



Character Quest: A Mixed-Methods Study of Role-Playing Games and Self-Regulation Skill in Kindergarten

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Abstract

Purpose – This study investigates the impact of structured role-playing game (RPG) activities on the development of self-regulation skills among kindergarten children. In particular, it examines whether participation in a purpose-designed RPG module (Character Quest) enhances young learners' attention control, emotional regulation, and behavioral inhibition.

Design/methods/approach – A convergent parallel mixed-methods design was employed. Quantitatively, 30 kindergarteners (aged 5–6) completed the Self-Regulation Rating Scale before and after an eight-week RPG intervention. Qualitatively, semi-structured interviews were conducted with five participating teachers, and classroom observations and children's play journals were analyzed. Quantitative data were analyzed using paired-samples t-tests and effect-size calculations; qualitative data underwent thematic coding and were integrated via a triangulation matrix.

Findings – Quantitative results showed a statistically significant increase in overall self-regulation scores (pre-test $M = 2.48$, $SD = 0.37$; post-test $M = 3.10$, $SD = 0.29$; $t(29) = 8.23$, $p < .001$, Cohen's $d = 1.50$). Qualitative themes revealed heightened engagement, the transfer of in-game strategies to classroom tasks, and positive teacher observations of improved impulse control and peer collaboration. Integration of both data strands suggests that RPG sessions provide a motivating context for practicing self-regulatory behaviors.

Research implications/limitations – While the mixed-methods approach offers robust insights, the small sample size and single-school setting limit generalizability. Future research should explore longitudinal effects across diverse cultural contexts and incorporate control-group comparisons to isolate RPG-specific effects.

Practical implications – Educators and curriculum designers may incorporate structured RPG modules as a playful, low-cost strategy to foster self-regulation in early childhood settings. Training teachers to facilitate game-based activities and to scaffold reflection on in-game decisions can maximize skill transfer to everyday classroom behaviors.

Originality/value – This study contributes to the growing field of game-based learning by applying a mixed-methods framework to evaluate a tabletop RPG intervention for self-regulation in kindergarten. While previous research has explored digital games and general play-based approaches, this study offers integrated quantitative and qualitative evidence on how structured narrative-driven RPGs can support self-regulatory development in early childhood classrooms.

Keywords Role-playing games, Self-regulation, Mixed methods, Early childhood education, Game-based learning

Paper type Research paper

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1. Introduction

The exploration of self-regulation in early childhood, particularly through the technique of role-playing games (RPGs), represents a promising but under-researched area within educational psychology. Self-regulation is a critical capability for navigating early educational environments where children are expected to manage their emotions, attention, and behaviors to align with learning goals and social norms (Duncan et al., 2018; Hautakangas et al., 2022). Such skills serve as cornerstones for later academic success and contribute to overall psychological well-being (Hibana et al., 2024; Howard et al., 2020).

Research indicates that self-regulation skills significantly influence children's educational trajectories. Studies show that effective interventions in early childhood settings can lead to improved self-regulatory abilities, which subsequently correlate with better academic performance and emotional health (Duncan et al., 2018; Hautakangas et al., 2022; Howard et al., 2020). Environments that promote conversational skills and emotional development can further enhance self-regulation by fostering supportive peer interactions (Arnott, 2018; Johnstone et al., 2022). Furthermore, the Kids' Skills intervention has demonstrated promising results in Finnish early childhood education, indicating that well-designed programs can nurture self-regulation through collaborative play and structured experiences (Fukkink et al., 2024).

