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# Building resilience beyond the COVID-19 pandemic: can it work through creative play with digital puzzles?

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The COVID-19 pandemic worldwide has had significant repercussions for early childhood education. In this article, we begin by discussing the impact of a world health pandemic on education and the challenges of conducting a literature review following the COVID-19 pandemic. Specifically, we examine the challenges of conducting a literature review on building resilience in young children in the digital era. The four sections categorize the resilience literature into the following themes: (1) defining resilience in young children, (2) powerful play for resilience in young children beyond the COVID-19 pandemic, (3) creative play building resilience in young children, and (4) digital puzzles for resilience: the case of early childhood classrooms in Indonesia. Each of the four themes is presented with a narrative whose content is current, followed by a literary consensus. The article ends with changes to build resilience in young children using creative play through digital puzzles. Digital puzzles as media for creative play support young children in developing skills that will make them happier and more resilient in overcoming daily hardships. Young children can become individuals who successfully face daily hardships creatively to reconstruct themselves after experiencing bad conditions due to the COVID-19 pandemic.

## KEYWORDS

resilience, early childhood education, creative play, digital puzzles, beyond the COVID-19 pandemic

## The impact of the COVID-19 pandemic on young children's resilience and the benefits of play

The COVID-19 pandemic has had a significant impact on the mental health of children worldwide. Research has shown that young people are experiencing increased fear, sleep disturbances, poor appetite, inattention, and separation disorders (Beal, 2021). To adjust to the changes brought on by the COVID-19 pandemic, they should possess the psychological skill of resilience, which allows for new habits. The promotion of resilience is now a crucial aspect of early childhood education. However, studies examining resilience within early childhood education remain scarce (Furu et al., 2023). The COVID-19 pandemic has also driven the early childhood education system to the brink of collapse and mobilized leading early childhood organizations to protect early childhood education programs (National Association for the Education of Young Children, 2020; Zero to Three, 2020).

Studies on resilience state that play develops resilience in young children (Garrett, 2014; Nicholson and Kurtz, 2023). Dyrfjoro and Hreidarsdottir point out that play impacts children's well-being (Dyrfjoro and Hreidarsdottir, 2022). From a developmental perspective, play functions by developing various skill sets that optimize young children's development and manage stress. Some previous research has shown that when developmentally appropriate, they can build executive function and a more prosocial brain through play. Both play functions can improve psychomotor, language, cognitive, social-emotional, and self-regulation skills, allowing young children to respond to and overcome challenges (Nijhof et al., 2018; Yogman et al., 2018). All at once, the abovementioned evidence suggests that play is a highly effective context for young children to develop all the foundations of resilience.

## Issues with conducting a literature review on resilience in young children beyond the COVID-19 pandemic

This article reports a literature study on resilience in young children, with search methods used to identify and evaluate relevant literature based on the Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA) model by Moher et al. (2009). Moher's model consists of four systematic review stages: identification, screening, eligibility, and inclusion. The Google online database was employed to identify literature because of its extensive multidisciplinary coverage and reach. The search used the following terms in various combinations: resilience, early childhood education, creative play, digital puzzles, and beyond the COVID-19 pandemic. The search was not limited to the year of publication of the literature found. We identified additional literature through government or educational organization websites. Second, there came the screening of literature on relevant topics with a focus on international and national indexes. This included quantitative, qualitative, and research and development: policy documents from global organizations, literature reviews conducted by professionals representing various fields, and resources prepared by leading professional associations. Third, we assessed the eligibility of the literature from the screening stage. Fourth, we included four themes synthesized from the literature review. Each theme highlighted crucial issues in the published scientific literature. These themes were (1) defining resilience in young children, (2) powerful play for resilience in young children beyond the COVID-19 pandemic, (3) creative play building resilience in young children, and (4) digital puzzles for resilience: the case of early childhood classrooms in Indonesia.

## What is the definition of resilience in young children?

The concept of resilience is not new. However, precisely defining it remains a challenge. Numerous variations in definitions of resilience exist in the literature, and these definitions have evolved. The most common definitions predominantly have two parts. The first component is exposure to risk/adversity that commonly threatens favorable outcomes, and the second component is that the individual exposed to said risk/adversity responds relatively well (Masten and

Reed, 2002). The table shows examples from some of the most prominent authors found during the literature review. Based on the findings of several definitions of resilience in young children gathered by Schafer (2022), we carried out further searches from different literature (see Table 1).

