



## Father-child attachment through educational games to support self-disclosure and achievement

Setriani <sup>1\*</sup>, Meilia Ishar <sup>2</sup>, Daffa Tiara Kurnia Prastiwi <sup>3</sup>

<sup>1</sup> Faculty of Psychology, University of Muhammadiyah Lampung, Bandar Lampung, 35131, Indonesia

<sup>2</sup> Faculty of Psychology, University of Muhammadiyah Lampung, Bandar Lampung, 35131, Indonesia

<sup>3</sup> Faculty of Psychology, University of Muhammadiyah Lampung, Bandar Lampung, 35131, Indonesia

\*Corresponding Author Email: [ria.setriani@gmail.com](mailto:ria.setriani@gmail.com)

### Abstract

This study examines the role of educational games in strengthening father-child attachment and supporting children's self-disclosure and academic achievement. The research employed a quasi-experimental design involving elementary school students and their fathers who participated in a structured educational game program called *Zona Nyaman*. Attachment, self-disclosure, and academic achievement were measured before and after the intervention. The results showed a significant increase in attachment quality and self-disclosure among children who participated in the program, accompanied by an improvement in academic achievement. These findings indicate that structured cooperative play may serve as an activation mechanism for father-child attachment, providing a meaningful context for emotional communication and learning support. The study contributes to the theoretical development of father involvement literature by highlighting the psychological processes through which educational play strengthens family relationships and learning outcomes. Practically, the results suggest that educational games can be implemented as a culturally appropriate and engaging strategy to increase fathers' involvement in their children's development. Future research is recommended to explore mediating and moderating variables and to examine the long-term sustainability of the intervention effects.

Keywords: academic achievement, educational games, father-child attachment, self-disclosure.

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### 1. Introduction

Attachment between fathers and children plays a crucial role in a child's social, emotional, and academic development. A strong attachment can foster a sense of security, self-disclosure, and emotional support, ultimately contributing to academic achievement [1]. However, in practice, father-child interactions are often less frequent than mother-child interactions, limiting opportunities for building emotional attachment. This condition is concerning, given the crucial role of fathers in child development, especially in Indonesia, which has been described as a "fatherless society" [2]. A survey by the Indonesian Child Protection Commission (KPAI) showed that only about 2% of fathers in urban areas communicate with their children for one hour per day [3], with the average interaction being only 65 minutes per day. This low level of father involvement is largely attributed to work-related demands and patriarchal cultural norms that limit the paternal role in parenting [4].

Weak father-child attachment may reduce self-disclosure, a key component of psychosocial

development [5], and influence academic achievement [6]. Previous research indicates that children with strong paternal attachments tend to show better emotional well-being, emotional regulation, and academic achievement [7][8][9]. Within Bowlby's [10] Attachment Theory, secure attachment to a caregiver forms the foundation for emotional and social functioning. Paquette [11] later emphasized the "activation relationship", highlighting the father's role in stimulating exploration and risk-taking through physically engaging play. Such interactions may strengthen attachment even when time spent together is limited [12].

Play, therefore, serves as a strategic medium for building father-child relationships. The concept of cooperative play, introduced by Parten [13] in his Six Stages of Play, describes how children work together toward a shared goal. Studies have shown that interactive, cooperative play can enhance trust and a sense of togetherness between fathers and children [14] while also fostering open communication [15]. Recent studies further confirm that collaborative play can improve social skills and strengthen emotional bonds

within families [16][17]. However, most prior research has focused on the mother-child relationship or unstructured play. Evidence regarding structured cooperative play interventions—especially those embedded in a specific program such as *Zona Nyaman*—remains limited.

Based on these theoretical foundations, this study integrates Bowlby's Attachment Theory and Parten's *Six Stages of Play* as a basis for designing *Zona Nyaman* educational game [10][13]. This innovation offers a structured intervention aimed at strengthening father-child attachment in elementary school children, enhancing self-disclosure, and supporting academic achievement. This approach combines psychological (emotional security), pedagogical (engaging learning strategies), and family-relationship (active father involvement) dimensions.

