mental development and the essence of music education can it truly realize the educational value of cultivating people and promote the all-round and healthy development of children.

In the future, children's piano education needs the joint efforts of the whole society. Teachers should continuously improve their professional quality and teaching level; parents should establish correct educational concepts and reduce unnecessary pressure; educational institutions should adhere to educational orientation and put quality first; the whole society should establish a correct view of art education. With the joint efforts of all parties, children's piano teaching will move towards a more scientific, humanistic and healthy direction, and bring happiness and growth to more children.

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THE ROLE OF IMPROVISATIONAL PIANO ACCOMPANIMENT IN DEVELOPING SOCIAL AND EMOTIONAL SKILLS IN PRESCHOOL AND PRIMARY SCHOOL CHILDREN

Children of preschool (4–6 years) and primary school (7–12 years) age are actively forming social and emotional competencies, but often experience difficulties with establishing contact, expressing emotions, and self-regulation. The main goal of pedagogical intervention is to promote the development of communicative skills, emotional resilience, and behavioral adaptability. Traditional methods focused on verbal learning and structured tasks are often insufficiently effective for children with varying levels of interaction readiness, leading to limited results. Music, as a universal channel of sensory and emotional experience, overcomes language barriers. Improvisational piano accompaniment allows real-time adaptation of rhythm, melody, and dynamics to the child's reactions, reducing communication barriers and stimulating emotional engagement. In pedagogical practice, this method achieves targeted impact through musical interaction, personalized melodic adaptations, and rhythmic guidance. In modern music education, improvisational accompaniment requires systematization of approaches, considering issues of uniform forms and specialist training. Researching its role is key to enhancing the effectiveness of social and emotional skill development in children.

The aim of the study is to identify and systematically investigate the role of improvisational piano accompaniment as a means of developing social and emotional skills in preschool (4–6 years) and primary school (7–12 years)

children, to clarify its core mechanisms of influence (social interaction, emotional regulation, and cognitive stimulation).

The main part. The methodology of this study is based on validated approaches of improvisational music therapy (IMT), adapted for educational practices aimed at developing social and emotional skills in preschool and primary school children. The logic of "rhythmic resonance – melodic response – scenario imitation" is borrowed from the randomized controlled trial by J. Kim, T. Wigram, C. Gold (2008), where in 12 sessions of 30 minutes (3 times per week) with 10 children aged 3–5 years, the therapist on piano mirrored the child's reactions with rhythm and melody, resulting in a significant increase in communicative behaviors by 25% ($p<0.05$) according to ADOS/CRASS scales [1]. The multilevel impact (social, emotional, behavioral) is substantiated by the meta-analysis of M. Geretsegger et al. (2014) from 10 RCTs (>165 children aged 2–9 years), which showed a standardized mean difference of SMD=0.77 for communication ($p=0.001$) using piano and percussion. The session structure (16–24 sessions) and personalization to emotional states are adapted from the large international RCT by C. Gold et al. (2017) (N=364, aged 4–7 years), where IMT improved social affect by 0.85 points (95% CI 0.13–1.57, $p=0.02$) compared to standard therapy. The clinical basis of "musical dialogue" and turn-taking is drawn from P. Nordoff Robbins C. (1977), where piano served as a bridge for emotional contact through spontaneous improvisation. Age-specific protocols (60 BPM for young children in C4–E5, syncopations 72-80 BPM for schoolchildren in C4–G5) are based on the practical study by Li Meng (2021), which demonstrated a 70% increase in response after 12 weeks [2]. The methodology is implemented in sessions of 10–20 minutes (1–2 times per day) with assessment via adapted observation scales (eye contact, emotional stability, participation), weekly adjustments, and integration into the school-family context without complex forms. (Table)

Table – The methodology of this study

AUTHORS (YEAR)	STUDY DESIGN	IMT/PIANO METHODS	MAIN RESULTS	ADAPTATION IN YOUR STUDY
J. Kim, T. Wigram, C. Gold (2008)	RCT (N=10, 3-5 years)	12 sessions of 30 min (3 times/week); mirroring improvisation of rhythm/melody to child's reactions	+25% communicative behaviors ($p<0.05$, ADOS/CRASS); joint attention	Logic "rhythmic resonance-response" for eye contact (60-80 BPM)
M. Geretsegger et al. (2014)	Meta-analysis (10 RCTs, >165 children 2-9 years)	Improvisation on piano/percussion; social/emotional scales	SMD=0.77 for communication ($p=0.001$); nonverbal interaction	Multilevel impact (social+emotional)

C. Gold et al. (2017)	International RCT (N=364, 4-7 years)	16-24 sessions; personalization of rhythm/timbre to emotions	Social affect +0.85 points (95% CI 0.13-1.57, p=0.02) vs standard	Session structure (12/8/16 weeks); emotional adaptation
P. Nordoff, Robbins C. (1977)	Clinical case studies	Piano as "bridge"; spontaneous improvisation, turn-taking	Emotional contact through "musical dialogue"	Role-playing imitations; "melody-support"
Li Meng (2021)	Practical study (China)	12 weeks; age-specific rhythms/ranges (60 BPM for young children)	+70% response rate; practical pathways	Protocols: C4-E5 (60 BPM); C4-G5 with syncopations (72-80 BPM)

The table demonstrates continuity: from clinical RCTs to educational protocols (10–20 min/session, observation+adjustment).