One of the most crucial implications of the definitions outlined above is the idea that the resilience of a developing child has both physiological and psychological ramifications. Young children's capacity to adapt to challenges depends on their relationships and systems outside the individual through processes involved in recovering from adversity. In this context, resilience is the ability to adapt to, withstand, or recover from stressors, challenges, or trauma resulting from a combination of both intrinsic and extrinsic factors. Researchers have stated that resilience is not a static process but a set of capabilities that can grow and develop (Svendsen et al., 2020; Forkey et al., 2021). If resilience is a dynamic process of positive adaptation despite significant adversity, then resilience is not a fixed ability or characteristic. Resilience includes skills that can be modeled, taught, practiced, strengthened, and learned. Through a give-and-take relationship that is safe, stable, and in a state of constant growth and development, young children will be able to achieve resilience. It occurs through play, exploration, and exposure to various routine activities and resources as skill-building exercises (Masten, 2001; Utami et al., 2021).

## Powerful play for resilience in young children beyond the COVID-19 pandemic

Play is an easy, natural, and universal practice for building resilience. Play comes naturally to all children and is a seemingly simple and enjoyable phenomenon (Masten, 2001; IICBA, 2019; Yoleri, 2020; Gidado and Tosin, 2022). As Parker et al. (2022) posit, learning through play is a powerful, measurable, and successful approach to ensure young children develop in a balanced way, particularly during times of crisis. Moreover, play can develop holistic skills and young children's resilience to thrive in a changing world (Right to Play UNESCO, 2018; Nicholson and Kurtz, 2023).

Play can support the development of resilience in young children because playing provides opportunities for them to develop various life skills for respite from stressful circumstances (Pearson et al., 2017). Folostina et al. (2015) investigated the impact of play on children's resilience at risk, and the results revealed an increase in self-confidence and a reduction in disruptive behaviors. In addition, play can mitigate the impact of adverse childhood experiences (ACEs), building young children's resilience and flexibility when facing uncertainty due to massive societal disturbances such as the COVID-19 pandemic (Guirguis and Longley, 2021; Herndon and Waggoner, 2021; McKenzie, 2021). According to the Centers for Disease Control and Prevention (CDC), ACEs are traumatic events outside the realm of typical developmental experiences that occur during early childhood. ACEs include various traumatic events such as sexual and emotional violence (Hartati et al., 2020), parental neglect, financial hardships, household dysfunction, and loss of family members (Centers for Disease Control and Prevention, 2020).

Edith Grotberg, Senior Scientist and Developmental Psychologist at the Civitan International Research Center at the University of

TABLE 1 Definitions of resilience in the literature.

Authors	Definitions of resilience
Bhamra et al. (2011)	The capacity and ability of an element to return to a stable state after a disruption (p. 5,376).
Ungar et al. (2013)	Children's developmental success under negative stress (p. 349).
National Scientific Council on the Developing Child (2015)	A positive, adaptive response in the face of significant adversity (p. 1).
Ginsburg and Jablow (2020)	The capacity to rise above difficult circumstances; moving forward with competence, confidence, connection, character, contribution, coping, and control even in the midst of adversity.
Brooks and Goldstein (2001)	The ability of a child to deal more effectively with stress and pressure, to cope with everyday challenges, to bounce back from disappointments, adversity, and trauma, to develop clear and realistic goals, to solve problems, to relate comfortably with others, and to treat oneself and others with respect (p. 1).
Zolkoski and Bullock (2012)	Good mental and physical health includes the ability to endure, adapt, and recover from adversity.
Bhushan et al. (2020)	Resilience arises from a combination of neural, hormonal, immune, metabolic, epigenetic, and genetic factors that interact with environmental influences and develop the individual's ability to adapt healthily.
Masten (2014)	A dynamic process for adapting successfully to challenges that threaten the future function, viability, or development of a system.

Alabama, stated that young children need to build resilience to overcome various adversities in life. They cannot accomplish it alone. They require adults who promote resilience (Grotberg, 1995). As a result, we need appropriate types of play for young children to foster resilience, particularly to the impact of the COVID-19 pandemic.

