VR Painting as a School-Based Mental Health Support in Exam-Oriented Education Systems: A Narrative Review

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Abstract

Adolescents in examination-oriented education systems face substantial and persistent psychological stress, yet school-based mental health support often remains didactic, time-limited and stigmatizing. Virtual reality (VR) painting has recently emerged as a potentially engaging modality that combines immersive technology with creative expression, but its role in supporting student mental health is not yet theoretically or empirically clarified. This narrative review develops a conceptually coherent account of VR painting at the intersection of three strands of literature: (a) VR interventions for student and youth mental health, (b) creative VR artmaking and VR painting, and (c) school-based arts or art-therapy programmes targeting emotional well-being. Drawing on a structured but selective search of Scopus (2010 onwards) and a thematic synthesis across these strands, the review shows that VR-based mental health interventions can yield small to medium improvements in anxiety, depression and stress, while immersive VR artmaking supports positive affect, absorption and emotional self-expression. Evidence from arts-based and school-based programmes further suggests that creative activities can reduce internalising symptoms when they are well integrated into existing school structures. However, empirical research specifically on VR painting with secondary school students remains sparse, small-scale and heterogeneous. The review proposes an integrative mechanism framework—combining emotion regulation, expressive arts and self-determination theory—to explain how VR painting might alleviate stress, and argues that VR painting is best positioned as an embedded component of wider school provision rather than a stand-alone intervention. Finally, it outlines a research agenda for rigorous, context-sensitive trials in exam-driven secondary education systems, with particular relevance for psychology and education scholars working in East Asian school contexts.

Keywords: Virtual Reality, Vr Painting, Adolescent Mental Health, School-Based Intervention, Art Therapy, Emotion Regulation, Academic Stress

Introduction

Adolescence is a sensitive developmental period during which emotional, cognitive, and social systems are rapidly reorganized. Global estimates suggest that about one in seven adolescents lives with a diagnosable mental disorder, with depressive and anxiety disorders among the leading causes of years lived with disability in this age group (World Health Organization, 2021). Recent scoping work focused on China further indicates that child and adolescent mental health problems have become a major public health concern, while service resources remain limited and unevenly distributed (Luan et al., 2025).

In East Asian education systems, and particularly in mainland China, these vulnerabilities are amplified by long-standing exam-oriented cultures. Large-scale studies and reviews in China and internationally using instruments such as the Depression Anxiety Stress Scales (DASS-21) consistently find high rates of depressive, anxiety, and stress symptoms among secondary school students, with academic pressure emerging as one of the most robust predictors (Steare et al., 2023; Luan et al., 2025; Wang et al., 2022). A recent systematic review of academic pressure and adolescent mental health across high- and middle-income countries similarly shows that sustained exam-related stress is associated with greater odds of depression, anxiety, self-harm, and suicidal ideation (Steare et al., 2023).

Policy makers have begun to respond to this crisis. Since 2021, the "Double Reduction" policy and a series of school mental health initiatives have sought to reduce excessive homework, curb the out-of-school tutoring industry, and strengthen school-based mental health services (Wang et al., 2022; Qu et al., 2024; Shang et al., 2025). However, follow-up studies suggest that policy reforms have only partially relieved perceived pressure, and that school-based services are still constrained by large class sizes, limited specialist staff, and stigma around help seeking (Guo et al., 2023; Wang et al., 2022; Qu et al., 2024). There is therefore a pressing need for low-threshold, engaging, and scalable interventions that can be embedded into everyday school life in ways that complement, rather than replace, existing counselling and psychoeducation.

Non-pharmacological interventions occupy an important position in this landscape. A growing body of reviews shows that creative arts therapies, including visual art, music, and dance/movement therapy, can reduce symptoms of depression and anxiety and improve well-being in children and adolescents (Bokoch et al., 2025). At the same time, virtual reality (VR) technologies have developed rapidly and are now widely accessible in educational and clinical contexts. Meta-analyses and scoping reviews of VR-based interventions indicate small-to-moderate benefits for anxiety, depressive symptoms, and stress across a range of populations and settings (Zeng et al., 2023; Hubbard et al., 2025; Pedram et al., 2025).

Within this broader evidence base, VR "nature" environments and VR-supported relaxation exercises are particularly relevant to adolescent stress. Randomized trials show that short VR sessions depicting restorative natural scenes can reduce subjective stress, negative affect, and physiological arousal in students and other non-clinical samples (Browning et al., 2023; Ma et al., 2025; Turoń-Skrzypińska et al., 2023). These effects are frequently interpreted through Stress Recovery Theory and Attention Restoration Theory, which propose that natural environments facilitate rapid affective recovery and replenish depleted attentional

resources (Ulrich et al., 1991; Kaplan, 1995), as well as the broaden-and-build theory of positive emotions (Fredrickson, 2001).

