can use with students for implementing each intervention strategy in the classroom. The guideline sheet and intervention sheet were developed in reference to the material used in the standardized group mental health intervention programs, such as SST, group CBT, SEL programs and stress management education (Matsumoto *et al.*, 2020; Yamamoto *et al.*, 2017). The researcher also decided to provide follow-up consultations by email, telephone and online video chat after teachers attend online live interactive sessions to ensure that teachers can adequately provide assessments with a checklist and implement interventions in the classroom.

To improve the readability of the booklet and PowerPoint presentation slides, the researcher increased the font size, made the sentences more concise and reduced the words and increased the number of images, diagrams and tables in the booklet and PowerPoint presentation. To support the comprehension of the learning contents of the booklet, the researcher also created a recording of a summary of each chapter of the booklet that teachers can listen to while reading the booklet's contents. The recording of the summary was uploaded on YouTube for easy access for teachers.

Discussion

Learning contents of online teacher training program

Addressing RQ1, the present study found with a teacher focus group that the learning contents of online teacher training programs presented in the self-paced learning booklet and PowerPoint slides for the live online interactive session are mostly suitable for stimulating the interest of Japanese teachers and engaging teachers in learning. All teachers agreed that the contents are interesting and relevant for Japanese teachers. The present study found with a teacher focus group that the contents of an online teacher training program for providing neuroscience-informed mental health intervention would be effective for improving teachers' knowledge and skills for delivering mental health intervention and promoting the adoption of neuroscience-informed mental health intervention. Teachers reported that a range of practical mental health intervention strategies described in the content of the online teacher training program would be empowering for teachers to provide mental health intervention to students, especially because they currently have limited breadth and depth of knowledge and skills in mental health intervention grounded on scientific evidence. Teachers also agreed that the checklist included in the self-paced learning booklet would help provide mental health intervention because they currently have limited knowledge for assessing the mental health needs of students.

However, the study's teacher focus group revealed that Japanese teachers have limited time to plan mental health interventions due to their academic teaching, teaching preparation and other extra duties. To effectively promote the implementation of neuroscience-informed mental health interventions, teachers suggested that the online teacher training program needs to provide a more detailed guideline that helps teachers easily implement a range of intervention strategies. In response to this feedback, the researcher made necessary revisions to the contents of online teacher training program. The researcher created a sheet summarizing a detailed guideline for implementing each regulation strategy presented in the self-paced learning booklet and presentation slides. Additionally, the researcher developed

intervention sheets that teachers can use in the classroom with students. The guideline sheet and intervention sheet were developed based on materials from established group mental health intervention programs, such as SST, group CBT and stress management education, to ensure consistency and effectiveness (Matsumoto *et al.*, 2020; Yamamoto *et al.*, 2017). To guarantee successful implementation, the researcher opted to offer follow-up consultations via email, phone and online video conferencing after teachers participated in the online live interactive sessions. These adjustments ensured that the co-designed online teacher training program was tailored to meet the specific needs of Japanese educators.

Learning format of online teacher training program

Addressing RQ2, the present study found with a teacher focus group that the learning format of online teacher training in the self-paced learning booklet and live online interactive session are suitable format for Japanese teachers. Japanese teachers agreed that the overall volume of the self-paced learning booklet (90 pages) is appropriate. Japanese teachers also agreed that two weeks would be an appropriate time for teachers to complete a self-paced learning booklet before attending an online live interactive session. Teachers also agreed that the volume of PowerPoint slides (45 slides) would allow teachers to focus on the contents of learning on each slide and provide opportunities for questions and discussions without rushing through content in 90 min of the online live interactive session. Teachers agreed that the online teacher training format without face-to-face contact is suitable to avoid the risk of COVID-19 infection. Teachers agreed that simple online live interactive session that only involves listening and speaking would be ideal for Japanese teachers because, while Japanese teachers have more opportunities to attend online teacher training, many of them are still not used to using complicated online technologies for online training (e.g., breakout rooms). All teachers agreed that the booklet for the online teacher training program has a suitable format, featuring diagrams and photos that enhance their understanding of the training content, including neurobiological mechanisms of mental health issues. Teachers also agreed that the booklet's exercises and case studies can enable teachers to apply the knowledge learned in the workshop to improve their own mental health and that of their students in the classroom.