Beyond applying existing attachment and play theories. This study aims to expand the theoretical understanding of father-child relationships. It does so by positioning educational games as a mechanism for attachment activation. Drawing on Bowlby's Attachment Theory and Parten's *Six Stages of Play*, the *Zona Nyaman educational game* is conceptualized as a structured cooperative play context that enables fathers to activate emotional security, communication, and exploration within limited interaction time. In this framework, self-disclosure is not merely treated as an outcome variable but as a proximal psychological process that reflects the quality of attachment formation and potentially bridges father involvement and children's academic achievement. By explicitly articulating this mechanism, the present study moves beyond descriptive application and offers a theoretically grounded explanation of how structured educational play operates within father-child attachment dynamics.

Accordingly, this study aims to: (1) examine the effectiveness of the *Zona Nyaman* educational game in enhancing attachment, and (2) assess whether the intervention can improve children's self-disclosure and academic achievement. Findings from this research are expected to address gaps in the existing literature and contribute practically to improving the quality of father-child interactions in Indonesia through educational game-based activities.

## 2. Methods

This study employed a quantitative approach with a quasi-experimental design using a pretest-post-test control group structure. This design involved an experimental group and a control group that were not randomly assigned.

Table 1. Form of Research Design

Group	Pretest	Treatment	Post-test
Experiment	O <sub>1</sub>	X	O <sub>2</sub>
Control	O <sub>3</sub>	-	O <sub>4</sub>

The experimental and control group was given a pretest (O<sub>1</sub> and O<sub>3</sub>) to assess baseline differences. The experimental group then received the treatment (X) by playing the *Zona Nyaman* educational game at home with their father. After four intervention sessions, both groups were administered post-test (O<sub>2</sub> and O<sub>4</sub>) to measure outcomes.

Participants were selected using a purposive sampling technique based on the following inclusion criteria: (1) fathers and children aged 9–11 years [18], (2) living in the same household, (3) exhibiting low levels of attachment or minimal communication, and (4) fathers who could commit to participating in all play sessions. The experimental group consisted of 30 father-child pairs who met these criteria, with interaction time controlled at a minimum of 60 minutes per day [19].

The study was conducted at Elementary School X in Lampung with students from grades III and IV. Both groups consisted of 30 students each, resulting in a total sample of 60 students.

In both the pretest and post-test phases, students were given three research instruments that included the parental attachment scale from the Inventory of Parent and Peer Attachment [20]. Self-disclosure was measured using the Revised Self-Disclosure Scale (RSDS) [21] and a teacher-created academic achievement test. These instruments were used to measure changes in the main variables of the study.

The research procedure consisted of five stages. The first stage was preliminary preparation, including problem identification and a review of relevant literature. An initial survey was conducted at Elementary School X to obtain data regarding father-child relationships.

The second stage was the development of the *Zona Nyaman* educational game, designed based on the cooperative play concept from [13]. This game consisted of four sessions: product creation, competitive play, role-play, and formal play (games with standardized rules). Each session lasted for at least 60 minutes per day and was conducted over two weeks.

Table 2. Conceptual Pathway of The *Zona Nyaman* Educational

Game Intervention

Game Component	Psychological Process	Expected Outcome
Role-play activities	Emotional expression and narrative sharing	Increased self-disclosure
Product creation	Trust building and emotional security	Strengthened father-child attachment

Competitive play	Cognitive engagement and persistence	Improved academic achievement
Formal game (Structured rule)	Learning motivation and self-regulation	Academic performance support

Operationally, each session of the *Zona Nyaman* educational game was designed to stimulate specific psychological processes. The role-play activities encouraged emotional expression and narrative sharing, facilitating children's self-disclosure toward their fathers. Product creation required joint decision-making and problem-solving, fostering mutual trust and emotional security as core components of attachment. Competitive and rule-based play introduced structured challenges that promoted engagement, persistence, and learning motivation. Through repeated father-child interaction in these structured activities, the intervention functioned as a systematic medium for strengthening attachment and supporting both psychosocial and academic achievement.

