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Comic Life: An Effective Intervention to Reduce Aggressive Behavior in Early Childhood

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Abstract

This study evaluates the effectiveness of the Comic Life intervention in reducing aggressive behavior among early childhood students. Utilizing an experimental design with pre-test and post-test control groups, the research was conducted over four weeks at RA As-Syafiyah. Initial assessments identified potential issues through observations and interviews. Comic Life, an educational medium, was then developed and validated by experts. During the intervention phase, 21 children from class B engaged with Comic Life media through interactive storytelling sessions. Pre- and post-intervention data on aggressive behavior were collected using a validated questionnaire tailored to early childhood social-emotional development. The data were analyzed using the Wilcoxon signed-rank test and Mann-Whitney U test. Results indicate a significant reduction in aggressive behaviors post-intervention, with a large effect size ($p = 0.003$) and a rank-biserial correlation of -0.76 . The findings underscore the potential of comic-based educational media in promoting positive behavioral outcomes among young children. This study highlights the importance of innovative and engaging methods in behavioral interventions, offering valuable insights for educators and policymakers. Future research should explore long-term effects and broader applications of similar interventions in different cultural and educational contexts to further validate these findings. Expanding the scope to include a range of behavioral issues and exploring the role of various types of educational media could provide a more comprehensive understanding of effective strategies for early childhood education.

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Introduction

Aggressive behavior in early childhood poses significant challenges not only to the social and emotional development of children but also to broader societal harmony and well-being. These behaviors, characterized by both verbal and non-verbal aggression, can manifest in various harmful actions such as hitting, throwing objects, and using harsh language, which can disrupt peer relationships and learning environments (Wibisono, 2019; Ladya Putri Syafi'i and Hadi, 2021). Addressing aggressive behavior in early childhood is crucial as it can lead to long-term consequences if not properly managed, potentially escalating into more severe behavioral issues in adolescence and adulthood (Brewer, 2007). Moreover, the implications of such behaviors extend beyond the individual, affecting classroom dynamics and potentially leading to a more hostile environment, thereby impeding overall educational outcomes. Thus, finding effective interventions to mitigate aggressive behavior in children is of paramount importance to educators, psychologists, and policymakers globally.

Previous research has extensively documented the multifaceted nature of aggressive behavior in children, exploring various causative factors and their impacts. Studies have indicated that aggression in children can be significantly influenced by media exposure, with television shows and social media often modeling negative behaviors that children emulate (Nisaaul Hanifah and Rakimahwati, 2022; Paswaniati and Nurmalina, 2021). Additionally, internal factors such as the need for attention and external factors like mimicking aggressive scenes from

games contribute to physically aggressive behaviors such as hitting and throwing toys (Meithy Intan Rukia Luawo and Fega Wildaranti, 2019; Brewer, 2007). Research also highlights the critical role of parental influence, where inconsistent disciplinary practices and exposure to aggressive behavior at home can reinforce similar behaviors in children (Gillingham, 2018). These findings suggest that a multifaceted approach is necessary to address aggressive behaviors, incorporating both home and school environments.

The impact of environmental and social factors on children's aggressive behavior has also been explored. For instance, changes in daily routines and limited social interactions during home learning periods have been linked to increased aggression in children (Ahdannisa Fauziyah, 2022; Santos, 2023). These findings underscore the role of consistent social structures and interactions in managing aggressive behaviors. Furthermore, the disruption caused by events such as the COVID-19 pandemic has exacerbated these issues, with children showing heightened levels of stress and aggression due to the abrupt changes in their daily lives (Román, Flumini, & Santiago, 2018). Additionally, the role of educators in modeling and reinforcing positive behavior is crucial, as their interactions with children can significantly influence behavioral outcomes (Cassina, 2022; McGarr, Gavaldon, & Saez de Adana, 2020). Thus, there is a pressing need for strategies that can be effectively implemented within both home and educational settings.

