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The Role of School Music Education in Supporting Adolescent Mental Health: The Potential of Digital Technology

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Abstract. Adolescence is a critical stage in which psychological and social relationships and self-identity are rapidly formed. Under the stresses of academics and identity, the detection rate of adolescent mental health problems has shown an increase. As a major and important setting for adolescence, school shoulders key responsibility for preventing mental health problems and offering psychological support. Under the aforementioned background, this paper will focus on how school music education may support adolescent mental health, comprehensively analyzing empirical studies and review literature concerning adolescent mental health, school music education, digital music education, etc., and further probing how digital technology may expand the forms and functions of traditional music education. Existing research suggests that school music education may support adolescent mental health in several ways, including emotional expression and regulation and the strengthening of social connections. Because digital technology offers immediacy, interactivity, personalization, and shareability, it has increasingly been integrated into traditional music teaching and has become an emerging instructional approach. However, the current study on digital music education mainly focuses on learning performance and participation, while direct effects of digital music education on mental health remain underexplored. Therefore, future research should explore the potential of digital technology and how combining it with face-to-face music education can support adolescent mental health.

Keywords: Adolescent mental health, School music education, Emotion regulation, Digital technology, Social-emotional learning

1. Introduction

Mental health problems, such as depression and anxiety among adolescents, have received increasing attention. Adolescence is a critical stage for physical and psychological development, during which rapid biological, emotional, and social changes can make them face the risks of mental health more easily. According to the data updated by the World Health Organization in 2025, about one in seven (14.3%) adolescents aged 10–19 worldwide have been experiencing mental health conditions. The mental health of Chinese adolescents also deserves attention. A recent meta-analysis has reported that the prevalence of depressive symptoms among Chinese children and adolescents

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was 23.3%, reaching 26.2% among general high school students [1]. These findings suggest that adolescent mental health is no longer an isolated issue but a public health concern with clear urgency. Schools are important settings for adolescents' daily learning and social interactions, while emotion regulation, self-management, and positive interpersonal relationships are also important parts of adolescent mental health. Salokivi noted that adolescents' emotional skills involve emotional identifying, expressing, understanding, and regulating as well as using emotional information for self-management and the ability to build positive relationships [2]. Váradi further argued that music education is closely related to the development of socio-emotional abilities, providing a theoretical basis for considering how school music education may support adolescent mental health [3].

Existing research also provides some empirical support. Lin et al. found that after a 17-week structured school-based music intervention, middle school students showed significant reductions in depression, anxiety, and stress indicators [4]. A scoping review by Goopy and MacArthur also found that music learning was associated with positive outcomes, such as emotional awareness, stress coping, self-esteem, self-efficacy, social connectedness, and a sense of belonging [5]. However, current research on digital music education still focuses more on music skills, learning motivation, and participation, while discussion of how digital technology may further support adolescent mental health remains limited. Therefore, this paper uses a literature review approach to examine the main ways in which school music education may support adolescent mental health. It also discusses the potential roles and limitations of digital technologies, including short-form video, online teaching, digital creation, virtual performance, and artificial intelligence, with the aim of providing a theoretical reference for the appropriate use of digital tools in school music education.

2. Empirical evidence and mechanisms of school music education in supporting adolescent mental health

2.1. Evidence of intervention studies

Intervention studies provide evidence that school-based music activities may benefit adolescent mental health. Lin et al. conducted a 17-week structured school music intervention with 414 students whose average age was approximately 14.57 years. After the intervention, the detection rates of depression in the music group decreased from 13.14% to 1.71%, those of anxiety from 14.29% to 5.14%, those of stress from 5.17% to 0%, and those of overall mental health problems from 18.29% to 5.71%, while the control group did not show the same significant changes. Post-intervention comparisons between groups also showed significantly lower detection rates of depression, anxiety, stress, and overall mental health problems in the music intervention group [4].

