

Cheng, C., Li, S., & Chen, S.: Evaluation of a multicomponent positive psychology program to prevent gaming disorder and enhance mental wellness in primary pupils: A randomized controlled trial. <https://doi.org/10.1556/2006.2024.00052>

Supplementary Materials

Program structure and features

The D.N.A. program encompassed four sessions, with each focusing on one of the four key modules of the P-A-G-E framework: psychological resilience, active coping, growth mindset, and emotion regulation (see Table 1 and Figure 2). Each session comprised animation clips that provided psychoeducation on the module's topic, mini-games that facilitated knowledge consolidation, badges and trophies that the participants could collect as reinforcement of their progress, and a collaborative pledge activity that encouraged the parents and children to set goals together to lead a balanced digital lifestyle.

These psychoeducational materials and activities were designed by drawing upon theories and empirical evidence highlighting the effectiveness of positive psychology interventions in enhancing learning outcomes (Csikszentmihalyi, 2008; Mendes de Oliveira et al., 2022). Specifically, animation clips and mini-games were developed to create an enjoyable and fun intervention environment, thereby attracting the participants' attention and promoting learning through positive emotions, which is an integral facet of positive psychology interventions (Carr et al., 2021; Shankland & Rosset, 2017). Psychoeducational information was presented through animation clips in a clear and engaging manner. After watching the animation clips, the participants engaged in mini-games that reinforced learning objectives. The participants were required to apply concepts learned in the animation clips when playing the mini games. These games were designed to both challenging and

achievable, aiming to instill a sense of flow among the participants and enhance their motivation to participate and successfully complete the modules (Nakamura & Csikszentmihályi, 2001). To foster a sense of achievement and progress, the participants collected badges and trophies for completing various activities and games in each module (Ahn et al., 2019).

To foster parent–child interaction, a pledge activity was included to encourage parents to actively contribute to cultivating healthy gaming habits in their children. The children could set goals and make a pledge together with their parents to foster a balanced digital lifestyle and responsible gaming practices. The pledge activity was designed to be a collaborative and interactive exercise in which parents and children could discuss their goals and aspirations for healthy gaming together. The participants were asked to share their goals and pledges with other participants in the intervention group, thereby fostering more extensive social support. By creating a caring social environment, the D.N.A. program aimed to cultivate positive attitudes toward gaming in the family and promote healthy and responsible gaming habits among all family members.

Measures

Psychological resilience. Psychological resilience was measured using the Child and Youth Resilience Measure-12 (Liebenberg et al., 2013), and the Chinese-translated version had been validated among Chinese youth (Mu & Hu, 2016). This self-report questionnaire assesses individual (e.g., personal skills), family (e.g., psychological caregiving), and contextual (e.g., culture) processes that enable individuals to cope with adversities and recover from challenging life events. The scale comprised 12 items, including a statement such as “*I have opportunities to develop skills that will be useful later in life.*” Participants rated each item on a 5-point Likert scale (1 = does not describe me at all, 5 = describes me a

lot). The composite score ranged from 12 to 60, with a higher score indicating a greater level of resilience.

Active coping. The active coping subscale of the Children's Coping Strategies Checklist-Revised (Ayers et al., 1996) was used in this study, and this coping checklist had been translated and validated among Chinese children (Zhang et al., 2022). Active coping involves the deliberate use of decision-making or problem-solving strategies to directly manage or change stressful events (Ayers et al., 1996). This subscale consisted of eight items, with a sample statement of "*When I have a problem, I try to make things better by changing what I do*". Participants rated each of these items on a 4-point Likert scale (1 = never, 4 = most of the time). The total score ranged from 8 to 32, and a higher score indicated greater deployment of active coping strategies to manage stress.

Growth mindset. The Growth Mindset Inventory (Dweck, 2006) was employed to determine the degree of growth mindset, and the Chinese version had been validated and found to demonstrate good psychometric properties among Chinese pupils (Zeng et al., 2016). The growth mindset subscale contained four items, with a sample statement being "*You can always substantially change how intelligent you are*". Participants rated on a 4-point Likert scale (1 = completely disagree, 4 = completely agree). The aggregated score ranged from 4 to 16, with a higher score indicating a greater tendency to exhibit a growth mindset.

Emotion regulation. Emotion regulation was assessed using the Emotion Regulation Questionnaire for Children and Adolescents (Gullone & Taffe, 2012), and this questionnaire had been translated into Chinese and had exhibited good reliability and validity among Chinese pupils (Gong et al., 2022; Liu et al., 2017). This questionnaire measured the deployment of emotion regulation strategies such as cognitive reappraisal and affective

suppression. It comprised 10 items, with a statement such as “When I am with my mother, I control my feelings by not showing them.” Participants rated each item on a 7-point Likert scale (1 = completely disagree, 7 = completely agree). The composite score ranged from 10 to 70, and a higher score indicated a greater use of emotion regulation strategies.

Symptoms of gaming disorder. The assessment of GD symptoms was conducted using the Korean Scale for Internet Addiction, the K-scale, which was specifically adapted for measuring GD symptoms according to the diagnostic criteria outlined in the DSM-5 (National Information Society Agency, 2014). This adapted scale was chosen due to its validation and suitability for assessing GD symptoms among Asian children and adolescents, and it has been widely utilized in previous Asian studies investigating various forms of information technology addiction (e.g., Jo et al., 2019; Koo et al., 2017; Mak et al., 2017; Tsui & Cheng, 2021). The scale consisted of 15 items, with a statement such as “After I am done playing video games, I want to play video games again.” Participants rate each item on a 4-point Likert scale (1 = strongly disagree, 4 = strongly agree). The composite scores ranged from 15 to 60, with a higher score indicating great severity of GD symptoms.

To classify participants into different groups based on GD symptom severity, we used a coding scheme that was validated in Hong Kong (Tsui & Cheng, 2021). Specifically, participants were categorized into three distinct groups: “average gamers” with scores of 40 or below, “at-risk gamers” with scores ranging from 41 to 43 inclusive, and “high-risk gamers” with scores of 44 or above. The coding procedures were automated using a SPSS macro program written by our research team to ensure consistent and efficient classification.

Positive and negative affect. The Positive and Negative Affect Scale for Children (Laurent et al., 1999) was used to assess both positive and negative affect, and the Chinese version had been validated among Chinese children (Pan et al., 2015). Positive affect was

measured using a subscale comprising 12 positive mood adjectives, and negative affect was measured using another subscale comprising 15 negative mood adjectives. The positive affect subscale includes mood adjectives such as “joyful” and “interested,” whereas the negative affect subscale includes mood adjectives such as “nervous” and “upset.” Participants rated the extent to which they experience each mood on a 5-point Likert scale (1 = very slightly or not at all, 5 = extremely). The aggregated score ranged from 12 to 60 and from 15 to 75 for the positive affect and the negative affect subscales, respectively. For both subscales, a higher score indicated a greater experience of the respective type of affect.