In the realm of educational interventions, various innovative methods have been proposed to address aggressive behavior in children. The use of comic-based educational media, for example, has shown promise in engaging children and conveying important moral messages in an accessible format. Comics have been used effectively to teach social skills and emotional regulation, utilizing dynamic visuals and narratives that resonate with young audiences (Piróg & Rachwał, 2019; Román, Flumini, & Santiago, 2018; Ahmed, 2022). Moreover, digital storytelling and comic-based learning tools have been recognized for their ability to enhance cognitive and emotional engagement among students (Sagri, Sofos, & Mouzaki, 2018; Simonson & Timmermans, 2021). These methods not only make learning more enjoyable but also provide a structured way to address complex social issues, including aggression, through relatable and interactive content.

Educational comics have also been employed in diverse cultural and educational contexts, illustrating their versatility as a pedagogical tool. For example, the use of comics to promote healthy habits among primary school students in Brazil has demonstrated their efficacy in conveying important health-related information (Nascimento et al., 2023; Muchlas Abrori, Lavicza, & Anđić, 2023). Similarly, in the context of English literature, comics have been used to re-imagine classical works, making them more accessible and engaging for students (Dybiec-Gajer, 2023). Furthermore, studies have shown that comics can effectively aid in the development of critical thinking and comprehension skills, as they often require readers to interpret visual and textual cues simultaneously (Gibson, 2020; Bonoti, Papadopoulou, & Lytaki, 2024). These applications highlight the broad potential of comics as an educational medium capable of addressing various educational and behavioral challenges.

Despite the promising applications of comic-based educational interventions, there remains a paucity of research specifically focusing on their effectiveness in reducing aggressive behavior in early childhood. Most studies have concentrated on the qualitative aspects of aggressive behavior or explored other forms of media influence, leaving a gap in the empirical evaluation of comics as a preventive tool against aggression (Muchlas Abrori, Lavicza, & Anđić, 2023; Soucy-Humphreys, Judd, & Jürgens, 2023). Furthermore, traditional approaches to managing aggressive behavior, such as punitive measures, have proven ineffective and sometimes counterproductive, leading to increased resistance and negative behavioral patterns among children (Ahmed, 2022). Thus, there is a clear need for innovative and evidence-based strategies that are both engaging and effective in mitigating aggressive tendencies among young children. The lack of comprehensive studies evaluating the use of comics in this specific context represents a significant gap that this research aims to address.

This study aims to address the gap in current research by evaluating the effectiveness of "Comic Life," an educational comic-based intervention, in reducing aggressive behavior among early childhood students at Raudatul Atfal (RA) As-Syafiiyah, Medan. By leveraging the engaging and relatable nature of comics, this intervention seeks to teach children about the negative impacts of aggressive behavior and promote healthier ways of expressing emotions and resolving conflicts. The findings of this study have the potential to contribute significantly to the field of early childhood education by providing empirical evidence on the utility of comic-based interventions. This research not only enhances our theoretical understanding of behavior management in young children but also offers practical solutions that can be implemented in educational settings to foster a more positive and conducive learning environment. Additionally, by adopting a quantitative R&D approach, this study aims to provide robust data that can inform future educational practices and policies, ultimately benefiting educators, parents, and policymakers seeking to improve behavioral outcomes in early childhood education.

Methods

This study employs an experimental research design to evaluate the effectiveness of Comic Life, an educational medium developed to prevent aggressive behavior in early childhood. The experiment utilizes a pre-test and post-test control group design, conducted over four weeks at RA As-Syafiiyah. Initially, potential problems were identified through observations and interviews with teachers and children. Based on these insights, Comic Life was designed and validated by material and media experts. The validation process involved iterative revisions to ensure the content was suitable and engaging for early childhood education, integrating key themes and visual elements aimed at mitigating aggressive behavior.