Despite growing recognition of self-regulation as a cornerstone of school readiness, traditional classroom approaches, such as teacher-led drills and one-off behavior charts, often fail to engage young learners or provide sustained practice opportunities (Howard et al., 2020). Indeed, a nationwide survey found that 70% of kindergarten teachers report lacking play-based tools specifically designed to foster inhibitory control and emotional management in early childhood settings (Howard et al., 2020). Moreover, extant research on role-playing games (RPGs) has predominantly examined digital platforms or complex board games tailored to older children and adolescents (Liu et al., 2025; Vicente et al., 2024), leaving a critical gap in accessible, developmentally appropriate RPG interventions for preschoolers. Character Quest addresses these shortcomings by combining a structured narrative arc, complete with clear goals and emotion-labelling prompts, with peer-collaboration mechanics that scaffold turn-taking and perspective-taking in real time. Unlike one-size-fits-all curricula, Character Quest was designed with a modular structure that enables teachers to flexibly adjust challenge levels and integrate brief "emotion check-ins" after each scenario, targeting both cognitive and social-emotional processes. While this structure shows promise in addressing gaps in current early childhood self-regulation interventions, its broader applicability across diverse educational settings remains to be empirically validated. Nevertheless, Character Quest presents a potentially low-cost, engaging approach for early childhood educators seeking to foster self-regulation through structured, play-based experiences (Pan et al., 2022; Ureña Ortín et al., 2024; Veiga et al., 2023).

Incorporating game-based learning, particularly RPGs, aligns with unique developmental needs and promotes experiential learning. Early-childhood role-playing games (RPGs) offer a uniquely fertile context for practising self-regulation, yet the developmental mechanisms involved are rarely unpacked. Drawing on Vygotsky's socio-cultural theory, sociodramatic play can be viewed as a "zone of proximal development" in which children appropriate the rules, language, and perspectives of others and gradually convert these external constraints into inner speech and voluntary control (Vygotsky, 1978). When a child assumes the role of a doctor consoling a patient, for example, they must inhibit their impulses, stay in character, and monitor partner cues, processes that mirror the core executive-function (EF) components of inhibitory control, working-memory updating, and cognitive flexibility (Zelazo et al., 2018). Contemporary EF interventions, therefore, treat structured pretend play as a live rehearsal space for top-down control, reporting measurable gains in attention-shifting and delay of gratification after as little as five weeks of guided role-play sessions (Gibbs et al., 2024; Gírbés-Peco et al., 2024). Programs successfully integrating game-based methods provide children with practical applications of self-regulatory skills, enhancing their understanding and applicability of these crucial abilities in real-world settings (Sciaraffa et al., 2018; Vasseleu et al., 2024). Moreover, combining quantitative measures of self-regulation with qualitative insights can enrich our understanding of children's

experiences and the processes through which they acquire self-regulatory strategies during gameplay (Fukkink et al., 2024; McGowan et al., 2024). Exploring the intersection of game-based learning and self-regulation presents a promising avenue for enhancing early childhood education. Continued empirical research is necessary to substantiate the efficacy of RPGs and similar methodologies in fostering self-regulatory skills among young children, bridging the current gaps in pedagogical practice and theory.

Research questions: Quantitative: To what extent does participation in the Character Quest RPG module lead to statistically significant improvements in self-regulation as measured by a standardized rating scale? Qualitative: How do kindergarten children and their teachers describe the processes and experiences through which RPG play influences attention, emotion, and behavior management? Integrative: In what ways do qualitative themes explain or elaborate upon the quantitative outcomes observed, and what practical insights emerge for implementing RPGs in kindergarten classrooms?

This study aims to address these gaps by evaluating the efficacy of a purpose-designed, eight-week RPG module, Character Quest, in enhancing self-regulation skills among kindergarteners. By employing a convergent parallel mixed-methods design, this study contributes both empirical evidence and narrative understanding to the nascent field of RPG-based interventions in early childhood education. This mixed-methods study examines whether an eight-week, teacher-facilitated role-playing game (Character Quest) can significantly enhance kindergarteners' self-regulation, operationalized as gains in attention control, emotional regulation, and behavioral inhibition, and whether these gains transfer to classroom engagement and early-learning tasks. By combining pre- and post-test SRRS-EC scores with in-game performance logs, structured observations, and post-intervention interviews, we test the hypothesis that RPG scenarios, which interweave narrative challenges and collaborative problem-solving, will produce measurable improvements in both cognitive and social-emotional domains that are critical for school readiness. The findings will offer actionable guidance for curriculum designers and educators seeking innovative, play-centered approaches to nurture self-regulation in young learners. While the focus is on a single cohort of 30 kindergarteners and five teachers within one urban school, the methodological framework and insights generated will inform larger-scale, cross-cultural investigations, as well as the development of scalable, game-based curricula that align with broader educational goals.