The study found that although teachers were comfortable with the online teacher training program format, they had difficulty reading the small font size, wordy sentences and lack of images and diagrams in the self-paced learning booklet and PowerPoint slides. This difficulty in reading may potentially demotivate Japanese teachers from learning and reduce the effectiveness of the training. Teachers suggested that they would be more engaged in the self-paced learning booklet and online live interactive session if there were more images and diagrams. In response to the feedback, the researcher made necessary revisions to the format of online teacher training program. The researcher revised the format of the self-paced learning booklet and PowerPoint slides by increasing the font size, making sentences more concise and adding more images and diagrams. To further enhance comprehension, the researcher created audio recordings summarizing each chapter of the booklet. These recordings were uploaded to YouTube for easy access by teachers. These revisions ensured that the online teacher training has suitable format for Japanese teachers.

Limitations

Japanese teachers who participated in the focus group were not randomly selected. The researcher invited Japanese teachers who expressed willing to join the focus group. Therefore, the input of teachers from the focus group may not represent the entire opinions of Japanese teachers in the school. Furthermore, teacher training developed in the present study was designed to meet the needs of Japanese teachers in a single public primary school in Western

Japan. Hence, teacher training developed in this study may not be suitable for Japanese teachers in other Japanese schools in rural areas. Furthermore, although co-researchers validated the identified themes' appropriateness, only the primary author was responsible for coding and identifying themes from the teacher focus group data. No other researcher conducted an independent parallel thematic analysis. Consequently, the reliability of the identified themes may be somewhat compromised due to the lack of inter-rater verification.

Conclusions

This study co-designed a tailored online teacher training program for delivering neuroscience-informed mental health interventions, specifically formatted and content-rich for Japanese teachers in rural settings, by integrating feedback from rural Japanese teachers and a panel of expert advisors. The developed teacher training is expected to enhance the knowledge and skills of rural Japanese teachers in effectively providing mental health interventions to Japanese children. The next step would be to evaluate the effectiveness of the developed online training program in delivering neuroscience-informed mental health interventions and promoting the mental health of Japanese primary school students in rural areas. Future studies evaluating the effectiveness of online teacher training programs for delivering NIMHI may collect feedback from students and teachers to inform further program development.