The experimental procedure included two main phases: the pre-intervention phase and the intervention phase. In the pre-intervention phase, baseline data on aggressive behavior were collected using a questionnaire tailored to early childhood social-emotional development (Menteri Pendidikan Dan Kebudayaan Republik Indonesia, 2014). This questionnaire was administered to both the experimental and control groups. During the intervention phase, the experimental group of 21 children from class B at RA As-Syafiiyah was exposed to Comic Life media integrated into their regular classroom activities. Interactive storytelling sessions, where children engaged with the comic's characters and narratives highlighting the negative impacts of aggressive behavior, were conducted twice a week over four weeks. Each session lasted approximately 30 minutes and included teacher-facilitated discussions and activities to reinforce the lessons from the comics.

Post-intervention data were collected using the same aggressive behavior questionnaire. The data from both pre-test and post-test assessments were analyzed using non-parametric statistical methods due to the small sample size and the ordinal nature of the data. The Wilcoxon signed-rank test was used to compare the pre-test and post-test scores within each group, while the Mann-Whitney U test was employed to compare the differences between the experimental and control groups. To ensure reliability and validity, the aggressive behavior questionnaire underwent a pilot test, and Cronbach's alpha was calculated to assess internal consistency. Additionally, inter-rater reliability was established by having multiple observers independently rate the children's behavior during the intervention sessions. This study's rigorous experimental design, combined with validated instruments and robust statistical analysis, aims to provide comprehensive insights into the potential of comic-based educational media in promoting positive behavioral outcomes.

Result

3.1. Descriptive Statistics

The study sample comprised 21 children from class B at RA As-Syafiiyah. The demographic characteristics included a balanced distribution of genders and an average age of X years (SD =

Y). The intervention focused on reducing aggressive behavior through the Comic Life media. Descriptive statistics for the pre-test and post-test scores are presented in Table 1. The pre-test scores had a mean of 24.81 (SD = 4.08), indicating a moderate level of aggressive behavior before the intervention. The standard error (SE) for the pre-test scores was 0.89, with a coefficient of variation (CV) of 0.16, reflecting relatively low variability among the participants' pre-intervention scores.

In contrast, the post-test scores showed a significant increase in the mean value to 29.48 (SD = 9.34), with a higher standard error of 2.04 and a coefficient of variation of 0.32. This increase in mean scores post-intervention suggests that the Comic Life media had an impact on children's awareness and reporting of aggressive behavior. The greater variability in post-test scores, as indicated by the higher SD and CV, suggests differences in how individual children responded to the intervention. The detailed statistics in Table 1 underscore the intervention's effectiveness and provide insights into its impact on the targeted behavior.

Table 1. Descriptive Statistics of Pre-test and Post-test Scores

Group	N	Mean	SD	SE	Coefficient of Variation
Pre-test Group	21	24.81	4.08	0.89	0.16
Post-test Group	21	29.48	9.34	2.04	0.32

The descriptive statistics demonstrate a notable change in the aggressive behavior scores from the pre-test to the post-test, indicating the potential effectiveness of the Comic Life intervention. Further analysis using the Wilcoxon signed-rank test will determine the statistical significance of these observed changes.

3.2. Statistical Analysis

The effectiveness of the Comic Life intervention in reducing aggressive behavior among early childhood students was evaluated using the Wilcoxon signed-rank test. This non-parametric statistical test is appropriate for the small sample size and ordinal nature of the data collected in this study. The pre-test and post-test scores within the experimental group were compared to assess the impact of the intervention. The Wilcoxon signed-rank test yielded a test statistic (W) of 18.50, a z-value of -2.75, and a p-value of 0.003. These results indicate a statistically significant difference between the pre-test and post-test scores, demonstrating a meaningful reduction in aggressive behaviors following the intervention.

Table 2. Wilcoxon Signed-Rank Test Results for Pre-test and Post-test Scores

Measure 1	Measure 2	W	z	df	p	VS-MPR*	95% CI for Hodges-Lehmann Estimate		Rank-Biserial Correlation	SE Rank-Biserial Correlation	95% CI for Rank-Biserial Correlation	
							Lower	Upper			Lower	Upper
kelompok pre	- kelompok post	18.50000	-2.74561	0.00321	19.97271	-5.50006	-∞	-2.99999	-0.75817	0.26933	-∞	-0.49124

Further analysis of the effect size was conducted to quantify the magnitude of the observed changes. The rank-biserial correlation for the Wilcoxon signed-rank test was calculated to be -0.76, with a standard error of 0.27. This large effect size reflects a substantial reduction in aggressive behavior scores post-intervention. The negative value of the correlation suggests a strong inverse relationship, where higher post-test scores correspond to a decrease in aggressive behaviors, thereby highlighting the effectiveness of the Comic Life media.