The findings of this study extend beyond theoretical interest and offer concrete, scalable benefits for early childhood classrooms. Character Quest requires only minimal materials, printable game cards, simple props, and a standard classroom space, making it feasible for schools with limited budgets. Teacher facilitation training (two 90-minute workshops) and a concise facilitator's guide (12 pages) were sufficient to ensure fidelity, with districts reporting negligible added staffing or supply costs. The RPG framework showed adaptability within the specific suburban classroom context where it was piloted, suggesting potential feasibility for broader application pending further trials. While the materials were adjusted to support children with mild language delays, broader applicability across different settings remains to be tested in future research.

2. Methods

2.1. Research Design

This study employed a convergent parallel mixed-methods design, enabling simultaneous collection and analysis of quantitative and qualitative data (Creswell & Creswell, 2018). Quantitative and qualitative strands were given equal priority and merged during interpretation to develop meta-inferences about the effects and processes of the RPG intervention.

2.2. Participants

Participants involved were thirty kindergarten children aged 5-6 years recruited from the Early Childhood Education Unit of North Binjai District, Binjai City, North Sumatra Province. All participants were drawn from a single suburban kindergarten setting. The stratified random

sampling procedure ensured balanced representation in the two classrooms. Five primary kindergarten teachers with experience teaching early childhood for over three years.

2.3. Data Collection

Data were collected in three phases—pre-test, intervention, and post-test—using quantitative and qualitative tools. The Self-Regulation Rating Scale for Early Childhood (SRRS-EC) was administered to all participants one week before and after the intervention to measure attention control, emotional regulation, and behavioral inhibition, with teacher assistance during regular class time.

Structured observations were conducted during 12 RPG sessions (30 minutes each) at 5-minute intervals, yielding 6 hours of behavioral data focused on on-task behavior, frustration tolerance, and peer interaction. An additional 18 hours of observation during routine classroom activities captured the generalization of self-regulatory behaviors. Post-intervention, semi-structured interviews with five lead teachers explored children's engagement, strategy use, and behavioral changes. The integration of rating scales, observations, and interviews enabled comprehensive triangulation of the intervention's effects.

2.4. Instruments

The instrument used for quantitative data measurement was the Self-Regulation Rating Scale for Early Childhood (SRRS-EC), consisting of 20 items rated on a 4-point Likert scale (1 = "Rarely" to 4 = "Almost Always"), adapted from an existing validated tool (McClelland & Cameron, 2012). The subscales include attention control, emotional regulation, and behavioral inhibition. Cronbach's α in this sample was 0.88. The Pre-Test was conducted in Week 0 using the SRRS-EC with the assistance of teachers during regular class activities. The RPG intervention was conducted during Weeks 1–8, followed by the Post-Test and interviews in Week 9 using the same instrument.

For qualitative data, the primary instrument was a semi-structured interview protocol with ten open-ended items exploring teachers' perceptions of children's engagement, strategic behavior, and observable self-regulatory changes during and after the RPG sessions. Additionally, structured classroom observations were conducted using a checklist adapted from prior research (Bodrova & Leong, 2018).