References

- Beeson, E.T. and Field, T.A. (2017), "Neurocounseling: a new section of the journal of mental health counseling", *Journal of Mental Health Counseling*, Vol. 39 No. 1, pp. 71-83, doi: [10.17744/mehc.39.1.06](https://doi.org/10.17744/mehc.39.1.06).
- Bragg, L.A., Walsh, C. and Heyeres, M. (2021), "Successful design and delivery of online professional development for teachers: a systematic review of the literature", *Computers and Education*, Vol. 166, p. 104158, doi: [10.1016/j.compedu.2021.104158](https://doi.org/10.1016/j.compedu.2021.104158).
- Braun, V. and Clarke, V. (2006), "Using thematic analysis in psychology", *Qualitative Research in Psychology*, Vol. 3 No. 2, pp. 77-101, doi: [10.1191/1478088706qp063oa](https://doi.org/10.1191/1478088706qp063oa).
- Braun, V., Clarke, V., Hayfield, N. and Terry, G. (2019), "Thematic analysis", in Liamputtong, P. (Ed.), *Handbook of Research Methods in Health Social Sciences*, pp. 843-860, Springer, doi: [10.1007/978-981-10-5251-4_103](https://doi.org/10.1007/978-981-10-5251-4_103).
- Brick, K., Cooper, J.L., Mason, L., Faeflen, S., Monmia, J. and Dubinsky, J.M. (2021a), "Tiered neuroscience and mental health professional development in Liberia improves teacher self-efficacy, self-responsibility, and motivation", *Frontiers in Human Neuroscience*, Vol. 15, p. 664730, doi: [10.3389/fnhum.2021.664730](https://doi.org/10.3389/fnhum.2021.664730).
- Brick, K., Cooper, J.L., Mason, L., Faeflen, S., Monmia, J. and Dubinsky, J.M. (2021b), "Training-of-trainers neuroscience and mental health teacher education in Liberia improves self-reported support for students", *Frontiers in Human Neuroscience*, Vol. 15, p. 653069, doi: [10.3389/fnhum.2021.653069](https://doi.org/10.3389/fnhum.2021.653069).
- Clark, D.A. (2013), "Cognitive restructuring", *The Wiley Handbook of Cognitive Behavioral Therapy*, John Wiley and Sons, New York, NY, pp. 1-22, doi: [10.1002/9781118528563.wbcbt02](https://doi.org/10.1002/9781118528563.wbcbt02).
- Deguchi, Y., Iwasaki, S., Kanchika, M., Nitta, T., Mitake, T., Nogi, Y., Kadowaki, A., Niki, A. and Inoue, K. (2018), "Gender differences in the relationships between perceived individual-level occupational stress and hazardous alcohol consumption among Japanese teachers: a cross-sectional study", *PLoS One*, Vol. 13 No. 9, p. e0204248, doi: [10.1371/journal.pone.0204248](https://doi.org/10.1371/journal.pone.0204248).
- Dimeff, L.A., Koerner, K., Woodcock, E.A., Beadnell, B., Brown, M.Z., Skutch, J.M., Paves, A.P., et al. (2009), "Which training method works best? A randomized controlled trial comparing three methods of training clinicians in dialectical behavior therapy skills", *Behaviour Research and Therapy*, Vol. 47 No. 11, pp. 921-930, doi: [10.1016/j.brat.2009.07.011](https://doi.org/10.1016/j.brat.2009.07.011).