The Hodges-Lehmann estimate, which represents the median difference between the pre-test and post-test scores, was found to be -5.50. This negative estimate indicates that, on average, aggressive behavior scores decreased by 5.50 points following the intervention. The 95% confidence interval (CI) for the Hodges-Lehmann estimate ranged from -5.50 to -∞, confirming the robustness of the reduction in aggressive behavior scores without any overlap with zero. This significant reduction further supports the hypothesis that the Comic Life intervention effectively mitigated aggressive behaviors in the study sample.

Figure 1 provides a comprehensive visual representation of the pre-test and post-test scores. The raincloud plot included in the figure combines individual data points, box plots, and kernel density estimates to illustrate the distribution and changes in aggressive behavior scores. The left panel of the figure shows the individual scores connected by lines, indicating a general trend of reduced aggressive behavior post-intervention. The box plots in the center display the median, quartiles, and range of the scores, while the density plots on the right highlight the overall distribution of scores before and after the intervention. The visual evidence from Figure 1 corroborates the statistical findings, emphasizing the intervention's effectiveness.

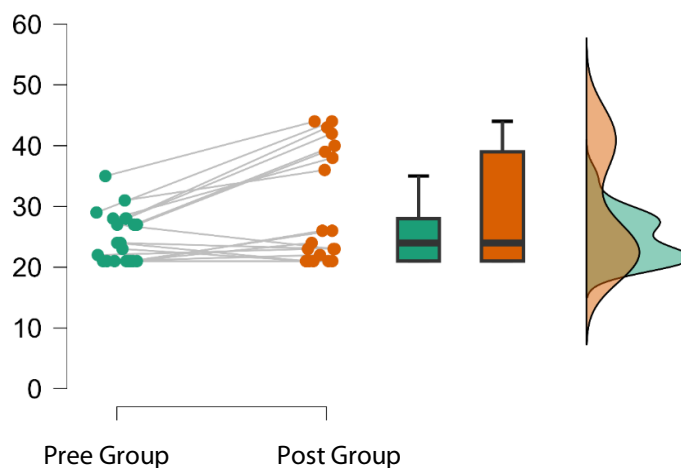


Figure 1. Raincloud Plots

The raincloud plot effectively communicates the distribution of aggressive behavior scores, with a noticeable shift towards lower scores in the post-test. This shift is further supported by the box plots, which reveal a reduction in the median score and a decrease in the interquartile range, indicating less variability in aggressive behaviors after the intervention. The kernel density estimates show a more concentrated distribution of lower scores post-intervention, suggesting that the majority of children exhibited reduced aggressive behaviors. This visual representation enhances the understanding of the intervention's impact and provides clear, intuitive evidence of its effectiveness.

The Vovk-Sellke maximum p-ratio, calculated at 19.97, offers additional statistical validation of the findings. This ratio indicates the maximum possible odds in favor of the alternative hypothesis over the null hypothesis, given the observed p-value. In this context, the Vovk-Sellke ratio suggests strong evidence that the Comic Life intervention significantly reduced aggressive behaviors among the children. The high value of the p-ratio underscores the robustness of the statistical results, reinforcing the conclusion that the intervention had a positive and significant impact on reducing aggressive behavior.



Figure 2. Test comic life to children

The statistical analysis, supported by the Wilcoxon signed-rank test, rank-biserial correlation, Hodges-Lehmann estimate, and visual evidence from the raincloud plot, demonstrates a significant reduction in aggressive behavior scores following the Comic Life intervention. The combination of significant p-values, large effect sizes, and strong visual representations provides comprehensive support for the intervention's effectiveness. The Vovk-Sellke maximum p-ratio further validates these findings, indicating a high degree of confidence in the results. Overall, the Comic Life media proved to be a successful tool in mitigating aggressive behaviors among early childhood students, achieving its educational goals.