The third stage involved expert validation of the educational game by psychologists, followed by validity and reliability testing of the research instruments. In the validity test of the educational game, a validity value ranging from 0.442 to 0.748 was obtained, given by a panel of experts in the field of psychology. Then, a try-out was conducted on the research scale with students who were not the research subjects. After the try-out, on the parental attachment scale [20], a reliability test was carried out, and a reliability coefficient of 0.823 was obtained with a validity value ranging from 0.578 to 0.832. Then, on the self-disclosure scale [21], a reliability coefficient of 0.886 was obtained with a validity value of 0.498 to 0.877. The Academic Achievement Test, with a reliability coefficient of 0.994, was obtained with a validity value of 0.781 to 0.943.

The fourth stage was the implementation of the intervention. Pretests were administered to both groups. Fathers and children in the experimental group then participated in four *Zona Nyaman* educational game sessions. After the intervention, post-tests were administered to both groups.

The fifth stage was data analysis. Hypothesis testing was conducted using t-tests and F-tests to examine mean differences between the experimental and control groups across all variables.

### 3. Results and Discussions

#### Results

This section presents the results of the pretest and post-test analyses for the experimental and control groups. The descriptive statistics showed that the mean scores for father-child attachment, self-disclosure, and academic achievement increased in the experimental

group after participating in the *Zona Nyaman* educational game, while changes in the control group were relatively small.

Assumption testing indicated that the data were normally distributed and homogeneous. Therefore, hypothesis testing was conducted using the t-test and F-test to examine mean differences between the two groups.

The results showed a significant difference in father-child attachment between the experimental and control groups in the post-test, with the experimental group obtaining a higher mean score. Similar results were found for self-disclosure and academic achievement, where the experimental group showed significantly higher post-test scores than the control group. These findings indicate that the *Zona Nyaman* educational game had a positive effect on improving father-child attachment, self-disclosure, and academic achievement.

#### 3.1. Pretest And Post-test Results

Table 3. Results of Father-Child Attachment Pretest and Post-test

	Group	N	Min	Max	Mean	SD
Pretest	Experiment	30	65	90	78.07	6.25
	Control	30	69	105	78.68	9.00
Post-test	Experiment	30	66	95	82.09	12.75
	Control	30	58	109	78.37	7.25

As shown in Table 3, the experimental group's mean score increased from 78.07 to 82.09, while the control group's mean slightly decreased from 78.68 to 78.37. The significance test indicated a p-value of 0.034 ( $p < 0.05$ ), suggesting that the intervention significantly improved father-child attachment.

Table 4. Results of the Self-disclosure Pretest and Post-test

	Group	N	Min	Max	Mean	SD
Pretest	Experiment	30	79	94	80.90	3.75
	Control	30	86	89	79.60	6.75
Post-test	Experiment	30	68	95	85.02	7.75
	Control	30	79	94	79.10	6.60

In Table 4, the mean self-disclosure score in the experimental group increased from 80.90 to 85.02, while the control group decreased from 79.60 to 79.10. The significance test yielded a p-value of 0.045 ( $p < 0.05$ ), indicating that the *Zona Nyaman* educational game intervention significantly enhanced children's self-disclosure compared to the control group.

Table 5. Results of Academic Achievement Pretest and Post-Test

	Group	N	Min	Max	Mean	SD
Pretest	Experimental	30	11	32	15.77	5.25
	Control	30	9	28	17.23	4.75
Post-test	Experimental	30	10	30	16.90	5.45
	Control	30	8	29	16.70	5.00

As illustrated in Table 5, the experimental group's mean score increased from 15.77 to 16.90, while the control group experienced a slight decrease from 17.23 to 16.70. The  $p$ -value of 0.028 ( $p < 0.05$ ) indicated that the increase in academic achievement in the experimental group was statistically significant.