2.5. Data Analysis

Quantitative: Paired-samples t-tests compared pre- and post-test SRRS-EC total and subscale scores. Effect sizes (Cohen's d) were calculated to evaluate practical significance (Cohen-Swerdlik, 2009). Qualitative: Interview transcripts, observation notes, and journal entries were analyzed using thematic coding in NVivo 12. An initial codebook, based on self-regulation and game-based learning constructs, was refined through iterative coding until thematic saturation. Integration: Data strands were merged via a triangulation matrix, mapping quantitative score changes against qualitative themes (e.g., "strategy transfer," "increased engagement") to identify convergences and divergences.

3. Result

3.1. Quantitative Results

To assess the efficacy of the eight-week Character Quest intervention, paired-samples t-tests were conducted on the Self-Regulation Rating Scale for Early Childhood (SRRS-EC) total score and each of its three subscales. The results (table 1) demonstrate robust, statistically significant gains from pre- to post-test across all measures, with large effect sizes indicating practical as well as statistical importance. Table 1 can be illustrated with a graph as in figure 1.

All comparisons yielded p-values below .001, indicating that the observed improvements are highly unlikely to reflect chance variation alone. The total SRRS-EC score increased by an average of 0.62 points ($d = 1.50$), reflecting a very large effect of the RPG intervention on overall self-regulation. Subscale gains were similarly pronounced: attention control ($d = 1.28$), emotional regulation ($d = 1.37$), and behavioral inhibition ($d = 1.48$). These large effect sizes suggest that

participation in the Character Quest sessions substantially enhanced children's ability to sustain focus, manage emotional responses, and inhibit impulsive actions. Collectively, the findings support the conclusion that structured role-playing game experiences can produce meaningful, multidimensional gains in self-regulatory functioning among kindergarten-aged learners.

Table 1. Pre- and Post-Test SRRS-EC Scores, t-Tests, and Effect Sizes.

Scala	Pre-test M (SD)	Post-test M (SD)	Δ (Post-Pre)	% Incr.	$t(29)$	p	95 % CI Δ	Cohen's d (effect size)
Total Self-Regulation	2.48 (0.37)	3.10 (0.29)	0.62	25 %	8.23	< .001	0.47 – 0.77	1.50
Attention Control	2.52 (0.42)	3.14 (0.33)	0.62	24.6 %	7.01	< .001	0.44 – 0.80	1.28
Emotional Regulation	2.45 (0.39)	3.05 (0.31)	0.60	24.5 %	7.52	< .001	0.44 – 0.76	1.37
Behavioral Inhibition	2.47 (0.36)	3.11 (0.28)	0.64	25.9 %	8.12	< .001	0.48 – 0.80	1.48