Gold and others conducted a cluster-randomized trial in Australian schools with 100 young people who showed unhealthy patterns of music use. The study compared eight weeks of group music therapy with independent music listening. Both groups showed small improvements in related psychological indicators, but there was no significant overall difference between group music therapy and independent listening. This suggests that music intervention may have potential, but differences between specific forms of music activity still require further investigation [6].

Heynen and others implemented the "Safe & Sound" music therapy program with 108 refugee children and adolescents aged 6–17 in three schools in the Netherlands. Negative emotions decreased during the intervention, while interviews with teachers and music therapists suggested that music activities could promote social connection and strengthen a sense of belonging [7]. Overall, current intervention studies suggest that music activities in school settings may have

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positive effects on depression, anxiety, stress, negative emotions, and social connection among young people.

2.2. Review evidence and possible mechanisms

Beyond intervention studies, review research also supports the possible positive role of music activities in adolescent mental health across different psychological indicators. Goopy and MacArthur reviewed studies on music learning and well-being among school-aged children and adolescents, with most studies focusing on participants aged 10–19. The review found that group singing could support personal development and well-being by strengthening social connectedness and confidence, while other music activities were also associated with emotion regulation, self-esteem, and subjective well-being [5].

With regard to possible mechanisms, Zhou and Tong noted that activation of the brain reward system by music may increase dopamine levels and improve mood and motivation. They also suggested that music-related regulation of the limbic system may help reduce anxiety and stress responses [8]. In a retrospective study involving 120 adolescents with depression, Zhou et al. compared conventional treatment with music therapy, and suggested that music may operate through emotional expression, stress relief, and improved emotion regulation. Although this study was conducted in a clinical music treatment context, it provides supplementary evidence for a possible relationship between music activities and emotion regulation in adolescents [8].

The study by Goopy and MacArthur also supports a positive relationship between music learning and adolescents' emotional experience and emotion regulation [5]. Music learning may also support adolescent mental health by strengthening confidence, self-esteem, and self-efficacy. Jiang and Tong noted that progress in music skills, completion of learning tasks, and positive feedback during music learning may strengthen students' beliefs in their abilities and further support self-esteem. However, their review also found that many existing studies used more cross-sectional designs, so the causal relationship between music education and self-esteem still needs to be tested through more longitudinal and experimental research [9].

In addition, the collaborative nature of music activities may strengthen adolescents' social connection and sense of belonging. Cooperative activities, such as choir and ensemble performances, provide opportunities for young people to interact with peers and build social relationships through shared participation [5, 9]. The extent to which students feel accepted, respected, included, and supported in the school social environment is negatively associated with psychological and emotional distress [10]. Vacca et al. support this point by noting that, because adolescents have a stronger need for peer belonging and acceptance, the experiences of discrimination, isolation, and bullying may be especially distressing [11]. Previous research also shows that a stronger sense of school belonging is positively associated with better psychological well-being [10].

Overall, school music education is supported by intervention studies, review evidence, and research on possible mechanisms. However, the strength of causal evidence, long-term effects, and the different psychological effects of specific forms of music activity still require further investigation.

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3. Traditional school music education: teaching approaches, practical strengths, and structural limitations

3.1. Teaching approaches and types in traditional school music education

School music education has developed several representative teaching approaches and practical systems. Among them, the Orff, Kodály, and Dalcroze approaches are widely recognized. The Orff approach emphasizes participation, experience, improvisation, and collaborative learning, the Kodály approach is based on singing and gives importance to music listening and music literacy, and the Dalcroze approach emphasizes understanding and experiencing music through body movement [12, 13]. Although the three approaches differ in specific methods and teaching priorities, all emphasize active participation and direct music experience. Together, they reflect a shift from knowledge- and skill-based teaching toward more experiential, participatory, and integrated forms of learning.

Under the influence of these pedagogical principles, school music classrooms include a wide range of experiential and practical activities, including singing and choir, instrumental performance, music listening, rhythm activities, body movement, music games, improvisation, collaborative creation, music theater rehearsal, and group performance [13].