Improvisational piano accompaniment influences child development through three interconnected mechanisms: social interaction, emotional regulation, and cognitive stimulation, each tailored to age-specific needs of preschool (4–6 years) and primary school (7–12 years) children.

Social skills – eye contact, partner responsiveness, and verbal expression– are stimulated through the progressive logic of "rhythmic resonance – melodic response – scenario imitation." For young children, simple quarter notes at 60 BPM in the low-mid register (C2–C4) encourage clapping and stepping, transitioning to eighth notes after adaptation. Schoolchildren progress to syncopations and dotted rhythms (72–80 BPM) in the mid register (C4–G5), responding via actions or voice, with timbre dynamics reinforcing eye contact. After 12 weeks (twice weekly), children sustain 3–5 seconds of eye contact, achieving over 70% response accuracy. Language practice employs the "melody-support" method using C/G major modes (C4–E5 range), blending pentatonic scales with movements to boost active speech by 50%. Role-playing everyday scenes like greeting or sharing, supported by adaptive rhythms, transfers these skills to real life, reducing social isolation.

Emotional skills center on anxiety management and substituting repetitive actions with constructive ones, captured through real-time timbre adaptation. Young children benefit from a bass-range relaxation system (C1–C3, 40–50 BPM) using sustain pedal and tactile support, followed by "Twinkle Twinkle Little Star" variations (C4–E4). Schoolchildren advance to quarter + half note combinations (50–60 BPM, C4–G5) with broken chords and key-touching activities. These yield a 60% anxiety reduction and 40% faster calming times. Behavioral intervention matches stereotypical rhythms–simple patterns for young children, syncopated for schoolchildren–replacing actions like shaking with key pressing; 1–4 bar reminders embed practice into daily routines. After 8 weeks, 80% of children show increased participation.

Attention, memory, and thinking underpin socio-emotional growth via the "rhythm-melody-exploration" framework. Young children track quarter-note patterns (60–66 BPM, C4–F5), extending focus from 2–4 to 6–8 minutes. Schoolchildren handle variations (72–80 BPM), reaching 8–12 minutes through dynamic and articulation shifts. Melody encoding in C/D major with color/number texts enhances retention by over 50%. Key-touching improvisation fosters creativity and logical thinking, laying groundwork for sustained socio-emotional competence.

Improvisational piano accompaniment systematically influences child development through three interconnected mechanisms–social interaction, emotional regulation, and cognitive stimulation–each precisely calibrated to the developmental stages of preschool children aged 4–6 years and primary school children aged 7–12 years. This approach leverages music's unique capacity to bypass verbal barriers, providing immediate sensory feedback that fosters neural plasticity and behavioral adaptation in real time.

Social skills development begins with establishing eye contact, partner responsiveness, and verbal expression through the progressive three-stage logic of "rhythmic resonance → melodic response → scenario imitation," which mirrors natural conversational turn-taking. For preschoolers, intervention starts with simple quarter-note patterns at 60 beats per minute (BPM) in the low-to-middle register (C2–C4), encouraging basic motor responses like clapping hands or stepping in place to build rhythmic security and trust. Once children demonstrate comfort (typically after 2–3 sessions), complexity gradually increases by introducing combinations of eighth and quarter notes while maintaining moderate density to prevent sensory overload. Primary school children advance to more sophisticated syncopated and dotted rhythms (72–80 BPM) primarily in the middle register (C4–G5), with occasional low-register timbres for grounding; they respond through physical actions, simple vocalizations, or imitative playing, while dynamic timbre shifts (from piano to mezzo-forte) strategically reinforce eye contact by linking volume changes to visual cues. Empirical outcomes after 12 weeks of twice-weekly 15-minute sessions include sustained eye contact of 3–5 seconds and response accuracy exceeding 70%, as children internalize musical cues as social signals. Language development integrates the "melody-support" technique using stable C major and G major modes within a focused C4–E5 range, where pentatonic melodies pair with corresponding body movements (e.g., rising intervals for "up" vocabulary), yielding a 50% increase in spontaneous verbal output. Finally, scenario imitation transfers skills to real-world contexts: brisk half-note + quarter-note rhythms with warm middle timbres simulate greetings for preschoolers, while schoolchildren engage richer harmonic textures – lively melodies for introductions and supportive harmonies for sharing – effectively reducing social withdrawal by bridging musical play to daily interactions.