A more recent line of work brings together art therapy and VR. Building on decades of research demonstrating that visual art making can support emotional regulation, meaning making, and social connectedness (Eisenberg et al., 2010; Compas et al., 2017), VR art therapy studies explore how immersive, three-dimensional creative tools might expand the expressive and regulatory possibilities of traditional art therapy (Kaimal et al., 2019; Hacmun et al., 2018; Hadjipanayi et al., 2023). Qualitative and mixed-methods findings suggest that VR-based art making can elicit a sense of play, mastery, and embodied agency that may be particularly attractive to digitally native adolescents (Hacmun et al., 2021; Shamri-Zeevi, 2021).

Against this background, VR painting art can be understood as a promising but still under-examined intersection of art therapy, immersive media, and school-based mental health promotion. Guided by contemporary models of emotion regulation and motivation (Aldao et al., 2010; Ryan & Deci, 2000), this narrative review focuses on how VR painting environments may help Chinese high school students manage psychological stress linked to exam pressure and daily school life. For this purpose, the review addresses three primary objectives. **First**, it synthesizes evidence on VR-based interventions for anxiety, depression, and stress in young people. Second, it traces the evolution from traditional art therapy to VR painting art. **Third**, it situates VR painting art within the specific stress ecology of Chinese senior high schools and discusses implications for school-based mental health strategies.

Literature Review
Virtual Reality–Based Interventions for Adolescent Anxiety, Depression, and Stress
VR is typically defined as an interactive, computer-generated environment that affords high levels of sensory immersion and a strong subjective sense of "being there." In mental health research, VR has been used both as a delivery channel for established interventions (e.g., exposure therapy, relaxation, cognitive-behavioural protocols) and as a novel experiential medium (e.g., immersive nature, meditative worlds). Several recent meta-analyses and scoping reviews converge in suggesting that VR-based interventions yield small-to-moderate reductions in anxiety, depressive symptoms, and stress across clinical and non-clinical populations (Zeng et al., 2023; Hubbard et al., 2025; Pedram et al., 2025).

Zeng and colleagues' (2023) meta-analysis of randomized and quasi-experimental trials involving individuals with anxiety and depression found that VR interventions produced significant improvements relative to control conditions, with effects comparable to those reported for in vivo exposure and traditional relaxation training. Hubbard et al. (2025) specifically synthesised trials of VR nature interventions for higher education students and reported consistent benefits for stress, negative affect, and perceived restoration. Complementary work has documented positive effects of VR-enhanced exercise, mindfulness, and psychoeducation on mood and anxiety outcomes (Browning et al., 2023; Turoń-Skrzypińska et al., 2023).

The evidence base focusing on adolescents and young adults is still developing but broadly aligns with these patterns. Pu et al. (2025) reviewed VR interventions targeting depressive

symptoms in adolescents and young adults and concluded that VR-based protocols are generally acceptable, safe, and capable of producing clinically meaningful symptom reductions, though most studies had small samples and short follow-up periods. Individual randomized trials have shown that brief VR "green space" experiences can reduce momentary stress and increase positive affect among university students (Browning et al., 2023; Ma et al., 2025), and that VR-enhanced relaxation can improve mood in adolescents receiving inpatient psychiatric care (Turoń-Skrzypińska et al., 2023).

Several mechanisms have been proposed to explain how VR exerts these effects. From a psychophysiological perspective, immersion and presence may facilitate rapid down-regulation of autonomic arousal by simulating safe, predictable environments that are rich in soft fascination—a core element in Attention Restoration Theory (Kaplan, 1995; Ulrich et al., 1991). From a cognitive–emotional standpoint, VR can scaffold adaptive emotion-regulation strategies, such as situational modification, attentional deployment, and cognitive reappraisal (Aldao et al., 2010; Compas et al., 2017). VR's interactivity and sense of agency may also enhance intrinsic motivation and engagement, consistent with self-determination theory, which emphasizes the role of autonomy, competence, and relatedness in sustaining behaviour change (Ryan & Deci, 2000).

At the same time, current evidence has important limitations when considered from the vantage point of Chinese high school settings. Most VR mental health trials have been conducted in high-income countries, with relatively small numbers of participants and short-term outcomes (Zeng et al., 2023; Hubbard et al., 2025). School-based trials in low- and middle-income contexts remain scarce, and few studies have explicitly targeted exam-related stress or integrated VR into routine school timetables. These gaps underline the need to examine more closely how VR can be combined with developmentally appropriate, culturally grounded activities—such as visual art making—to address the specific stressors faced by Chinese adolescents.

From traditional Art Therapy to VR Painting Art
Visual art therapy has a long history as a complementary or alternative approach to supporting mental health. Across diverse populations, art therapy and structured art-making programmes have been shown to reduce distress, support emotional processing, and enhance resilience, often through non-verbal channels that are particularly valuable for young people who struggle to articulate their emotions in words (Eisenberg et al., 2010; Bokoch et al., 2025). Contemporary theoretical models integrate psychodynamic, humanistic, and cognitive–behavioural perspectives, and increasingly draw on neuroscience to explain how sensorimotor, affective, and cognitive networks interact during art making (King & Kaimal, 2019; Malhotra et al., 2024; Strang, 2024).