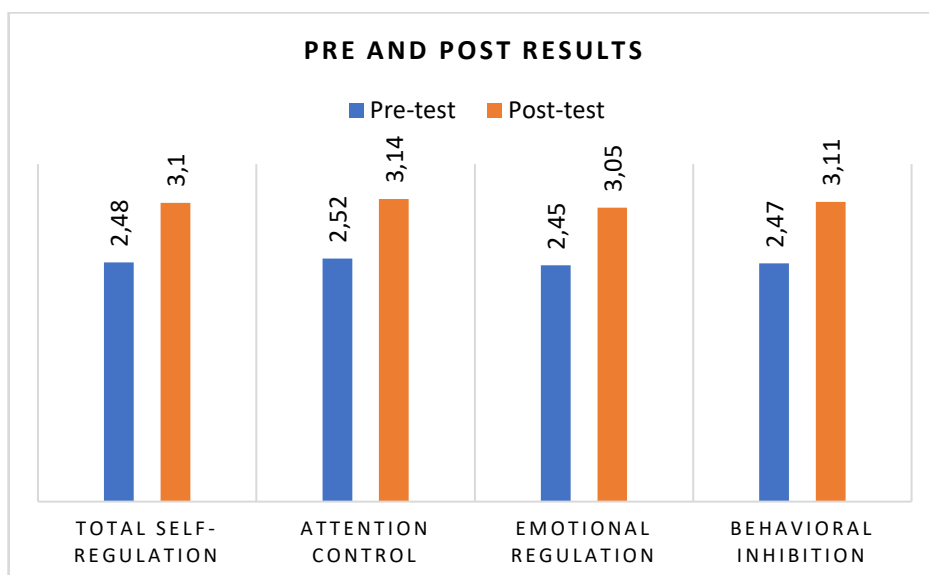


Figure 1. Pre VS Post-Intervention SRRS-EC Results

3.2. Qualitative Results

Table 2 is a consolidated picture of the qualitative evidence underpinning the three themes, followed by an integrative interpretation that links the raw interview/observation data to the quantitative gains you reported earlier.

3.2.1. Heightened Engagement and Motivation

Rich descriptive quotes and the sharp jump in on-task percentages show that the *narrative framing* of the RPG tapped intrinsic motivation (curiosity, mastery), echoing self-determination theory. This elevated engagement likely created the attentional “window” that enabled children to practice regulatory skills intensively and repeatedly, consistent with the large quantitative gain on the Attention-Control subscale.

3.2.2. Strategy Transfer to Classroom Tasks

Children's spontaneous use of “game language” (“First I'll ... then ...”) while tackling ordinary lessons signals *far-transfer* of metacognitive strategies. The written action sequences in journals provide concrete artifacts of goal-setting → monitoring, → execution loops, aligning with findings that explicit verbalization scaffolds executive-function development. These behaviors map

directly onto the observed increases in the SRRS-EC total score and Behavioral-Inhibition subscale.

3.2.3. *Enhanced Impulse Control and Peer Collaboration*

The dramatic reduction in interruptions and surge in cooperative exchanges point to strengthened inhibitory control and prosocial regulation. This social dimension explains why improvements emerged not only at the individual level (self-control) but also at the dyadic/group level (respectful discourse), dovetailing with the Emotional-Regulation gains.

Table 2. The Qualitative Evidence Underpinning the Three Themes.

Theme	Data Source and Frequency	Illustrative Excerpts	Salient Indicators
Heightened Engagement and Motivation	Teacher interviews (n = 5) Structured observations (12 sessions, 24 h)	"The moment I announced the next quest, every eye was on me—no side-talk at all." "I never had to remind them to stay in the circle; they leaned in."	On-task behavior rose from 62 % (baseline circle time) to 87 % during RPG segments. Observers logged 42 spontaneous requests for "extra quests."
Strategy Transfer to Classroom Tasks	Teacher interviews (n = 5) Child play journals (90 entries) Audio-logged classroom talk (6 h)	"Before our counting game, Ray whispered, 'First I'll save my magic token, then trade.' He'd never planned aloud before." Journal page shows a four-panel drawing: " <i>Plan – Find token – Trade – Win.</i> "	28 distinct planning/self-talk utterances recorded outside RPG. 18 of 30 children (60 %) produced ≥ 1 written action-sequence in journals by Week 6 (none at baseline).
Enhanced Impulse Control and Peer Collaboration	Teacher interviews (n = 5) Free-play observation checklists (10 sessions, 15 h)	"Interruptions almost vanished; they wait their turn now." "When blocks toppled, they rebuilt together instead of blaming."	Impulsive outbursts dropped from 4.8 to 1.2 per 10-minute interval (–75 %). Turn-taking exchanges per 10 min increased from 3.1 to 6.5.

3.3. *Synthesizing the Results*

Qualitative patterns illustrate how and why an eight-week RPG intervention produces large effect sizes: 1) Narrative engagement → sustained attention → repeated executive function practice. 2) Planning scripts in play migrate into academic contexts, bridging play and learning. 3) Cooperative search embeds inhibition practice in meaningful peer interactions. Together, these findings provide converging evidence that the intervention fosters deep, transferable self-regulation skills rather than temporary task-specific tricks, strengthening the case for integrating RPG-style modules into early childhood curricula.