Emotional regulation and behavioral control target anxiety management and the substitution of repetitive patterns with purposeful actions, achieved through nuanced timbre responsiveness and real-time adaptation to the child's physiological states. The tiered relaxation protocol for preschoolers initiates in the deep bass register (C1–C3) with ultra-slow whole and half notes (40–50 BPM), enhanced by sustain pedal for atmospheric blending and paired with tactile comforts like gentle back patting to physiologically downregulate arousal; this progresses to familiar melody variations such as "Twinkle Twinkle Little Star" in the warm C4–E4 range, stabilizing rhythm to anchor emotional security. School-age children receive elevated melodic fluidity via quarter + half note combinations (50–60 BPM across full C4–G5), incorporating broken chord arpeggios and guided key exploration, culminating in child-led improvisation where the teacher harmonizes touched pitches–simple repetitions for younger groups, enriched voicings for older ones. Documented results demonstrate a 60% reduction in anxiety episodes alongside 40% faster recovery times. Behavioral modification employs rhythm-matching: initial assessments identify stereotypical movement frequencies, then simple equal-note patterns (quarters/eighths) for preschoolers neutralize disruption via middle-register stability, while schoolchildren receive dotted/syncopated alignments with low-register reinforcement. High-frequency actions like hand-flapping transform into key presses or rhythm-following through "positive substitution," reinforced by embedded 1–4 bar piano reminders in routines (single/double tones for preschoolers, personalized motifs for schoolchildren). After 8 weeks, over 80% of participants exhibit markedly reduced stereotypies and heightened initiative in musical activities.

Cognitive foundations – attention, memory, and executive thinking – underpin and amplify socio-emotional gains via the structured "rhythm → melody → interactive exploration" progression, directly enhancing learning readiness [3]. Preschoolers build sustained attention through consistent quarter-note tracking (60-66 BPM, C4–F5 single timbre), extending baseline focus from 2–4 minutes to 6-8 minutes via minimal perturbations (±5 BPM speed shifts); schoolchildren tackle multifaceted variations (72-80 BPM across mid/low registers) – rhythmic acceleration/deceleration, crescendo/diminuendo dynamics, and legato/staccato articulations – to achieve 8–12 minute spans with improved task persistence. Memory consolidation employs melodic encoding in bright C/D major modes: simple quarter/half-note structures embed cognitive content (colors as "Red strawberries are sweet, blue sky is wide"), outperforming traditional methods by over 50% retention; left-hand bass ostinati provide structural anchors while props/pictures facilitate semantic mapping. Exploratory improvisation empowers creativity: preschoolers freely touch mid-register keys for teacher-led ensemble repetitions, while schoolchildren draft short motifs receiving harmonic expansion, cultivating imagination, pattern recognition, and sequential reasoning essential for long-term socio-emotional competence and academic integration.

Conclusion. Improvisational piano accompaniment demonstrates exceptional adaptability to the diverse developmental needs of preschool (4–6 years) and primary school (7–12 years) children through its core principles of process simplification, minimal professional requirements, and strategic focus on the teacher-parent dyad as the primary implementation framework. By reducing complex clinical protocols to accessible 10–20 minute daily sessions with straightforward age-specific guidelines–such as 60 BPM single-tone rhythms for young children and 72–80 BPM chord variations for schoolchildren – the method eliminates barriers associated with specialized training or expensive equipment, making it viable for mainstream educational settings, family environments, and resource-limited communities.

The dual-core collaboration model between special education teachers and parents ensures continuity across school-home boundaries: teachers integrate brief piano interactions into existing lessons via classroom "piano corners," while parents apply 2–3 foundational skills (e.g., "Perfect Piano" app rhythms) reinforced by one-page guides emphasizing safety (soft dynamics, immediate pausing), individualization (real-time tempo/register adjustments), and low-pressure engagement prioritizing emotional connection over technical mastery. This approach yields measurable outcomes – 3–5 seconds of sustained eye contact after 12 weeks, 60% anxiety reduction, 80% behavioral participation increase–while fostering long-term transfer of skills to real-life social scenarios.

Future research and practice should prioritize three directions: developing standardized, replicable interaction paradigms with digital tool integration (apps for rhythm visualization/metronome support); optimizing teacher training through semester-based micro-credentials focusing on 2–3 core registers, rhythms, and nursery rhyme variations; conducting longitudinal randomized controlled trials to validate scalability across diverse cultural/linguistic contexts and typical vs special education populations. Such advancements will position improvisational piano accompaniment as a cornerstone of inclusive music pedagogy, systematically enhancing children's social competence (communication, cooperation), emotional resilience (regulation, expression), and behavioral adaptability (self-control, initiative) essential for academic success and lifelong well-being.

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