Neuroscience-informed work suggests that different art materials and instructions engage distinct patterns of brain activity and psychological experience. For example, Pénzes et al. (2023) used quantitative electroencephalography to show that variations in art materials and task structure modulate neural oscillations associated with attention, emotion, and sensorimotor processing during art making. Malhotra and colleagues (2024) proposed a conceptual framework linking art therapy for post-traumatic stress disorder (PTSD) to functional changes within large-scale brain networks. Strang (2024) highlights both the

promise and limits of such neuro-based explanations, arguing that they should be integrated with phenomenological accounts of clients' subjective experiences rather than treated as standalone mechanisms.

VR-based art therapy emerges at the intersection of these traditions with immersive media. In a pioneering qualitative pilot study, Kaimal et al. (2019) invited adults to create artworks in a three-dimensional VR painting environment and found that participants described heightened feelings of playfulness, curiosity, and freedom compared with traditional media, alongside occasional discomfort linked to technical challenges or motion sickness. A subsequent experiment by Kaimal et al. (2020) combined VR drawing with olfactory stimulation and found that VR-based visual self-expression could reduce self-reported stress and, in some cases, modulate physiological indicators, pointing to the potential of multi-sensory VR art experiences.

Other empirical work has examined VR art therapy from the standpoint of clinical practice and programme design. Hacmun et al. (2018) outlined core principles for translating art therapy processes into VR, emphasizing issues such as embodiment, control over the environment, and the symbolic meaning of digital materials. In a later qualitative study, Hacmun et al. (2021) interviewed expert art therapists about their experiences using VR in practice and identified perceived advantages—such as expanded spatial possibilities and novel forms of self-representation—alongside concerns about technical access, training, and overstimulation. A scoping review by Hadjipanayi et al. (2023) synthesised available studies and concluded that VR art therapy can enhance engagement and self-expression in diverse groups, but that rigorous controlled trials are still rare.

With adolescents specifically, Shamri-Zeevi (2021) described how VR was integrated into group art therapy with teenagers, reporting that the technology increased participation and offered new ways to explore identity, relationships, and future-oriented hopes. In the Chinese context, Li (2022) reported early clinical psychology work using VR-supported expressive art therapy, suggesting that VR can lower barriers to participation in group-based interventions and resonate with young people who are already familiar with digital drawing and gaming environments.

Taken together, these studies indicate that VR painting art inherits many of the benefits of traditional art therapy—non-verbal expression, symbolic exploration, opportunities for mastery—while adding distinctive affordances rooted in immersion, embodiment, and playful experimentation. From a theoretical perspective, VR painting can be conceptualised as a context that supports adaptive emotion regulation (e.g., distraction, reappraisal, acceptance), fosters positive emotions that broaden attentional scope (Fredrickson, 2001), and satisfies basic psychological needs for autonomy and competence (Ryan & Deci, 2000). These characteristics make VR painting a plausible candidate for mitigating school-related psychological stress, particularly in settings where verbal psychotherapy is difficult to scale.

Situating VR Painting art within China's Exam-Oriented Stress Ecology
To assess the potential role of VR painting art in relieving psychological stress among Chinese high school students, it is essential to consider the broader structural and cultural context that shapes adolescents' daily experience. Chinese secondary education remains strongly

exam-oriented, with the National College Entrance Examination (gaokao) exerting powerful influence over school curricula, teacher evaluation, and family expectations. Empirical studies consistently link academic stress, long study hours, and high parental expectations to elevated levels of depression, anxiety, and suicidal ideation among Chinese adolescents (Steare et al., 2023; Wang et al., 2022; Luan et al., 2025).

In response to these concerns, the Chinese government has launched several major initiatives to reform basic education and strengthen student mental health. The 2021 "Double Reduction" policy formally aims to reduce homework and off-campus tutoring burdens for students in compulsory education, thereby alleviating excessive academic pressure and promoting more holistic development (Wang et al., 2022). Follow-up evaluations indicate that while the policy has reduced some forms of shadow education and evening homework, many students continue to experience high levels of internalised pressure, and new forms of competition (e.g., interest classes, informal tutoring) have emerged (Cao, 2025; Wang et al., 2022).

Parallel reforms focus on school-based mental health services. Qu et al. (2024) reviewed prevention and intervention strategies in Mainland China and concluded that the volume of school mental health research has increased sharply since 2021, but that programmes remain unevenly distributed and often rely on small-scale projects initiated by enthusiastic teachers or external partners. Shang et al. (2025) further highlight systemic challenges to integrating mental health education into everyday school life, including limited time in crowded timetables, a shortage of trained staff, and persistent stigma surrounding mental illness. At the same time, promising models—such as school-based psychosocial group interventions in rural areas (Guo et al., 2023) and gatekeeper training for suicide prevention (Qu et al., 2024)—demonstrate that structured, curriculum-linked programmes can be implemented when institutional support is present.