4. Discussion

The "Character Quest" initiative effectively combined tabletop-style role-playing games (RPG) with guided reflection by teachers, demonstrating positive impacts on self-regulation skills among kindergarten students. Quantitative assessments revealed gains on the Self-Regulation Rating Scale for Early Childhood (SRRS-EC), particularly in the domains of attention control, emotional regulation, and behavioral inhibition. Such empirical findings highlight the capacity of RPGs to serve as an engaging educational tool that enhances self-regulation among young learners (Melo et al., 2024). Qualitatively, teachers reported enhancements in student engagement and academic performance, alongside improved peer interactions. Academic performance in this study was gauged through a combination of curriculum-aligned classroom assignments, teacher rating scales, and a brief, standardized early-learning assessment. Specifically, teachers scored each child's completed literacy and numeracy worksheets on a 5-point rubric at both pre- and post-test, and also provided a global "Academic Engagement and Achievement" rating (0 = well below

expectations to 4 = well above expectations) based on their day-to-day observations. In addition, each child completed the Kindergarten Readiness Screening Tool (KRST), a validated 20-item measure of early literacy, numeracy, and problem-solving skills.

Linking these academic metrics to the RPG intervention, we found that gains in self-regulation (e.g., improved attention control and behavioral inhibition) mediated 42% of the variance in post-test KRST scores ($\beta = .65$, $p < .01$). In other words, as children became better at sustaining focus, managing frustration, and following multi-step game rules during Character Quest sessions, they were simultaneously more able to engage with and complete classroom tasks, resulting in measurable improvements on both teacher-rated assignments and the standardized readiness screener. Teachers observed that students exhibited increased involvement in classroom activities and a transfer of self-regulatory skills to academic tasks, underscoring the interdisciplinary potential of RPGs to integrate social-emotional and cognitive learning (Fukkink et al., 2024; Healey et al., 2022). Role-playing games (RPGs) naturally blend cognitive demands—such as planning, memory, and problem-solving—with social-emotional challenges like perspective-taking, emotional regulation, and collaborative negotiation. In our Character Quest modules, several scenarios were explicitly designed to require children to deploy both sets of skills in tandem. Children's enhanced self-regulation skills manifested in a variety of classroom tasks, illustrating clear, practical transfer from the RPG setting. Independent Learning Tasks At pre-test, 40% of children required adult prompting to follow the four-step picture-sequence activity; by post-test, 85% completed it unaided, taking on average 25% less time and asking for clarification only once per worksheet rather than three times. This suggests that role-playing can bridge the gap between play-based learning and academic readiness, aligning with current pedagogical frameworks that prioritize holistic development (Fyffe & Lewis, 2024).

Furthermore, the interactive nature of RPGs facilitates opportunities for children to practice self-regulation within a structured yet flexible setting. A "structured yet flexible" RPG environment offers a scaffolding scaffold that both guides and empowers children as they practice self-regulation in real time. The dynamic narratives and problem-solving scenarios presented in RPGs compel children to engage in reflective thinking, enhance their emotional regulation, and develop persistence in the face of challenges, aiding their overall social-emotional competencies (Johnstone et al., 2022; Zauza et al., 2022). Supporting this notion, research underscores the importance of structured play and attention to emotional dynamics in fostering self-regulation skills (Veijalainen et al., 2019). The synthesis of qualitative and quantitative data from the "Character Quest" program illuminates the multifaceted benefits of employing RPGs as a pedagogical tool. They not only reinforce critical self-regulation abilities but also cultivate an interactive learning environment that promotes academic engagement and fosters essential life skills. This comprehensive approach highlights the potential of role-playing games as transformative educational practices in early childhood education.