## Creative play building resilience in young children

Play can take numerous different shapes: communication play, deep play, dramatic play, exploratory play, fantasy and imaginative play, locomotor play, mastery play, object play, recapitulative play, role play, rough and tumble play, social play, socio-dramatic play, symbolic play, and creative play (Hughes, 2006). Experts have identified numerous types of playing that offer distinct benefits to children. Plenty of play types indicate a range of behaviors and how they may influence physical, mental, and emotional development. Creative play is one of the most apparent in staffed play areas. It is more than offering young children access to resources and is not creating something based on templates or instructions. Playfulness, open-mindedness, and thinking “outside the box” indicate a desirable and highly esteemed state where they naturally get involved.

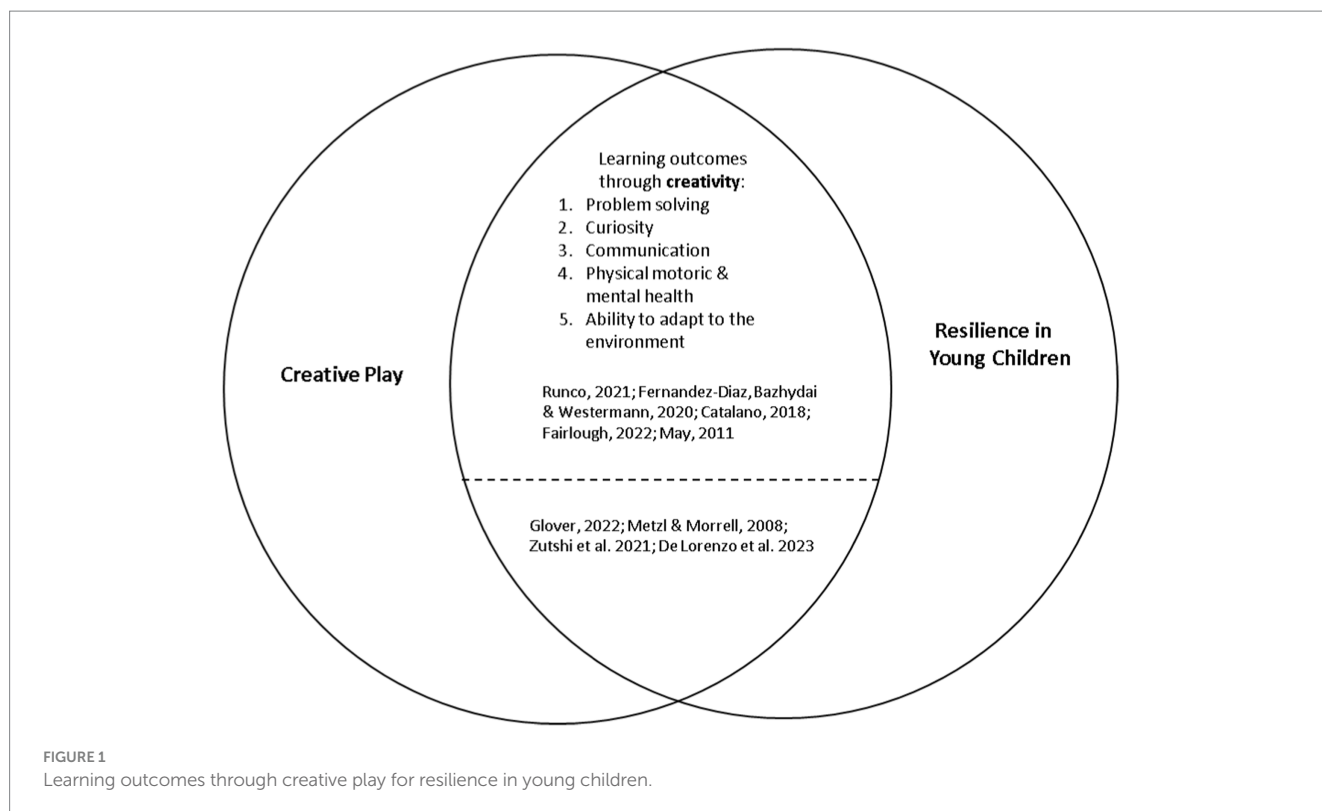
As the name suggests, creative play is an activity that involves children's creativity while playing (Wardhani and Kusumaningtyas, 2022). It is widely recognized that play and creativity are essential elements as integrated domains that impact early childhood learning and development (Avgitidou, 2016; Tee et al., 2017; Marsh et al., 2018). Woods et al. (1999) emphasized creativity in child-centered teaching. Creativity is closely related to problem-solving, curiosity, the ability to adapt to the environment, physical motor and mental health, and communication (May, 2011; Catalano, 2018; Bazhydai and Westermann, 2020; Fernández-Díaz et al., 2021; Runco, 2021; Fairclough, 2022). Therefore, creativity has a crucial relationship with resilience (Metzl and Morrell, 2008; Zutshi et al., 2021; Glover, 2022; De Lorenzo et al., 2023). Here, we classify and analyze literature about creative play and creativity in building resilience in young children (Figure 1).