### 3.2. F Test Results

Table 6. F Test Results

F	Sig.
3,432	0.044

As shown in Table 6, the F value of 3.432 with a significance level of  $p = 0.044$  suggests that self-disclosure and academic achievement jointly have a significant influence on father-child attachment.

In addition to statistical significance, the observed mean differences indicate a meaningful improvement in practical terms. Although the magnitude of score changes can be categorized as small to moderate, such differences are considered educationally relevant in elementary school settings, where gradual improvements in emotional security, communication, and academic performance reflect meaningful developmental progress.

### 3.3. Effect Size

Table 7. Effect Size (Cohen's d)

Variabel	Mean Difference (m1–m2)	Pooled SD	Cohen's d
Father-child attachment	4.02	10.04	0.40
Self-disclosure	4.00	6.09	0.66
Academic achievement	0.20	5.35	0.04

The effect size for father-child attachment was Cohen's  $d = 0.40$ , which falls within the small-to-moderate range. This indicates that children in the experimental group reported attachment scores that were, on average, 0.40 standard deviations higher than those in the control group.

The strongest intervention effect was found for self-disclosure, with a Cohen's  $d$  of 0.66, indicating a moderate-to-large effect size. This means that the average child in the experimental group reported a level

of self-disclosure higher than approximately 73% of children in the control group.

By contrast, the effect of the intervention on academic achievement was very small and practically negligible (Cohen's  $d = 0.04$ ). Although the mean achievement score increased slightly in the experimental group, the effect size indicates that this difference was minimal when expressed in standard deviation units.

## Discussion

The findings of this study show that the *Zona Nyaman* educational game was effective in improving father-child attachment, children's self-disclosure, and academic achievement. The experimental group demonstrated significantly higher post-test scores than the control group across all three variables. These results indicate that structured educational play can provide an effective medium for strengthening emotional relationships between fathers and children. This finding is consistent with [22], who reported that father involvement is positively correlated with children's academic achievement. Similarly, the stronger paternal attachment predicts higher levels of adolescent self-disclosure [23]. Thus, the research objective was achieved, and the hypothesis was supported by the data.

From a theoretical perspective, Bowlby's attachment theory [10] explains that the emotional security provided by a father figure enables children to explore their environment more confidently. The increased father-child attachment observed in this study may thus foster self-disclosure, particularly among girls [23]. This is consistent with previous studies that found that children with secure attachments tend to demonstrate better academic performance [24].

Furthermore, within Parten's framework, cooperative play theory, educational games serve as a structured form of play that promotes collaboration and interaction. The father-child play sessions in this study reflect cooperative play that emphasizes teamwork and communication. [13]. Educational games involving fathers and children are a form of *cooperative play* that emphasizes cooperation. This is reflected in literature findings that educational games create opportunities for parents and children to learn together, thereby strengthening bonds and cooperation [16]. In other words, educational games facilitate the cooperative process of father-child learning, in accordance with Parten's concept. Thus, the results of this study support the theoretical framework of Bowlby [10] and Parten [13], namely that secure attachment and cooperative play both support children's emotional and cognitive development.

The improvement in self-disclosure suggests that stronger attachment encourages children to

communicate more openly with their fathers. During the *Zona Nyaman* educational game activities, children were invited to express feelings, opinions, and ideas in a supportive atmosphere. This aligns with the findings of Situmeang et al. [25], who reported that educational play activities significantly improve the social development of preschool children. This aligns with Parten's prediction that cooperative play improves social skills; in our context, educational play with fathers can also strengthen children's social and communication skills. These results align with other empirical evidence that increased father involvement through educational play activities improves children's cognitive, emotional, and social aspects [16][22][25].

The findings of this study reinforce previous research emphasizing the vital role of fathers in the emotional and behavioral development of children. Dewi and Ambarwati found that a secure father attachment is significantly associated with higher emotional regulation among young adult women [26]. This aligns with the present study, which demonstrates that when fathers are actively involved through educational games, children are better able to express their emotions openly and develop confidence in interpersonal relationships.