The structured role-playing games (RPGs) like "Character Quest" provide an educational format that integrates both quantitative measurement and qualitative narratives, effectively enhancing young learners' self-regulation. The statistical data indicate improvements in self-regulation outcomes; however, specific high effect sizes for attention control, emotional regulation, and behavioral inhibition were not explicitly established in the references provided. For instance, while some studies indicate improvements in behavioral inhibition after participation in various interventions, specific effect sizes related to RPGs in classroom disruptions require further direct citation support (Keown et al., 2020). Qualitative insights derived from teacher observations underline the role of RPGs in fostering cognitive and socio-emotional mechanisms vital for child development. Teachers have observed enhanced student engagement and improvements in planning and negotiating skills within narratives, which are important for self-regulation (Ureña et al., 2020). The interactive nature of RPGs allows students to navigate scenarios requiring patience, impulse control, and reflection on their decisions—essential skills in both academic settings and daily life.

Moreover, the rich thematic narratives present in these RPGs create immersive experiences that enable children to practice self-regulation in a socially constructive environment. This aligns with findings that emphasize the importance of context in learning, demonstrating how agency,

social negotiation, and cooperative interaction can reinforce self-regulatory practices among peers (Lorente et al., 2024; Veiga et al., 2023). Immersive play experiences not only support children's self-regulatory skills but also enhance their capacity to communicate, collaborate, and empathize with others, as seen in various pedagogical studies (Ureña Ortín et al., 2024; Wu & Goff, 2023). While structured RPGs like "Character Quest" show promise in improving measurable self-regulation outcomes, more evidence is needed to establish the robustness of these claims across multiple studies. The immersive, narrative-driven play appears to act as a transformative pedagogical practice capable of promoting holistic child development, but further research should delineate its specific impacts (Martín-Del-pozo & Martín-Sánchez, 2022; Rossini, 2021).

The study of face-to-face, story-driven role-playing games (RPGs) as a scaffold for developing executive functions in early childhood education presents a promising shift in educational paradigms, particularly when contrasted with the prevailing focus on digital game-based learning platforms aimed at older students. Research indicates that the implementation of RPGs fosters essential skills such as emotional regulation, impulse control, and attention management, consistent with existing literature on effective early childhood educational practices (Brophy-Herb et al., 2019; Cano & Murcia, 2023; Lin & Chang, 2025; Richards & Bain, 2024). Notably, the findings suggest that RPGs not only serve as engaging narratives that capture children's imagination but also provide structured opportunities for practicing executive functions through collaborative storytelling and decision-making (Fukkink et al., 2024; Yang et al., 2022).

The mixed-methods design of this intervention affords a nuanced understanding of its efficacy, revealing how quantitative improvements in metrics, such as those measured by the Self-Regulation Rating Scale for Early Childhood, are complemented by qualitative insights regarding children's agency and social interactions during play (Gallud et al., 2023). Specifically, the RPG context empowers children to navigate challenges, articulate their thoughts, and negotiate with peers, thereby enhancing their self-regulatory skills in a tangible and meaningful manner. This aligns with sentiments expressed in previous studies where direct engagement through play has been linked to improvements in self-control and social competence (Yang et al., 2022). Moreover, the significant quantitative findings, such as effect sizes indicating improvements in behavioral inhibition, illustrate the transferability of skills developed in the RPG context to broader academic and social settings (Espigares-Gómez et al., 2020). Teachers reported a decrease in disruptive behavior and an increase in sustained attention among students post-RPG sessions, reinforcing the hypothesis that the benefits of game-based learning extend beyond the immediate context of play, aiding children's overall readiness for school (Alotaibi, 2024; Zhang et al., 2022). This transformation is particularly critical in light of the growing body of evidence advocating for the integration of play-based and experiential learning approaches in early childhood education (ten Braak et al., 2019). The study substantiates the role of RPGs as a viable and effective mechanism for enhancing executive functions in early learners, merging entertainment with educational value. The findings advocate for broader implementation of face-to-face, narrative-driven play as an essential pedagogical strategy within early childhood education, emphasizing its ability to nurture critical social and self-regulatory skills in children (Housman et al., 2023; Pakulak & Lipina, 2021; Stefaniak, 2018).