Within this evolving policy and practice environment, aesthetic and arts-based approaches are beginning to gain recognition but remain underutilized compared with cognitive–behavioural and psychoeducational programmes. Luan et al. (2025) note that most documented school-based interventions in China focus on didactic mental health education, social skills training, or resilience-building workshops, with relatively few explicitly using creative arts as the primary medium. This gap is striking given international evidence that art-based interventions can engage students who are reluctant to join verbally focused counselling, provide culturally resonant channels for emotion expression, and be adapted for group delivery within ordinary classrooms (Bokoch et al., 2025).

VR painting art is well positioned to address several of these structural and cultural challenges. First, it offers a non-verbal, low-stigma activity that can be framed as part of arts or technology education rather than as "mental health treatment," which may reduce barriers associated with help-seeking stigma. Second, VR painting sessions can be designed as brief, structured modules (e.g., 15–20 minutes) that fit within existing class periods or after-school activities, aligning with calls for time-efficient interventions in busy school schedules (Qu et al., 2024; Shang et al., 2025). Third, by combining elements of play, mastery, and peer sharing, VR painting may support adaptive coping and positive peer norms around stress management

in ways that resonate with adolescents' everyday digital practices (Kaimal et al., 2019; Hacmun et al., 2021).

Finally, embedding VR painting art within the broader school mental health system in China aligns with current policy directions that emphasise multi-level, multi-modal approaches to youth mental health (Luan et al., 2025; National Health Commission of the People's Republic of China, 2025). For example, brief VR painting modules could complement universal mental health education by providing experiential practice in emotion regulation, or be integrated into targeted support for students identified as at risk through screening or teacher referral. In this sense, VR painting art is not a stand-alone solution but a potentially valuable component within an emerging ecosystem of school-based mental health promotion, particularly in high-pressure academic environments such as Guangzhou's senior high schools.

Method

Review Design and Positioning

This paper adopts a narrative review design rather than a fully systematic review or meta-analysis. The aim is to develop a conceptually coherent overview that connects three partially overlapping bodies of work: (a) VR interventions targeting mental health outcomes in students and young people; (b) VR-based artmaking, especially VR drawing and painting; and (c) school-based arts or art-therapy programmes relevant to psychological stress and emotional well-being. Within the typology of review types, this review is best described as a non-systematic, narrative synthesis focused on integrating diverse quantitative, qualitative, and conceptual contributions around a clearly defined set of questions.

Given this aim, we sought to follow current recommendations for conducting narrative reviews in a transparent way—by clearly describing the search strategy, eligibility criteria, and synthesis approach—while acknowledging that the review is selective rather than exhaustive and does not include a formal risk-of-bias assessment or quantitative pooling of effect sizes (Baethge et al., 2019; Ferrari, 2015; Grant & Booth, 2009). The emphasis is on conceptual integration and theory-informed interpretation of existing work, rather than on estimating pooled effect sizes or cataloguing every eligible study.

Information Sources and Search Strategy

The primary information source for this review was the Scopus database, which covers a wide range of journals in education, psychology, computer science, and the arts and is widely used as a starting point for narrative and scoping reviews in multidisciplinary fields (Grant & Booth, 2009). Searches were conducted in 2025 and targeted publications from 2010 onwards, a period that roughly corresponds to the broader uptake of contemporary head-mounted VR systems and commercially available VR painting tools.

To structure the search, we used three broad blocks of keywords corresponding to the three strands of interest:

1. **VR × student/youth mental health (block A):** combining terms such as "virtual reality" with population terms (student, adolescent, youth) and mental health outcomes (mental health, stress, anxiety, depression, well-being).
2. **VR art / VR drawing or painting (block B):** combining "virtual reality" with art-related terms such as art, arts-based, creative, painting, drawing, sculpting, art therapy, together with emotion- and stress-related words.
3. **School-based art / art therapy and mental health (block C):** using terms such as art therapy, arts therapies, art-based, creative arts together with school, school-based, classroom and mental health, well-being, stress, anxiety, or depression.

Within each block, search strings were adapted iteratively to balance recall and precision. This involved refining combinations of keywords, checking the yield against known sentinel papers, and broadening or narrowing terms when initial results were too sparse or dominated by clearly irrelevant records. No formal language limits were imposed at the search stage, but in practice the vast majority of relevant records were in English. We did not attempt to systematically search additional databases such as PubMed, PsycINFO, or ERIC; instead, backward citation chasing and author-name searches were used to locate key related works once core articles and reviews had been identified in Scopus. This approach is consistent with guidance that, for narrative reviews, conceptual saturation and clarity of the search strategy can be prioritised over exhaustive multi-database coverage (Ferrari, 2015; Grant & Booth, 2009).