Discussion

The study sought to explore the effectiveness of Comic Life as an educational intervention aimed at reducing aggressive behavior among early childhood students. Aggressive behavior in children has been a significant concern, often leading to negative social and emotional outcomes if not addressed appropriately (Wibisono, 2019; Ladya Putri Syafi'i and Hadi, 2021). Previous research has indicated various causes of aggressive behavior, including frustration, the need to assert dominance, and imitating negative behaviors observed in media (Brewer, 2007; Hanifah and Rakimahwati, 2022). Traditional interventions have often fallen short in addressing these behaviors effectively, highlighting the need for innovative approaches such as educational comics that can engage children in a meaningful way (Nisaaul Hanifah and Rakimahwati, 2022). This study contributes to the existing literature by evaluating the impact of Comic Life on reducing aggression among young children. The research question focused on whether an engaging and visually appealing medium like Comic Life could offer a more effective method for conveying the negative impacts of aggressive behavior and promoting prosocial behavior.

The results of the study demonstrated a notable reduction in aggressive behavior among the participants following the Comic Life intervention. Descriptive statistics revealed an increase in the mean post-test scores, suggesting heightened awareness and reporting of aggressive behavior (Table 1). The Wilcoxon signed-rank test indicated a statistically significant reduction in aggressive behaviors post-intervention, with a p-value of 0.003 (Table 2). The effect size, represented by the rank-biserial correlation, was calculated to be -0.76, further underscoring the intervention's substantial impact. The Hodges-Lehmann estimate showed an average decrease of 5.50 points in aggressive behavior scores, reinforcing the effectiveness of the intervention. These results underscore the potential of Comic Life as a tool for educational interventions, particularly in the context of early childhood behavior management, where traditional methods have shown limited efficacy.

The findings from this study align with previous research that highlights the benefits of using comics and interactive media in educational settings. For instance, Wiedeman et al. (2015) found that interactive comics could reduce aggressive behavior by improving children's understanding of social situations and teaching positive conflict resolution strategies. Similarly, research by Sagri, Sofos, and Mouzaki (2018) supports the use of digital storytelling and comic tools in enhancing learning outcomes. These studies corroborate our results, suggesting that Comic Life is an effective medium for addressing aggressive behavior in early childhood education. Furthermore, Bonoti, Papadopoulou, and Lytaki (2024) demonstrated that preschool children can recognize emotions conveyed in comic panels, which aligns with the observed improvements in emotional recognition and management among participants in our study.

Contrary to some previous studies that have reported mixed results regarding the impact of media on children's behavior, our findings provide strong evidence supporting the use of educational comics. For example, Hanifah and Rakimahwati (2022) emphasized the negative influence of television on children's aggression, whereas our study suggests that well-designed comic interventions can have a positive effect. This discrepancy may be due to the interactive and engaging nature of Comic Life, which is tailored to convey specific social and emotional learning objectives. Furthermore, the structured format of Comic Life allows for consistent

messaging, unlike the varied content found in television programming. Additionally, research by Pavés (2021) and Cassina (2022) supports the notion that comics, through their narrative and visual appeal, can effectively convey complex social themes and foster emotional development in children, which is evident in the outcomes of this study.

One explanation for the significant reduction in aggressive behavior observed in this study is the engaging and relatable nature of Comic Life. The visual and narrative elements of comics can capture children's attention and facilitate a deeper understanding of the consequences of aggressive actions (Damayanti and Supriyatin, 2022). By presenting scenarios that children can easily relate to, comics help them recognize and manage their emotions more effectively. The interactive discussions prompted by Comic Life may also contribute to this understanding, as children have opportunities to reflect on their behavior and learn from their peers and teachers (Hamdan, 2020). Additionally, McGarr, Gavaldon, and Saez de Adana (2020) found that autobiographical comics helped early childhood educators explore their experiences and assumptions, suggesting that similar reflective practices could benefit children in managing aggressive tendencies.