3.2. Practical strengths and limitations of traditional school music education

Traditional school music education has several practical strengths. First, active participation and direct experience may improve students' learning motivation and classroom engagement. Second, collaborative music activities can provide opportunities for peer interaction, social connection, and a sense of belonging. Third, music expression, improvisation, and group performance may support emotional expression and regulation, as well as confidence, self-esteem, and self-efficacy. Fourth, music courses may have potential value for stress relief and mental health [4, 5, 9]. These strengths are consistent with the psychological mechanisms discussed in Section 2 and form an important basis for understanding how school music education may support adolescent mental health.

At the same time, traditional school music education has some limitations in terms of learning time and space, personalized feedback, and access to resources. With the development of digital technology, online flipped classrooms, recorded videos, social media, mobile music applications, and digital editing tools have gradually been incorporated into music teaching. Ng and others used a model combining pre-class recorded videos, online collaboration, and a mobile instrument app to strengthen participation and collaborative learning among secondary school students [14]. AI technology can further provide personalized learning, real-time feedback, intelligent tutoring, and support for composition [15]. Digital technology therefore offers new possibilities for extending the flexibility, interactivity, and personalization of traditional music classrooms.

Digital technology does not simply replace the traditional music classroom. Instead, it may work as a supplementary resource that can be combined with traditional teaching approaches, teacher support, and face-to-face music interaction, potentially extending the ways in which school music education can support adolescent mental health.

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4. Main pathways and future directions for digital technology in school music education

4.1. Short-form video and social media platforms

Short-form video and social media platforms extend when and where music learning takes place, so that learning is no longer limited to formal classrooms. Salavuo noted that social networking platforms and online music communities are used not only for building social connections but also for sharing music, obtaining information, and learning. By giving learners greater control over their learning environment, these platforms may support more student-centered learning and encourage participation in a community of practice [16]. Online environments can also help learners move from being passive receivers of information to more active participants.

Cayari further discussed the relationship between YouTube and informal music learning, arguing that adolescents' online music practices can help connect school music education with contemporary culture and may encourage students to continue music learning and music creation outside the classroom [17]. Social media platforms, such as YouTube, can therefore expand opportunities for self-directed music learning and extend music learning from a fixed classroom activity into a more continuous part of everyday life. From the perspective of mental health support, these platforms may also have potential through greater autonomy, continued participation, and opportunities for social connection.

4.2. Teacher-created online media and instructional videos

Teacher-created online media and instructional videos have changed how teachers provide music learning resources and organize classroom activities. Kruse and Veblen analyzed music instructional videos on YouTube and found that online videos often include aural reinforcement, teacher demonstrations, technical instruction, and performance-related movement cues, suggesting that video platforms can support some aspects of music skill teaching and demonstration [18]. Ng et al. studied an online flipped music classroom involving 122 secondary school students in Hong Kong. Students prepared before class using recorded videos provided by the teacher and then joined collaborative activities and music creation in synchronous online sessions. The study found that this approach improved students' motivation to learn music, learning satisfaction, and music knowledge [14].

Digital resources do not necessarily replace the music teacher. Instead, they can help teachers reorganize teaching time: students can complete some basic learning through videos and online resources, while more synchronous class time can be used for interaction, collaboration, music creation, and feedback. In this way, teacher-created online media and instructional videos may support students through structured guidance, repeatable demonstrations, and classroom interaction, potentially strengthening self-efficacy, positive learning experiences, and a sense of classroom belonging.

4.3. Digital creation, virtual performance, and online music communities

One important change in digital music education is that students can move from passively watching and receiving music content to actively creating, producing, and sharing it. Salavuo noted that social media environments allow learners to become creators of information and audiovisual content and to build networks and communities of practice. This means that online music learning can shift from content consumption toward participatory learning [16]. Kruse and Veblen described this Internet

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culture as a participatory culture, in which individuals can take an active role in creating and sharing new content and gain greater control over how they express themselves [18]. The introduction of social media therefore broadens the meaning of "participation" in school music education: students are not only learners and viewers but also creators, performers, and community participants.