Numerous strategic media options can build resilience in early childhood education. In this article, digital puzzles are a game tool to build resilience for young children, particularly beyond the COVID-19 pandemic. Zhang et al. (2023) revealed that there is literature documenting the surge in young children's use of digital media during the COVID-19 pandemic: digital puzzles are an appropriate play medium because they are digital based and have become familiar.

## Why are digital puzzles essential?

Play is never absent in human life, particularly among children. The activity of playing requires a game. According to a report by Whitebread et al. (2012) on the value of children's play, young children are highly motivated to make sense of their world when enjoying games. There are two types of games: digital games and non-digital games. Digital games refer to playing on computers, mobile or portable devices, or gaming, whereas non-digital games may involve physical interaction and tools.

Amidst the rapid technological advancements following COVID-19, various online tools foster resilience in young children, such as online board games, Ultaco games, and digital puzzles (Alexander et al., 2019; Fadlillah and Setyowahyudi, 2021; Maresch and Kampman, 2022; Wang et al., 2023). Our study outlines a new puzzle to promote resilience in the digital domain. As preschool teachers and parents utilize digital technology to enhance young children's learning capabilities (Iasha et al., 2018; Enochsson and Ribaeus, 2021; Sonnenschein et al., 2023), playing with the aid of digital technology is a significant part of early childhood education (Ethridge et al., 2022; Nurani et al., 2022). Innovation through play is essential in early childhood education (Fragkiadaki et al., 2021). Unexpectedly, the COVID-19 pandemic moved the learning process from face-to-face instruction to distance learning via technology utilization (Alvarez, 2020; Cardullo et al., 2021). This move caused substantial shock in early childhood education as children were unprepared for online education and its challenges (Munawaroh and Nurmalasari, 2021). Karta et al. (2022) discuss symptoms of depression in early childhood. They state that remote learning, family circumstances, and mental



resilience influenced resilience in young children. This fact caused confusion among teachers and parents to provide the best stimulation for young children (Muhdi and Yuliejantiningasih, 2020; Choudhury et al., 2022).

At the global level, several leading studies in creativity and developmental science have produced designs for play models based on digital technology to foster young children's curiosity, confidence, and resilience in dealing with the COVID-19 pandemic (Ernst and Burcak, 2019; Teichert et al., 2021; Burke et al., 2023). At the height of the pandemic, digital technology strengthened the skills young children need through play (Tonkin, 2019; Kauffmann et al., 2020; Lourenço et al., 2021). In this paper, 'digital technology' refers to physical devices (i.e., computers, tablets, and phones) and the software they run (i.e., games and apps). Digital puzzles are a new strategy in play that encourages social interaction and creative processes to solve problems, originality, and open-mindedness of young children (Tonéis, 2011; Eagle, 2012). It can be a valuable form of creative play for young children who are in vulnerable situations and may not have access to opportunities for face-to-face play due to the COVID-19 pandemic (Jennings, 2017).

For a long time, early childhood education has used puzzles as a learning medium (May, 2011; Syukur et al., 2020; Winarsunu et al., 2022). Puzzle games are popular and well-liked by young children due to their engaging nature. When puzzles first came into being, they were made primarily of wooden blocks that fit together (Van Delft and Botermans, 1995) and wooden bricks (May, 2011). Van Delft and Botermans argue that almost all living things tested their resilience with puzzles. For instance, in a classic experiment, they tested chimpanzees and were found to be efficient puzzle solvers after several confusing experiments (Van Delft and Botermans, 1995). The current use of puzzles is similar to that introduced by Martin Gardner. He