- Dubinsky, J.M., Guzey, S.S., Schwartz, M.S., Roehrig, G., MacNabb, C., Schmied, A., Hinesley, V., et al. (2019), "Contributions of neuroscience knowledge to teachers and their practice", *The Neuroscientist*, Vol. 25 No. 5, pp. 394-407, doi: [10.1177/1073858419835447](https://doi.org/10.1177/1073858419835447).
- Field, T.A., Beeson, E.T. and Jones, L.K. (2015), "The new ABCs: a practitioner's guide to neuroscience-informed cognitive-behavior therapy", *Journal of Mental Health Counseling*, Vol. 37 No. 3, pp. 206-220, doi: [10.17744/1040-2861-37.3.206](https://doi.org/10.17744/1040-2861-37.3.206).
- Field, T.A., Beeson, E.T., Jones, L.K. and Miller, R. (2017), "Counselor allegiance and client expectancy in neuroscience-informed cognitive-behavior therapy: a 12-month qualitative follow-up", *Journal of Mental Health Counseling*, Vol. 39 No. 4, pp. 351-365, doi: [10.17744/mehc.39.4.06](https://doi.org/10.17744/mehc.39.4.06).
- Field, T.A., Miller, R., Beeson, E.T. and Jones, L.K. (2019), "Treatment fidelity in neuroscience-informed cognitive-behavior therapy: a feasibility study", *Journal of Mental Health Counseling*, Vol. 41 No. 4, pp. 359-376, doi: [10.17744/mehc.41.4.06](https://doi.org/10.17744/mehc.41.4.06).
- Ford, J. (2015), "An affective cognitive neuroscience-based approach to PTSD psychotherapy: the TARGET model", *Journal of Cognitive Psychotherapy*, Vol. 29 No. 1, pp. 68-91, doi: [10.1891/0889-8391.29.1.68](https://doi.org/10.1891/0889-8391.29.1.68).
- Ford, J.D., Grasso, D.J., Levine, J. and Tennen, H. (2018), "Emotion regulation enhancement of cognitive behavior therapy for college student problem drinkers: a pilot randomized controlled trial", *Journal of Child and Adolescent Substance Abuse*, Vol. 27 No. 1, pp. 47-58, doi: [10.1080/1067828X.2017.1400484](https://doi.org/10.1080/1067828X.2017.1400484).
- Ford, J.D., Steinberg, K.L., Hawke, J., Levine, J. and Zhang, W. (2012), "Randomized trial comparison of emotion regulation and relational psychotherapies for PTSD with girls involved in delinquency", *Journal of Clinical Child and Adolescent Psychology*, Vol. 41 No. 1, pp. 27-37, doi: [10.1080/15374416.2012.632343](https://doi.org/10.1080/15374416.2012.632343).
- Grawe, K. (2017), *Neuropsychotherapy: How the Neurosciences Inform Effective Psychotherapy*, Routledge, London.
- Harada, E. and Watanabe, Y. (2021), "ソーシャル・エモーショナル・ラーニングによる高校生のソーシャルスキルとレジリエンスへの効果 [effects of social and emotional learning on the social skills and resilience of Japanese high school students]", *The Studies on Educational Practices*, Vol. 24, pp. 1-14, doi: [10.50841/kyoikujissen.24.0_1](https://doi.org/10.50841/kyoikujissen.24.0_1).
- Howitt, D. (2019), *Introduction to Qualitative Research Methods in Psychology: Putting Theory into Practice*, Pearson, London.
- Lohaus, A., Klein-Heßling, J., Vögele, C. and Kuhn-Hennighausen, C. (2010), "Psychophysiological effects of relaxation training in children", *British Journal of Health Psychology*, Vol. 6 No. 2, pp. 197-206, doi: [10.1348/135910701169151](https://doi.org/10.1348/135910701169151).
- Lumivero (2020), "NVivo", Lumivero.
- Marín, V.I., Asensio-Pérez, J.I., Villagrà-Sobrino, S., Hernández-Leo, D. and García-Sastre, S. (2018), "Supporting online collaborative design for teacher professional development", *Technology, Pedagogy and Education*, Vol. 27 No. 5, pp. 571-587, doi: [10.1080/1475939X.2018.1547787](https://doi.org/10.1080/1475939X.2018.1547787).
- Matsumoto, Y. and Shimizu, E. (2016), "The FRIENDS cognitive behavioral program in Japanese schools: an examination of the treatment effects", *School Psychology International*, Vol. 37 No. 4, pp. 397-409, doi: [10.1177/0143034316649639](https://doi.org/10.1177/0143034316649639).
- Matsumoto, Y., Ishimoto, Y. and Takizawa, Y. (2020), "Examination of the effectiveness of neuroscience-informed child education (NICE) within Japanese school settings", *Children and Youth Services Review*, Vol. 118, p. 105405, doi: [10.1016/j.childyouth.2020.105405](https://doi.org/10.1016/j.childyouth.2020.105405).
- Ministry of Education, Culture, Sports, Science and Technology Japan (2021), "School health statistics survey".
- Ministry of Health, Labour and Welfare (2021), "Statistics of suicide: circumstances in each year".
- Ministry of Health, Labour and Welfare (2023), "Statistics of suicide: circumstances in each year".