4.4. Intelligent tutoring and personalized feedback technologies

Intelligent tutoring and personalized feedback technologies primarily involve artificial intelligence in music education. A review by Merchán Sánchez-Jara et al. identified applications of AI in music education including personalized learning, intelligent tutoring systems, composition support, automated assessment, and tools for music collaboration and performance. Digital technology can also provide personalized learning according to individual needs and offer real-time feedback for music practice and ear training [15]. Chen further noted that AI tools can provide personalized experiences based on students' different learning styles, learning pace, and creative processes, while also offering immediate feedback, tailored practice, and interactive learning environments. In a survey of 521 music students in China, positive perceptions of AI were significantly associated with learning motivation, engagement, and learning success [19].

4.5. Future directions for digital technology in music education

Digital technology provides more flexible and varied ways of learning in school music education. Online courses, instructional videos, social media, mobile music applications, and digital creation tools can extend learning beyond the traditional classroom by providing personalized learning, immediate feedback, and opportunities for independent practice. They can also support collaborative creation, sharing of work, and virtual performance. Research on technology-enhanced music learning suggests that digital tools can support learning motivation, engagement, self-regulated learning, and practice efficiency [20]. Digital technology can therefore expand the interactivity, flexibility, and learning resources of traditional music classrooms.

However, learning advantages created by digital technology should not be treated as direct evidence of mental health benefits. Mohammadian et al. found that technology-enhanced music learning research places greater emphasis on music performance and technical skills, while emotional expression accounted for only 10% of reported outcomes and aesthetic sensitivity for only 7%. This suggests that emotion and broader artistic development still receive relatively limited attention [20]. Therefore, improvements in motivation or participation alone cannot demonstrate that students' emotion regulation or mental health has improved.

Digital music education also involves risks related to privacy, cyberbullying, technological dependence, and educational inequality. Albert argued that the use of social media in music education requires attention to privacy, inappropriate use, cyberbullying, and inappropriate online communication between teachers and students [21]. In addition, the cost of technology, access to devices, and Internet conditions may create new learning inequalities, while an excessive focus on technical ability and product output may reduce attention to emotional expression, aesthetic experience, and interpersonal interaction [20]. Digital technology is therefore more suitable as a teacher-guided support tool, and its value for adolescent mental health still requires further empirical research.

The future of digital music education need not choose between "online" and "face-to-face" learning. Instead, a blended model may combine the strengths of both. Merchán Sánchez-Jara et al. suggested that future research should explore models that combine AI with face-to-face teaching, so

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that generative AI can complement rather than replace teachers, reduce their workload, and improve learning resources [15].

5. Conclusion

School music education may support adolescent mental health by promoting emotional expression and regulation, strengthening self-esteem and self-efficacy, and increasing social connection and a sense of belonging. Digital technology can further extend when and where learning occurs and provide personalized resources, immediate feedback, and opportunities for self-directed learning. However, digital technology cannot fully replace face-to-face classrooms in areas such as teachers' emotional support, peer interaction, collaborative music activities, and social belonging. Existing research also has limitations, including a lack of long-term follow-up and causal evidence. The specific psychological effects of different music activities have not been fully distinguished, and digital music education research still focuses more on learning performance than on direct mental health outcomes. Future research should therefore move beyond the question of whether digital music education can replace traditional classrooms and further explore blended models that combine digital learning with face-to-face music activities. By integrating personalized digital learning, independent practice, collaborative creation, real social interaction, teacher support, and ethical guidance, digital technology may be more appropriately used as a supplementary resource for school music education rather than as a single solution that replaces teachers, peer relationships, and real music interaction.

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