Furthermore, the results are consistent with Kurniawan et al, who reported a positive relationship between parental attachment and adolescent independence [27]. Within the context of educational games, the collaborative and communicative processes between fathers and children create opportunities for children to learn decision-making, cooperation, and emotional regulation in constructive ways. Thus, the *Zona Nyaman* educational game can be viewed as a medium that stimulates both cognitive and social development while simultaneously strengthening the child's sense of security within the father-child relationship.

Academic achievement also improved following the intervention. This effect may be related to increased emotional security and motivation arising from positive learning support at home. When fathers are actively involved, children may feel more confident and supported, which contributes to better learning outcomes.

Comparison with previous research confirms these findings. A meta-analysis found that paternal involvement positively contributes to children's academic achievement, consistent with the observed improvement in academic grades [22]. In the context of educational games, the use of educational games improves students' motivation and mathematics learning outcomes [28]. This is reinforced by research findings that all studies support the significant influence of educational media on learning interest and outcomes [28]. Furthermore, similar research explains that the use of educational games significantly improves

mathematics learning achievement, with increases in test scores and learning motivation [29]. Overall, the findings highlight the importance of structured father-child interaction as a medium for strengthening emotional bonds and supporting children's psychosocial and academic development.

Beyond statistical significance, it is also important to consider the magnitude of the intervention effects. Therefore, an effect size analysis was conducted to determine the practical significance of the differences between the experimental and control groups for each study variable.

In addition to statistical significance testing, the interpretation of effect sizes offers a clearer understanding of the practical relevance of the differences observed between the experimental and control groups. Effect sizes are widely considered essential in psychological research because they quantify the magnitude of differences beyond p-values [30][31]. Traditionally, standardized mean differences have been interpreted according to conventional benchmarks proposed by Cohen, where  $d = 0.20$ ,  $0.50$ , and  $0.80$  are considered small, medium, and large effects, respectively [32]. These conventions provide a useful reference when domain-specific guidelines are unavailable but should be interpreted with attention to the substantive context of the research [30][31].

For father-child attachment, the intervention produced a small-to-moderate effect size (Cohen's  $d = 0.40$ ), indicating that the attachment scores of children in the experimental group were, on average,  $0.40$  standard deviations higher than those in the control group. Although this magnitude does not reach a large effect according to conventional benchmarks, it represents a meaningful relational improvement, given that attachment is a relatively stable interpersonal construct that typically evolves gradually over repeated interactions. The observed effect size, therefore, suggests that the structured cooperative play in the *Zona Nyaman* program facilitated enhanced perceived relational security between fathers and children.

The largest intervention effect was observed for self-disclosure, with a moderate-to-large effect size (Cohen's  $d = 0.66$ ). This effect suggests that the average level of self-disclosure reported by children in the experimental group was meaningfully higher than in the control group. The dialogic and cooperative nature of the activities may have fostered a psychologically safe environment that encouraged children to express their thoughts and feelings more openly to their fathers, consistent with theoretical perspectives that link shared interaction with enhanced emotional communication.

In contrast, the effect of the intervention on academic achievement was very small (Cohen's  $d = 0.04$ ). Although there was a slight increase in academic scores among children in the experimental group, the size of

this difference was minimal when compared to the variability in scores across participants. This pattern suggests that the short-term implementation of the program was more directly associated with changes in relational and communicative outcomes than with academic performance, which may require a longer period of time and a wider range of influencing factors before noticeable changes can be observed.

Taken together, the pattern of effect sizes indicates that the most immediate impact of the intervention lies in strengthening emotional communication and perceived relational security, while academic achievement may function as a long-term downstream outcome. This interpretation aligns with attachment theory and contemporary research emphasizing the role of secure relational bases in supporting broader developmental competencies.

### Theoretical Implications

This study extends the application of Bowlby's attachment theory [10] to the context of father-child interactions through educational play. Our findings confirm that the father-child relationship, as a "secure base," not only influences children's emotional openness but also impacts academic performance. This strengthens the model that secure attachment facilitates children's exploratory learning. More broadly, this study supports Parten's framework by demonstrating the benefits of cooperative play in the family context. Educational play can be viewed as an important collaborative learning medium, connecting early development theory with family learning practices.