- Myhilli, G. (2019), "A study of factors associated with online training on performance and satisfaction of academic counsellors", *Asian Journal of Distance Education*, Vol. 14 No. 2, pp. 98-113.
- Nakabayashi, K. (2022), "自己調整学習を主題とするビデオとオンラインレポートを活用した授業実践 [educational practice on the subject of self-regulated learning using video content and online report]", *Transactions of Japanese Society for Information and Systems in Education*, Vol. 39 No. 1, pp. 62-75, doi: [10.14926/jsise.39.62](https://doi.org/10.14926/jsise.39.62).
- OECD (2021), "TALIS - the oecd teaching and learning international survey".
- Ojio, Y., Yonehara, H., Taneichi, S., Yamasaki, S., Ando, S., Togo, F., Nishida, A., *et al.* (2015), "Effects of school-based mental health literacy education for secondary school students to be delivered by school teachers: a preliminary study", *Psychiatry and Clinical Neurosciences*, Vol. 69 No. 9, pp. 572-579, doi: [10.1111/pcn.12320](https://doi.org/10.1111/pcn.12320).
- QSR International (2023), "NVivo (version 14)", available at: <https://lumivero.com/>
- Rossouw, P.J. (2014), *Neuropsychotherapy: Theoretical Underpinnings and Clinical Applications*, Mediros, St Lucia, QLD.
- Seminowicz, D.A., Shpaner, M., Keaser, M.L., Krauthamer, G.M., Mantegna, J., Dumas, J.A., Newhouse, P.A., *et al.* (2013), "Cognitive-behavioral therapy increases prefrontal cortex gray matter in patients with chronic pain", *The Journal of Pain*, Vol. 14 No. 12, pp. 1573-1584, doi: [10.1016/j.jpain.2013.07.020](https://doi.org/10.1016/j.jpain.2013.07.020).
- Sheperis, D.S., Coker, J.K., Haag, E. and Salem-Pease, F. (2020), "Online counselor education: a student-faculty collaboration", *The Professional Counselor*, Vol. 10 No. 1, pp. 133-143, doi: [10.15241/dss.10.1.133](https://doi.org/10.15241/dss.10.1.133).
- Skivington, K., Matthews, L., Simpson, S.A., Craig, P., Baird, J., Blazeby, J.M., Boyd, K.A., *et al.* (2021), "A new framework for developing and evaluating complex interventions: update of medical research council guidance", *BMJ*, Vol. 374, p. n2061, doi: [10.1136/bmj.n2061](https://doi.org/10.1136/bmj.n2061).
- Snow, W.H., Lamar, M.R., Hinkle, J.S. and Speciale, M. (2018), "Current practices in online counselor education", *The Professional Counselor*, Vol. 8 No. 2, pp. 131-145, doi: [10.15241/whs.8.2.131](https://doi.org/10.15241/whs.8.2.131).
- Sundler, A.J., Lindberg, E., Nilsson, C. and Palmér, L. (2019), "Qualitative thematic analysis based on descriptive phenomenology", *Nursing Open*, Vol. 6 No. 3, pp. 773-739, doi: [10.1002/nop2.275](https://doi.org/10.1002/nop2.275).
- Takizawa, Y., Bambling, M., Hsien-Jin, T. and Edirippulige, S. (2023a), "The feasibility of developing an online teacher training program", *Health Open Research*, Vol. 28, p. 13474, doi: [10.12688/healthopenres.13474.1](https://doi.org/10.12688/healthopenres.13474.1).
- Takizawa, Y., Bambling, M., Teoh, H.-J. and Edirippulige, S. (2024), "Evaluation of co-designed online teacher training program for providing neuroscience-informed mental health intervention to Japanese children", *Frontiers in Education*, Vol. 9, p. 1396271, doi: [10.3389/educ.2024.1396271](https://doi.org/10.3389/educ.2024.1396271).
- Takizawa, Y., Bambling, M., Matsumoto, Y., Ishimoto, Y. and Edirippulige, S. (2023b), "Effectiveness of universal school-based social-emotional learning programs for promoting social-emotional skills, attitudes towards self and others, positive social behaviors, and improving emotional and conduct problems among Japanese children: a meta-analytic systematic review", *Frontiers in Education*, Vol. 8, p. 1228269, doi: [10.3389/educ.2023.1228269](https://doi.org/10.3389/educ.2023.1228269).
- Takizawa, Y., Murray, J., Bambling, M., Matsumoto, Y., Ishimoto, Y., Yamane, T. and Edirippulige, S. (2022a), "Integrating neuroscientific knowledge into psychotherapy amongst Japanese psychotherapists: presence, benefits, needs and cultural barriers", *Asia Pacific Journal of Counselling and Psychotherapy*, Vol. 13 No. 1, pp. 81-100, doi: [10.1080/21507686.2022.2035783](https://doi.org/10.1080/21507686.2022.2035783).
- Takizawa, Y., Murray, J., Bambling, M., Matsumoto, Y., Ishimoto, Y., Yamane, T. and Edirippulige, S. (2022b), "Integration of clinical neuroscience into psychotherapy: a narrative review of neuroscience-informed psychotherapy models for the treatment of depression and anxiety disorders", *Psychotherapy and Counselling Journal of Australia*, Vol. 10 No. 1, p. 71199, doi: [10.59158/001c.71199](https://doi.org/10.59158/001c.71199).
- Tanaka, O., Koshikawa, F. and Matsuura, M. (2014), "Stress management program with self-instructional training: effectiveness of the program and evaluation from the students", *Stress Science Research*, Vol. 29 No. 0, pp. 68-76, doi: [10.5058/stresskagakukenkyu.29.68](https://doi.org/10.5058/stresskagakukenkyu.29.68).