Eligibility Criteria
Eligibility criteria were defined separately for the three strands, but with shared core elements:

- **Population:** We focused on studies involving children, adolescents, and young adults in education-related age ranges (approximately 10–25 years). For VR art/VR painting studies (block B), we also included work with adult samples when the mechanisms or experiences were judged to be conceptually relevant to youth and school contexts (for example, studies that examined emotional regulation or stress responses to VR artmaking in adults).
- **Intervention/exposure:** For block A, eligible studies had to include an intervention, activity, or exposure delivered through immersive or semi-immersive VR with at least one mental health–related outcome such as stress, anxiety, depression, mood, affect, well-being, or closely related constructs. For block B, eligible studies had to involve creative VR artmaking—such as drawing, painting, sculpting, or constructing visual scenes in VR—either as a therapeutic activity, an experimental task, or a creative experience. Studies in which participants only viewed VR content without creating their own artwork were excluded from this strand. For block C, eligible studies involved arts-based or art-therapy activities in school or school-related settings where mental health or emotional well-being outcomes were reported.
- **Outcomes:** We included studies that reported at least one of the following: quantitative indicators of psychological stress, anxiety, depression, mood, or well-being; qualitative or mixed-methods data on emotional experience, coping, self-expression, or perceived psychological impact; or, for conceptual/theoretical papers and reviews, explicit discussion of mechanisms or rationales linking VR (or art/arts-based practice) to mental health or stress relief.

- **Study types:** We considered a broad range of designs, including randomised controlled trials, quasi-experiments, pre–post studies without control groups, qualitative and mixed-methods studies, and narrative or scoping reviews. Purely technical papers (e.g. describing VR rendering algorithms without user data), editorials, and conference abstracts without sufficient methodological detail were excluded. Conceptual or review papers were retained when they offered frameworks or syntheses directly relevant to the questions of how VR and/or art-based approaches might influence psychological stress and emotional regulation.

Study Selection and Screening
Search results from each block were exported from Scopus and screened in two stages. First, titles and abstracts were read to remove clearly irrelevant records—for example, VR for surgical training or engineering education without psychological outcomes, or generic art education papers with no explicit mental health component. For block B, we retained studies that explicitly mentioned artmaking, drawing, painting, or creative visual expression in VR.
Second, for potentially relevant records, full texts were consulted (where accessible) to confirm that the study met the population, intervention/exposure, outcome, and study-type criteria described above. At this stage, we also identified highly relevant reviews and conceptual papers that could help frame the narrative synthesis, even if they did not fit all empirical eligibility criteria.

Because this review is narrative and selective, we did not attempt to document the full PRISMA-style flow of records with exact numbers at each stage, and we did not seek to identify every single eligible study. Instead, the aim of screening was to assemble a coherent, conceptually representative set of studies within each strand, with particular emphasis on high-level evidence in block A, key empirical and conceptual work on VR art/VR painting in block B, and illustrative examples of school-based arts or art-therapy programmes in block C. This positioning aligns with recent arguments that narrative reviews can be rigorous and useful when their selection logic and inclusion boundaries are made explicit, even if they are not exhaustive in the systematic-review sense (Baethge et al., 2019; Ferrari, 2015).

Data Extraction and Narrative Synthesis
We did not perform formal data extraction into standardized tables with effect sizes. Instead, we adopted a thematic, question-driven approach to synthesis. From block A, we extracted information on populations, VR intervention types, and mental health outcomes, and focused on what is known about VR's overall potential and limitations in supporting student and youth mental health. From block B, we concentrated on the affordances and experiential qualities of VR artmaking, reported emotional or stress-related effects of VR drawing and painting, and how these have been conceptualised in relation to art therapy, creativity, and well-being. From block C, we drew out the key features of school-based arts and arts-therapy interventions targeting emotional well-being or stress, in order to understand how arts-based approaches are practically embedded in school life.

Across these strands, findings were then organized into three integrative sections: (1) an overview of VR interventions for student and youth mental health; (2) a synthesis of evidence on VR creative art and VR painting in relation to emotional experience and stress; and (3) a discussion of implications for school-based practice, particularly in exam-driven secondary

education contexts. Our narrative synthesis was informed by methodological guidance that emphasizes theory development, structured comparison across studies, exploration of relationships within and between strands, and explicit reflection on the robustness of the synthesis (Popay et al., 2006; Rai et al., 2020). No formal risk-of-bias tool or quality-rating scale was applied. Instead, when discussing individual studies or groups of studies, we qualitatively noted major limitations such as small sample sizes, lack of control groups, short follow-up periods, or restricted ecological validity, and we deliberately avoided making causal claims or generalisations that went beyond what the underlying studies justified.