popularized recreational mathematics to appreciate the subject and highlighted the numerous links between mathematics, puzzles, and magic to enhance problem-solving skills (Morgan, 2008). LaBonte (2016) revealed the connection of Sudoku puzzles in a simple mathematics game with a magic square. According to him, Sudoku puzzles are an enjoyable way to fill the time. Their orderliness and organized nature make them particularly attractive. Sudoku can be a mental challenge and a satisfying accomplishment when completed. Learning how to solve puzzles is a great approach to stimulate creativity and to lay the foundation for young children to become effective problem solvers in real-life situations (Tudor-Hart, 1955; Costa, 2017). Engaging in puzzle-solving activities can offer various advantages. It can increase motivation, enhance the comprehension of concepts, promote creativity, and expand problem-solving capability and ability to engage and solve miscellaneous challenges from various perspectives (Jelle, 2017).

Beyond the COVID-19 pandemic, the educational process has changed and moved on to be adapted, requiring young children to overcome new learning challenges. Occasionally, it causes them anxiety issues and often gives rise to a conflict of emotions. Motor interactions and the sociocultural context of young children define the type of motor play suited (Gil-Madrona et al., 2020). Puzzles, one of the favorite motor games in early childhood education, can build fine motor and emotional skills when caregivers use time with puzzles wisely (May, 2011). Here, puzzles impact a child's physical skills, allowing them to develop fine motor skills through the coordination of small muscles. Young children with strong fine motor skills tend to find it easier to write, draw, and learn to play instruments. When a child completes a puzzle, they acquire many skills without realizing it. Puzzles enable a child to develop problem-solving skills on how to place a piece in the correct space, cognitive skills through



visual-spatial awareness, fine motor skills to learn how to grasp and pick up pieces in the proper order, and social skills by completing puzzles with peers (Aussie Childcare Network Team, 2022).

## Digital puzzles for resilience: the case of early childhood classrooms in Indonesia

In Indonesia, research and development of digital puzzles for children are increasingly being carried out, particularly before and after the COVID-19 pandemic (Kristianti et al., 2018; Maududi et al., 2018; Widyatmoko, 2019; Wathoni et al., 2021; Rizkiyah et al., 2022; Asmawati, 2023; Ramlah Abadi et al., 2023). Based on several of this research, we focused on research and development of digital puzzles to develop resilience in the context of early childhood education. Therefore, we only discuss research by Kristianti, Wathoni, and Asmawati.

Kristianti et al. (2018) conducted research and development of digital puzzles to understand learning behavior in young children. This research aimed to develop conditions for educational games so that emotional changes occur in young children after playing puzzles. Their study found that children's emotional resilience increased, becoming more relaxed and less aggressive, because this educational game focuses on recognizing objects in the environment by displaying automatically generated images that can adjust to the condition of aggressive or non-aggressive children. The expert system with forward chaining determines that the puzzle will automatically produce results according to the condition of young children, i.e., divided into young children with special needs and normal children; interests of young children are the flora and fauna, numbers, or incorporated over the three. In addition to that, this game needs the guidance of parents who know their children's condition. Specialized in young children with special needs, the game can only perform with an entire body (such as a hand that is not disabled) because it fully uses the touch of hands-on media tablets. Parents have a crucial role in choosing a game. The appropriate choice can help children to develop their cognitive ability. In several cases, children with special needs learn more slowly than children with average cognitive skills.

Wathoni et al. (2021) developed digital puzzles to improve visual-spatial abilities and religious character. Based on this study, digital puzzle provides visualization in animation adapted to the type of each prayer movement regularly based on three-dimensional image characters. The ability of young children to survive and rise when experiencing difficulties and failures in the orderly sequencing of each prayer movement is a process by which young children build their resilience. The results of their research show that visual-spatial stimulation promoted the ability to perceive image patterns and colors, and religious characteristics consist of values, moral feelings, and moral values of action through images of prayer movements.

Recently, Asmawati (2023) developed a digital puzzle based on the local wisdom of Banten culture. She found that digital puzzles improved the cognitive development of young children. Resilience in young children develops when children can solve problems when arranging the picture pieces into one mosque object and naming the order of the puzzle pieces 1–20. In the context of this research, digital puzzles are a series of activities that include problem-solving processes, religious character, and moral development.