Despite the positive findings, alternative explanations should be considered. One possibility is the novelty effect, in which children's initial enthusiasm toward a new game temporarily enhances engagement and openness. Another explanation may lie in the increased intensity of father presence during the intervention period, independent of the game itself. While this study cannot fully disentangle these effects, the structured nature of the *Zona Nyaman* educational game likely functioned as a channel that organized father involvement into meaningful and emotionally supportive interactions rather than mere time spent together.

### Theoretical Contributions

This study offers several theoretical contributions to attachment and play-based learning literature. First, it extends Bowlby's attachment theory by demonstrating that attachment activation in father-child relationships can occur through structured cooperative play, not solely through emotional availability or caregiving routines. Second, the findings support Parten's cooperative play framework by showing that **collaborative** play within family settings facilitates not only social interaction but also emotional security and

academic engagement. Third, self-disclosure emerges as a theoretically important proximal outcome of attachment enhancement, suggesting its potential role as a psychological mechanism linking father involvement and children's academic achievement. Together, these contributions position educational games as a theoretically meaningful intervention that integrates emotional, relational, and cognitive development within the family context.

### Practical Implications

Educators and family advocates can integrate educational games into parenting programs. For example, schools and community organizations can recommend father-child play activities as a strategy to increase attachment and motivation to learn. Family development programs can also use these findings to train fathers how to use educational games as an effective teaching and communication tool. Specifically, education policies can encourage father involvement in learning activities by providing educational game materials that support school subjects.

From an educational perspective, this study offers practical insights for educators by demonstrating that father involvement through educational games can support not only children's emotional well-being but also their academic achievement. Teachers and schools may utilize structured educational play as a complementary strategy to strengthen family engagement in learning, particularly in elementary education settings where parental support plays a critical role.

For practitioners and designers of father-based parenting programs, the findings provide an evidence-based framework for developing interventions that encourage active paternal engagement in child development. The *Zona Nyaman* educational game illustrates how structured play can serve as an accessible and culturally appropriate medium for increasing fathers' emotional involvement, especially in contexts where traditional caregiving roles are limited by patriarchal norms.

At the policy level, the results support the integration of father-focused educational play initiatives into family development and educational policies. Programs that promote father participation in children's learning activities may contribute to strengthening family relationships and improving children's psychosocial and academic achievement. These implications are particularly relevant for policymakers and institutions seeking innovative, low-cost strategies to enhance parental involvement and child development within culturally specific contexts such as Indonesia.

### Limitations

This study has several limitations. The findings of this study are embedded within the Indonesian sociocultural

context, where patriarchal norms often limit fathers' involvement in daily caregiving. This context may enhance the intervention's effectiveness, as structured educational play provides fathers with a culturally acceptable entry point into emotional engagement with their children. However, this cultural specificity may constrain cross-cultural generalization, and caution is required when applying these findings to societies with different family role expectations. The research design did not control for the role of mothers or other caregivers, even though maternal involvement may interact with or buffer the effects of father-child attachment. As a result, the observed outcomes cannot be attributed exclusively to paternal engagement without considering the broader family system. Although improvements in academic achievement were observed, the study did not directly measure children's learning motivation as a potential intervening variable. Consequently, the psychological pathway through which enhanced attachment and self-disclosure translate into academic achievement remains theoretically inferred rather than empirically tested.

### Future Research

Several recommendations can be made. Further studies should employ longitudinal designs or randomized experiments with larger and more diverse samples, including those from different age groups and cultural backgrounds. Additional variables that could be explored include maternal involvement, parenting styles, or specific types of play. Research could also examine mediating mechanisms, such as whether increased paternal attachment increases children's learning motivation (a mediator), which in turn impacts achievement. Trials of educational game interventions specifically designed to strengthen family bonds could confirm these findings. Specifically, mediation models could be used to examine whether self-disclosure or learning motivation functions as a psychological mechanism linking father involvement and academic achievement. In addition, moderation analyses may help identify cultural, familial, or individual factors, such as parenting roles or child gender, that influence the strength of the intervention effects.