Discussion

Overview of Main Findings

This narrative review brought together three strands of literature: VR interventions for student and youth mental health, creative VR artmaking and VR painting, and school-based arts or art-therapy activities relevant to emotional well-being. Across these strands, several points emerge. First, multiple systematic reviews and meta-analyses indicate that VR-based interventions can produce small to medium beneficial effects on anxiety, depression, stress and related outcomes, although estimates vary by population, setting and comparison condition (Baghaei et al., 2021; Fodor et al., 2018; Jerdan et al., 2018; Wiebe et al., 2022). However, studies are methodologically heterogeneous, sample sizes are often modest and long-term effects—especially in non-clinical youth populations—remain largely unknown (Jerdan et al., 2018).

Second, a growing body of exploratory work suggests that immersive VR artmaking, including VR painting tools, offers distinctive affordances for emotional expression, enjoyment and short-term stress relief, and is feasible and acceptable in both clinical and educational contexts (Hacmun et al., 2021; Kaimal et al., 2020; Yap & Lee, 2024). These studies report experiences of absorption, playfulness, a sense of "being there" in the artwork and perceived emotional release, but most involve small samples, pilot designs or expert informants, limiting the strength of causal inferences.

Third, when viewed from the perspective of everyday school life in examination-driven systems, VR painting can be read alongside evidence on arts-based and school-based mental health programmes more broadly. Systematic reviews indicate that art therapy and arts-based interventions can yield meaningful reductions in symptoms such as anxiety and depression among children and adolescents, while also highlighting the need for more rigorous, controlled designs (Braito et al., 2022; Zhang et al., 2024; Zhang et al., 2025). Parallel meta-analyses of school-based mental health interventions suggest that universal programmes typically achieve small effects on internalising symptoms, and that implementation quality and contextual fit are critical (Feiss et al., 2019; Werner-Seidler et al., 2017; Hayes et al., 2025; Lekamge et al., 2025).

Taken together, these observations support a cautious conclusion: VR painting is best understood at present as a promising direction for future school-based research and innovation, rather than as an already validated intervention. It appears to align with several practical needs in exam-oriented schools—such as engaging students, offering low-stigma forms of emotional expression and integrating with existing curricula—but robust evidence on its specific mental health impact in secondary school contexts is still largely absent.

Theoretical Implications: From Immersive Creation to Emotion Regulation
From a theoretical standpoint, the potential of VR painting to support emotion regulation and stress relief can be interpreted through several established lenses. Emotion regulation and positive psychology perspectives emphasise that frequent experiences of positive affect and engagement can buffer the impact of chronic stress and support psychological resilience (Fredrickson, 2001; Gross, 2015). Immersive VR painting sessions may function as short "psychological breathing spaces" in which students temporarily disengage from persistent stressors—such as exams and peer comparison—while experiencing curiosity, enjoyment and a sense of absorption or flow. Such episodes of positive engagement have been linked to improved coping and broader emotion regulation capacity (Aldao et al., 2010; Compas et al., 2017).

Expressive arts and art therapy frameworks highlight the importance of symbolic representation and aesthetic distance in processing difficult experiences. Drawing and painting allow individuals to externalise feelings and narratives in a form that is both tangible and modifiable, which can support reflection and integration over time (Van Lith, 2016; Braito et al., 2022). VR painting extends this by enabling three-dimensional, embodied engagement with symbolic environments: students can step into their images, move around them and reconfigure them, potentially generating new perspectives on stressful or overwhelming experiences (Hacmun et al., 2021; Kaimal et al., 2020). Such embodied symbolic activity may support the integration of cognitive, emotional and bodily aspects of stress.

Self-determination theory and related motivational theories provide a further lens. VR painting can plausibly satisfy basic psychological needs for autonomy (freedom to choose themes, pace and modes of expression), competence (rapid access to visually impactful results using accessible tools) and relatedness (sharing and co-creating with peers), which are strongly associated with well-being and intrinsic motivation (Ryan & Deci, 2000, 2002). In contrast to didactic mental health education, which may be experienced as imposed or stigmatising, VR painting is more likely to be perceived as an activity that one chooses and shapes. While current empirical evidence is insufficient to formalise a complete "VR painting–emotion regulation" theory, the recurring mechanisms identified across VR mental health, VR artmaking and art therapy studies provide a useful starting point for future theory-building and hypothesis testing.

Taken together, these strands can be synthesised into an integrative framework that positions VR painting as a mediating process between exam-oriented school stressors and students' psychological outcomes. As shown in Figure 1, the model foregrounds three partially overlapping pathways—emotion regulation, expressive arts, and basic psychological needs satisfaction—that jointly contribute to reduced exam-related psychological stress and improved emotional well-being.