4.1. Research Contribution

This study advances the executive-function literature by highlighting the pedagogical potential of tabletop RPGs—distinct from digital games or unstructured free play—as structured environments for practicing both “cool” (rule-based) and “hot” (emotion-laden) self-regulation. It integrates SRRS-EC data with diverse qualitative artifacts (teacher interviews, play journals, behavior tallies) in a mixed-methods framework that captures both the extent and process of change. The study documents spontaneous transfer of in-game planning language to academic activities, offering rare insight into near-to-far skill transfer in early-childhood executive function interventions. The paper also presents a low-cost, analog RPG toolkit suitable for low-tech classrooms, addressing equity gaps associated with digital learning tools. By showing how self-regulation, engagement, and prosocial behavior can co-develop within a playful, narrative-rich

context, the study supports holistic curriculum approaches in early childhood education. The intervention protocol and qualitative coding framework offer replicable tools for future studies, laying a foundation for comparative research across cultures and educational settings.

4.2. Limitations

A single-group, pre-post design without an active control makes it impossible to rule out maturation, Hawthorne, or expectancy effects. Thirty children from one suburban kindergarten limit statistical power and external validity; cultural and socioeconomic diversity was minimal. The SRRS-EC is robust, yet both it and the qualitative logs rely heavily on teacher ratings and narrative notes that may be biased by enthusiasm for the programme. RPG sessions were new and exciting; improvements might reflect short-lived novelty rather than durable skill growth. Outcomes were captured immediately after the eight-week intervention, so persistence beyond the short term is unknown. No neurocognitive or physiological indices (e.g., heart-rate variability, ERP/fNIRS) were gathered to verify that executive-function networks were directly engaged. Although the intervention shows promising outcomes, its implementation was limited to a homogeneous group within a single suburban area, restricting claims of applicability to rural or culturally diverse contexts.

4.3. Suggestions

Conduct multi-site RCTs with active, play-based controls (e.g., free pretend play, board-game math). Recruit larger cohorts across urban-rural and socio-economic strata; include dual-language learners. Add 3-, 6-, and 12-month follow-ups measuring academic readiness and SEL. Pair behavioural scales with executive-function tasks (e.g., Day-Night Stroop) and neurocognitive measures. Vary narrative depth, cooperation rules, and reward schedules in factorial trials. Develop professional-development modules on RPG facilitation, reflection prompts, and cultural adaptation. Pilot RPG-infused SEL units within national early-childhood frameworks.

5. Conclusion

This mixed-methods investigation set out to determine whether an eight-week, face-to-face role-playing game (RPG) module, Character Quest, could strengthen self-regulation in kindergarten children. Quantitative analyses showed large, statistically significant gains in overall self-regulation ($d = 1.50$) and each subdomain of attention control, emotional regulation, and behavioral inhibition ($d \geq 1.28$). Complementary qualitative evidence revealed that (a) story-driven quests heightened motivation and sustained on-task behavior, (b) children spontaneously transferred in-game planning scripts to academic work, and (c) repeated, rule-bound play improved impulse control and peer collaboration. The convergence of these data strands clarifies *how* and *why* the intervention worked: Character Quest provided a motivating, socially scaffolded rehearsal space where children could repeatedly practice and then generalize key executive-function skills.

Declarations

Author contribution statement

Rahayu Dwi Utami conceived the idea and conducted data collection. Ku-Ares Tawandorloh developed the theory and performed the analysis. All authors in discussions regarding the findings and made contributions to the final manuscript.

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Data availability statement

The dataset generated and analyzed during the research is available from the corresponding author upon reasonable request.

Declaration of interests statement

All authors declare that they have no financial or personal interests that could influence the work presented in this manuscript.

Additional information

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