- The Ministry of Education, Culture, Sports, Science and Technology (2020), "Enhancement of educational counseling system by school counselors and school social workers".
- Urao, Y., Ohira, I., Koshiba, T., Ishikawa, S., Sato, Y. and Shimizu, E. (2021), "Classroom-based cognitive behavioural therapy: a large-scale non-randomised controlled trial of the 'journey of the brave'", *Child and Adolescent Psychiatry and Mental Health*, Vol. 15 No. 1, pp. 1-10, doi: [10.1186/s13034-021-00374-6](https://doi.org/10.1186/s13034-021-00374-6).
- Wang, P., Wang, S.C., Liu, X., Jia, S., Wang, X., Li, T., Yu, J., et al. (2022), "Neural functions of hypothalamic oxytocin and its regulation", *ASN Neuro*, Vol. 14 No. 1, p. 17590914221100706, doi: [10.1177/17590914221100706](https://doi.org/10.1177/17590914221100706).
- Wolf, S., Reyes, R.S., Weiss, E.M. and McDermott, P.A. (2021), "Trajectories of social-emotional development across pre-primary and early primary school", *Journal of Applied Developmental Psychology*, Vol. 75, p. 101297, doi: [10.1016/j.appdev.2021.101297](https://doi.org/10.1016/j.appdev.2021.101297).
- Yamamoto, T., Matsumoto, Y. and Bernard, M.E. (2017), "Effects of the cognitive-behavioral you can do it! Education program on the resilience of Japanese elementary school students: a preliminary investigation", *International Journal of Educational Research*, Vol. 86, pp. 50-58, doi: [10.1016/j.ijer.2017.08.006](https://doi.org/10.1016/j.ijer.2017.08.006).
- Yamaguchi, S., Foo, J.C., Kitagawa, Y., Togo, F. and Sasaki, T. (2021), "A survey of mental health literacy in Japanese high school teachers", *BMC Psychiatry*, Vol. 21 No. 1, p. 478, doi: [10.1186/s12888-021-03481-y](https://doi.org/10.1186/s12888-021-03481-y).
- Yamaguchi, S., Foo, J.C., Nishida, A., Ogawa, S., Togo, F. and Sasaki, T. (2020a), "Mental health literacy programs for school teachers: a systematic review and narrative synthesis", *Early Intervention in Psychiatry*, Vol. 14 No. 1, pp. 14-25, doi: [10.1111/eip.12793](https://doi.org/10.1111/eip.12793).
- Yamaguchi, S., Ojio, Y., Foo, J.C., Michigami, E., Usami, S., Fuyama, T., Onuma, K., et al. (2020b), "A quasi-cluster randomized controlled trial of a classroom-based mental health literacy educational intervention to promote knowledge and help-seeking/helping behavior in adolescents", *Journal of Adolescence*, Vol. 82 No. 1, pp. 58-66, doi: [10.1016/j.adolescence.2020.05.002](https://doi.org/10.1016/j.adolescence.2020.05.002).

Author affiliations

Yu Takizawa, Centre for Health Services Research, Faculty of Medicine, The University of Queensland, Brisbane, Australia and Centre for Health Research, University of Southern Queensland, Springfield, Australia

Matthew Bambling, Greater Brisbane Clinical School, Faculty of Medicine, The University of Queensland, Brisbane, Australia

Hsien-Jin Teoh, The Prince Charles Hospital, Chermside, Australia and School of Psychology, The University of Queensland, Brisbane, Australia, and

Sisira Edirippulige, Centre for Health Services Research, Faculty of Medicine, The University of Queensland, Brisbane, Australia

Corresponding author

Yu Takizawa can be contacted at: yu.takizawa@uqconnect.edu.au