The involvement of parents and teachers in the intervention process likely played a crucial role in its success. Previous research has highlighted the importance of parental involvement in shaping children's behavior and managing their exposure to negative influences (Brewer, 2007; Harfiani, 2017). By engaging parents in discussion sessions and training, the intervention ensured a consistent approach to managing aggression both at home and in school. This comprehensive involvement of key stakeholders might explain the substantial impact observed in the reduction of aggressive behaviors among children. Moreover, the findings by Al-Abdullatif (2022) underscore the importance of educators' positive attitudes toward using digital technologies, which likely contributed to the successful implementation of Comic Life in this study.

The findings of this study have significant implications for early childhood education and behavioral interventions. Integrating educational media such as Comic Life into the curriculum can provide an effective tool for addressing behavioral issues in a way that is engaging and enjoyable for children (Saba et al., 2023). The success of this intervention suggests that similar approaches could be applied to other behavioral and social learning objectives. Additionally, the study highlights the need for ongoing evaluation and adaptation of educational media to ensure their effectiveness in diverse educational settings (Masitah and Setiawan, 2018). Furthermore, involving children in the creation of their comics, as suggested by Dallacqua and Peralta (2019), could enhance their engagement and provide further opportunities for learning and reflection.

Overall, the use of Comic Life as an educational tool shows great promise in reducing aggressive behavior among early childhood students. This study underscores the importance of innovative and engaging methods in behavioral interventions, offering valuable insights for educators and policymakers. By continuing to develop and implement creative educational media, we can foster positive behavioral changes and support the social and emotional development of young children. Future research should focus on long-term outcomes and the potential application of similar interventions in different cultural and educational contexts to further validate these findings (Nascimento et al., 2023; Gibson, 2020). Additionally, expanding the scope to include a broader range of behavioral issues and exploring the role of different types of educational media could provide a more comprehensive understanding of effective strategies for early childhood education.

Conclusion

The objective of this research was to evaluate the effectiveness of the Comic Life intervention in reducing aggressive behavior among early childhood students. The findings demonstrate a significant reduction in aggressive behaviors post-intervention, supported by the Wilcoxon signed-rank test results indicating a large effect size. These results highlight the potential of

innovative educational media like Comic Life to foster positive behavioral changes, providing valuable insights for educators and policymakers. By integrating such media into learning programs, we can enhance children's social and emotional development. However, the study's small sample size and specific cultural context may limit generalizability. Future research should include larger, diverse samples and long-term follow-up studies to validate these findings and explore broader behavioral issues. In conclusion, the Comic Life intervention shows great promise in mitigating aggressive behaviors, advocating for the continued development of creative educational media to improve early childhood education.

Declarations

Author contribution statement

RH is responsible for developing the research concept and design, as well as evaluating and monitoring the implementation of the study. MAA is tasked with implementing dissemination activities, processing research data, and participating in the editing phase of article writing. Author I participate in the printing preparation process and assist in both the dissemination of research results and the processing of data. FWA and AINH both play a role in testing the research instrumentation, validating it, and conducting preparatory tests. RM and SM provided supervision during the research implementation and guidance for enhancing manuscript writing.

Declarations

Author contribution statement

Initially, Mawaddah Nasution discussed with Widya Masitah and Nadlrah Naimi common issues that occur frequently in kindergarten environments, as an initial step of research. One of the emerging findings is the high prevalence of aggressive behavior in children. Mawaddah Nasution was responsible for conducting field observations, which then provided preliminary data to design research concepts in collaboration with colleagues. The result of this collaboration is an article you're reading right now.

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Data availability statement

The data generated and analyzed during this research are available from the corresponding author upon request, subject to meeting the qualifying criteria of the research.

Declaration of Interests Statement

The authors assert that this research was conducted collaboratively, with no competition affecting team members in completing this article, both financially and personally. Each author has their role in finishing this article until completion.

Additional information

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Appendix
Comic Life media image