### 4. Conclusions

This study concludes that the *Zona Nyaman* educational game is effective in improving father-child attachment, self-disclosure, and academic achievement. The experimental group demonstrated better outcomes than the control group after participating in the intervention, showing that structured cooperative play can strengthen emotional relationships and support children's learning processes. These findings directly address the research questions by confirming that father involvement through educational play contributes positively to children's emotional openness and academic performance.

The originality of this study lies in positioning educational games as a structured family-based intervention that integrates psychological, pedagogical, and relational dimensions. By applying attachment theory and cooperative play principles to the father-child context, this research offers a conceptual and empirical model of how structured play encourages emotional security, communication, and learning engagement within families. This contribution extends the literature on father involvement and play-based learning by demonstrating that educational play is not only a cognitive learning strategy but also a meaningful relational experience that strengthens emotional bonds.

The findings of this study also provide important theoretical and practical implications. Theoretically, the results reinforce the view that attachment processes and cooperative interaction within families play a critical role in supporting children's socio-emotional and academic development. Practically, the *Zona Nyaman* educational game may be implemented as part of parenting programs or school-family collaboration initiatives to encourage more active father participation in children's education. This approach is particularly relevant in contexts where paternal involvement tends to be limited.

Although the study shows positive outcomes, the quasi-experimental design and limited sample size suggest the need for caution in generalizing the results. Future research may explore longitudinal effects and potential mediating factors, such as learning motivation or maternal roles, to deepen the understanding of how father-child educational play influences development over time. Even so, this study provides important empirical support for the role of structured father involvement through educational games in enhancing children's emotional well-being and academic achievement.

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**Author Contribution Statement**

Author Name	C	M	So	Va	Fo	I	R	D	W
Setriani	✓	✓	✓	✓	✓	✓	✓	✓	✓
Meilia	✓	✓		✓	✓	✓	✓	✓	
Ishar									
Daffa	✓	✓	✓			✓	✓	✓	✓
Tiara									
K.P									

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#### Author Biography

	<b>Setriani, M.Psi., Psychologist</b>  She works at the University of Muhammadiyah Lampung as a lecturer in the Psychology Study Program, Faculty of Psychology. Setriani earned her bachelor's degree from the Faculty of Psychology, Psychology Study Program, Universitas Putra Indonesia "YPTK". She then pursued a Master's degree in Professional Psychology from the Islamic
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	<p>University of Bandung, obtaining a Psychology Practice Permit (SIPP). Setriani has also been certified as an assessor since 2014. Her specialty is Clinical Psychology. Her email address is <a href="mailto:ria.setriani@gmail.com">ria.setriani@gmail.com</a></p>
	<p><b>Meilia Ishar, M. Psi., Psychologist</b> </p> <p>She teaches at the University of Muhammadiyah Lampung as a lecturer in the Psychology Study Program, Faculty of Psychology. Meilia earned her undergraduate education at Maranatha Christian University, Faculty of Psychology, Psychology Study Program. She continued her postgraduate studies at the Islamic University of Bandung, earning a Master's degree in Psychology (M.Psi) and a Psychology Practice Permit (SIPP). Her areas of specialization are Educational Psychology and Developmental Psychology. Her email address is <a href="mailto:meiliaishar2826@gmail.com">meiliaishar2826@gmail.com</a></p>
	<p><b>Daffa Tiara Kurnia Prastiwi, M.Psi</b> </p> <p>She is a lecturer in the Psychology Department of the Faculty of Psychology, Muhammadiyah University of Lampung. She earned her undergraduate degree from Ahmad Dahlan University and then pursued a Master's degree in Psychology. Her specialty is educational psychology. Her email address is <a href="mailto:daffatiara5@gmail.com">daffatiara5@gmail.com</a>.</p>