Figure 1 An Integrative Frameworof of VR Painting for Stress Regulation in Exam-Oriented School Contexts
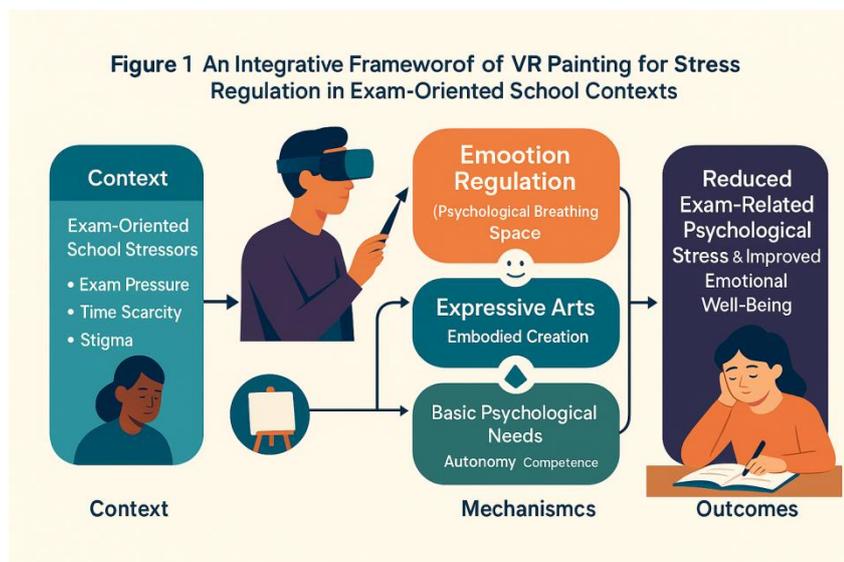
Note. VR painting is conceptualised as a mediating process between exam-oriented school stressors and students' psychological outcomes, operating through three partially overlapping pathways: emotion regulation, expressive arts, and basic psychological needs satisfaction.

Implications for School Practice: VR Painting as an Embedded Support Pathway
In terms of school practice, the reviewed evidence and contextual analysis suggest that VR painting is most realistically positioned as an embedded activity within broader educational and pastoral frameworks, rather than as a stand-alone therapeutic programme. This positioning is consistent with broader findings that school-based mental health support tends to be more effective and sustainable when integrated with existing structures rather than added as isolated, time-limited projects (Feiss et al., 2019; Lekamge et al., 2025; Werner-Seidler et al., 2017).

One possibility is to integrate VR painting into existing mental health education weeks, theme days or class meetings as short workshop-style sessions focused on topics such as "mapping my stress," "imagining my safe space" or "future self." In such formats, VR painting can function as a structured experiential component that naturally leads into guided discussion and reflection, paralleling arts-based psychoeducational approaches that have shown promise for adolescent depression and anxiety in other contexts (Osborn et al., 2023; Martínez-Vérez et al., 2024).

A second possibility is to offer VR painting as a group activity within school counselling or student support centres, aimed at students who experience elevated stress or emotional difficulties but may not meet diagnostic thresholds. Evidence from art therapy and arts psychotherapies indicates that such group-based creative interventions can provide relational support, reduce internalising symptoms and improve engagement for young people with mental health difficulties, particularly when delivered in youth-friendly environments (Braito et al., 2022; Melvin et al., 2025; Versitano et al., 2025). Repeated sessions of collaborative or parallel VR artmaking, followed by sharing and discussion, could thus help build a sense of community and provide an intermediate level of support between universal mental health education and individual counselling.

Third, VR painting can be incorporated into art courses or cross-curricular projects that combine art, technology and well-being themes. Projects focused on school culture, local heritage or imagined futures can simultaneously address artistic learning goals and create spaces for students to reflect on and express their emotional experiences. In this guise, VR painting functions as "implicit" mental health support rather than an explicit intervention, which may improve acceptability among students and parents and is consistent with broader calls to embed social and emotional learning within academic and creative curricula (Clarke et al., 2021; Hayes et al., 2025).

Any attempt to implement VR painting in schools must, however, take seriously the practical and ethical constraints documented in the wider VR and digital mental health literature. Hardware acquisition and maintenance require resources; teachers and counsellors need training in both technical use and facilitation; and clear guidelines are needed for session length, content selection and supervision to reduce risks such as cybersickness, visual strain or emotional overwhelm (Jerdan et al., 2018; Wiebe et al., 2022). In highly exam-focused secondary schools, there is also a risk that VR activities are perceived as distractions from core academic work. Realistically, VR painting is therefore likely to begin as small-scale pilots tied closely to existing curricula or programmes, with careful evaluation of feasibility, acceptability and potential benefits.

Limitations and Future Directions
Several limitations of this review need to be acknowledged. First, the review was designed as a narrative synthesis rather than a systematic review or formal scoping review. Although we sought to make the search and selection process transparent, we relied primarily on a single database, did not generate a PRISMA-style flow diagram and did not apply standardised risk-of-bias tools. In this sense, the review aligns with contemporary recommendations for narrative reviews—emphasising clarity about scope, search strategy and synthesis—while falling short of the more formal quality criteria proposed in tools such as SANRA (Baethge et al., 2019; Ferrari, 2015; Grant & Booth, 2009; Popay et al., 2006). The resulting body of literature should therefore be understood as conceptually representative rather than exhaustive.