## Discussion

Physical distancing restrictions due to the COVID-19 pandemic led to home confinement and school closures that encouraged online education and significantly reduced access to early learning and play opportunities (Chaabane et al., 2021; Dong, 2023). This change resulted in a significant shock to early childhood education as children were unprepared for online education and its challenges. This fact hurts child development (Jalongo, 2021). Trauma in early childhood, without protective buffering, can result in permanent changes to lower-level neural circuits that essentially embed the traumatic experiences into the functional architecture of the brain (Forkey et al., 2021). The evaluation of the Right to Play program reports that play can support children's healthy, resilient development when effectively facilitated (Right to Play UNESCO, 2018).

Based on the research findings of Kristianti, Wathoni, and Asmawati, the digital puzzle is an educative and fun learning medium that can develop resilience in young children by growing cognitive, emotional, and religious areas of development. Conway and McDonough found that emotional resilience during preschool relates to behavior problems and low levels of concurrent anxiety and depression in young children (Conway and McDonough, 2006). Apart from Conway and McDonough's study, numerous researchers have focused on understanding the role and relationship of emotional-behavioral resilience to anticipate and overcome anxiety and depression in young children (Bernard and Pires, 2006; Cabaj et al., 2014; Giallo et al., 2018), particularly after the COVID-19 pandemic (Pedrosa et al., 2020; Essler et al., 2023). Young children being religious impacts their emotions, resilience, and well-being (Edara et al., 2021). Wahyuningrum and Setiyani (2022) found a positive correlation between religiosity and resilience in COVID-19 survivors. According to their findings, religiosity is one component that encourages the development of resilience in young children. As stated by Asmawati, Tchombe examines resilient cultural practices informed by cultural values for cognitive development in socialization during early childhood within the learning pathways model. Tchombe revealed that resilient cultural practices build young children's resilience through multiple processes based on cultural beliefs and actions to help them develop appropriately against all odds. Resilient cultural practices include personal survival skills, responsible leadership, and morals (Tchombe, 2022).

Corresponding to the COVID-19 pandemic, digital puzzles can be a part of learning transformation and represent a type of creative play experience that uses a fun activity to improve the development of physical, mental, and cognitive abilities in young children (Wang et al., 2023). These games are enjoyable for young children, and by providing guidance and examples, they can develop cooperative social skills by working with their friends to arrange shapes and colors or apply logic (Nugraeny and Mukminin, 2019; Virawanti and Sugiarto., 2022). On the other hand, puzzles are a more solitary form of play, a pastime that adults and children relish for the same motives. They provide a challenge in themselves rather than against competitors, yet they promise enormous satisfaction when completed. Playing puzzles is often relaxing and a favorite to return to many times and is still fun (May, 2011).

Creative play through digital puzzles is a concept related to the theory of creativity by Vygotsky (2004), which states that all human beings, even the young, are creative and that creativity is the

foundation of art, science, and technology. In this challenging time, research and development of digital puzzles to increase resilience after the COVID-19 pandemic have become widespread in early childhood education in Indonesia. Young children become a priority for consideration of how all elements of education must be able to design innovative learning tools.

Recent developments in instructional design indicate tremendous research growth. Eileen Scanlon finds this fascinating for two reasons. First, the potential of new instructional design: teachers may facilitate their student's success. Second, teachers are under increased pressure to enhance student learning outcomes (Scanlon, 2021). As a benefit, the emergence of various research on digital puzzles as a creative play medium might provide teachers with understanding and opportunity to build innovative and interactive learning for young children's resilience to the effects of the COVID-19 pandemic. Over the past few years, researchers have embarked on systematic research efforts to develop theories and models to support research on technology integration in learning (Angeli et al., 2016). Thus, their statement corresponds with the utilization of digital puzzles in early childhood classrooms in today's digital era.

We propose combining the power of play as a pathway to build resilience and provide opportunities for young children to explore playing creatively after the COVID-19 pandemic. Creative play is pressing because distance learning during the COVID-19 pandemic has resulted in a learning loss effect for young children, making it difficult for them to adapt and demonstrate strong resilience. Digital puzzles offer a playful learning experience. Learning to deal with failure in puzzle games is a crucial component of resilience. We believe digital puzzles as a creative play medium can support young children in developing skills that will make them happier and more resilient in overcoming life's hardships. They can become individuals who successfully and

creatively reconstruct themselves after experiencing bad conditions due to the COVID-19 pandemic.

## Author contributions

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## 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.

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