Second, the evidence base on VR creative work and VR painting remains limited and heterogeneous. Most studies involve small samples, short-term interventions and diverse designs, with few rigorous control conditions and almost no long-term follow-up; many practice-oriented reports lack formal research design (Baghaei et al., 2021; Hacmun et al., 2021; Kaimal et al., 2020). As a result, this review can only describe associations between VR painting and emotional or stress-related outcomes and cannot make strong causal claims.
Third, our analysis of school settings and, in particular, of exam-driven secondary education contexts, combines empirical findings from education and psychology with reasoned interpretation based on professional experience. We have attempted to distinguish clearly between evidence-based statements and contextual extrapolations, but these extrapolations remain hypotheses that require empirical testing, especially in specific national contexts such as Chinese high schools.

Future research can build on this review in several ways. One priority is to conduct more rigorous empirical studies in real school environments, ideally using randomised or quasi-

experimental designs at the class or grade level to compare combinations such as "VR painting plus standard mental health education" versus standard education alone. These studies should track not only short-term changes in stress, anxiety and well-being but also medium-term outcomes and patterns of engagement, drawing on lessons from school-based mental health trials and arts-based interventions (Feiss et al., 2019; Hayes et al., 2025; Osborn et al., 2023; Zhang et al., 2024). A second priority is to integrate quantitative and qualitative methods, combining validated scales with interviews, observations and analyses of students' artworks to gain a richer understanding of experience and context.

A third direction is to refine and test theoretical models of how VR painting may influence emotion regulation and stress, drawing explicitly on mechanisms such as immersive disengagement from stressors, symbolic expression, embodied experience and the satisfaction of basic psychological needs (Fredrickson, 2001; Gross, 2015; Ryan & Deci, 2000). Finally, there is a need for systematic work on ethical and safety issues, including usage frequency and duration, physical side effects, the handling of potentially distressing content and the perspectives of parents, teachers and school leaders on VR-based activities, in line with the broader VR mental health literature (Jerdan et al., 2018; Wiebe et al., 2022). Only through such careful, context-sensitive research can VR painting move from being a novel technology to a robust, evidence-informed tool for supporting student mental health.

Conclusion
This narrative review examined the emerging intersection between virtual reality (VR) painting, adolescent mental health and school-based practice. By bringing together evidence on VR interventions for youth mental health, research and theory on creative VR artmaking, and studies of arts-based and school-based mental health programmes, the review suggests that VR painting holds genuine promise as a novel modality for supporting students' emotional well-being and stress regulation. At the same time, the existing empirical base is still preliminary, fragmented and heavily weighted towards small-scale, exploratory work, meaning that VR painting should be viewed as an opportunity for future research and practice development rather than as a fully validated intervention.

Conceptually, the review clarifies why VR painting may be particularly suited to exam-driven secondary education systems. Immersive, interactive painting in VR can create short but intense episodes of positive engagement and absorption; it affords rich symbolic expression and embodied reconfiguration of stressful experiences; and it can satisfy basic psychological needs for autonomy, competence and relatedness in ways that feel less stigmatising than traditional mental health education. Framing VR painting through theories of emotion regulation, expressive arts and self-determination provides a coherent set of mechanisms that future studies can explicitly test, rather than treating VR simply as an attractive but theoretically vague technology.

Practically, the review argues that VR painting is best understood as an embedded pathway within broader school systems and policies. The most realistic near-term applications are likely to be structured VR painting sessions integrated into mental health education activities, group-based workshops in school counselling services, and projects within art or cross-curricular courses that combine creativity, technology and well-being themes. For schools operating under high academic pressure—such as those in examination-oriented contexts—

these embedded formats may offer a feasible way to expand students' emotional "space to breathe" without undermining core academic priorities, provided that issues of access, teacher training, safety and parental acceptance are addressed.

For researchers, the review identifies a clear agenda: rigorous, context-sensitive studies in real school environments that compare VR painting plus standard provision with standard provision alone; mixed-methods designs that capture both quantitative changes in stress and well-being and qualitative accounts of students' lived experiences; and theory-driven investigations of the mechanisms linking VR painting to emotion regulation. For practitioners and policymakers, the key message is one of cautious optimism. VR painting is not a quick solution to the complex challenges of adolescent mental health in exam-focused systems, but it represents a theoretically grounded, developmentally appropriate and potentially engaging medium through which schools can begin to diversify how they support students' psychological well-being. If developed and evaluated carefully, VR painting could evolve from a novel technology into a meaningful component of comprehensive, school-based mental health support.

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