

Improving Parent-Child Interactions in Vulnerable and Maltreated Families with Attachment Video-Feedback Intervention: Power Positive Parental as a Moderator of Treatment Effects

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Submitted: 17 May 2025

Accepted: 16 July 2025

Int J Behav Sci. 2025; 19(2): 115-123

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Abstract

Introduction: Strained parent-child interactions in vulnerable and maltreated families, characterized by emotional distress, atypical behaviors, and lack of emotional support, can severely hinder a child's psychosocial development. This research investigated how attachment video-feedback intervention improves these interactions along with the mediating role of positive parental influence in the treatment's success.

Method: A quasi-experimental study with pre-test, post-test, and three-month follow-up was conducted on vulnerable families under the Welfare Organization's supervision in Tehran and surrounding areas during the summer/fall of 2023. Convenience sampling was used to select 32 participants (n=16 per group). The experimental group received four weekly 60-minute educational sessions with video broadcasts. VIA-IS and PCR questionnaires were used for assessment. Data was analyzed using SPSS 27 with descriptive statistics, repeated measures of covariance, mixed model analysis, Kruskal-Wallis H test, and Bonferroni post hoc test ($p < 0.05$).

Results: At follow-up, mother-child and father-child interactions were significantly different between vulnerable/maltreated families and the control group ($P < 0.001$ and $P = 0.002$, respectively). Mother-child interactions in vulnerable/maltreated families significantly improved from post-test to follow-up ($P = 0.046$), suggesting lasting positive effects. Parental power positive was not a significant predictor of outcomes ($P = 0.615$).

Conclusion: The study findings revealed that attachment video-feedback intervention had a beneficial impact on enhancing parent-child interactions in vulnerable and maltreated families. However, the presence of power-positive parents did not play a significant role in moderating this effect.

Keywords: Parent-Child Interactions, Vulnerable Families, Maltreated Families, Attachment Video-Feedback Intervention, Positive Power

Introduction

A supportive family environment is crucial for the mental development of children. Healthy communication and strong family bonds create a nurturing space for the formation of positive habits. On the other hand, children raised in dysfunctional families exposed to factors like violence, neglect, or parental separation are more prone to psychological and behavioral issues such as depression and anxiety [1]. Vulnerable families are those facing challenges in functioning well due to various social, economic, and environmental obstacles,

as well as physical or mental health limitations [2]. Families in difficult financial situations usually have diminished social support and family unity, leading to increased internal conflicts and vulnerability to family violence [3]. Concerns about heightened exposure to domestic violence, prolonged isolation from support systems, and disruptions in daily routines can escalate family conflict and the risk of child abuse and domestic violence [4]. Research shows that most family discord in refugee settings stems from mental health issues in parents or children, domestic violence, and childcare problems, often correlated to difficulties in school [5].

Growing up in dysfunctional families can have lasting negative impacts on children. Children in these situations often have little control over their living conditions, and parents involved in toxic and abusive relationships may not realize how their behavior affects their children [1]. Parent-child interactions are crucial for the well-being of both parties. These interactions can be affected by various risk factors, such as the parents' emotional circumstances and underlying issues [6]. Exposure to stressors like poverty, violence, food insecurity, and lack of access to health care can impact parents' mental health and their ability to provide nurturing care, especially for young and less educated parents [7]. Research suggests that family dysfunction, particularly in families facing economic and social challenges, can lead to a decline in the quality of parent-child interactions and result in poor psychological adjustment in children, including behavioral issues, anxiety, and depression [8]. The study also found that vulnerable families may have limited interactions between parents and children [6].

During times of family trauma, the personality traits of parents can have a significant impact on the mental well-being and overall functioning of the family. Peterson and Seligman have outlined a list of 24 personality strengths categorized into six main virtues: wisdom and knowledge, courage, humanity, justice, moderation, and transcendence [9]. These personality strengths are considered valuable characteristics that, when followed, can enhance positive emotions, bring more meaning to life, strengthen relationships, and lead to greater success. By positively influencing parents and children, these strengths help improve parent-child interactions and cultivate a sense of belonging, purpose, and optimism in the daily lives of parents [10]. Research findings have shown a strong and positive connection between parental emotional warmth, attachment to parents, peer relationships, and personality strengths [11]. Additionally, studies have revealed that childhood maltreatment can directly impact an individual's social and emotional skills, as well as their personality strengths [12].

Careful consideration should be given to parent-child interactions, as research indicates that high levels of conflict can have a significant impact on the development of socio-emotional disorders in children and teenagers. Problematic family dynamics and a negative home environment can have long-lasting effects on a child's psychological development, while parental stress not only endangers the well-being of children but also has

negative repercussions on the mental and physical health of parents [13]. One approach to improving parent-child interactions is the Attachment Video-feedback Intervention (AVI). This therapeutic method involves recording parent-child interactions during emotional and behavioral communication and then showing the video to parents so they can assess their behaviors and the child's reactions, gaining insight into the child's emotional needs and responses [14]. Studies have shown that video feedback intervention is effective in enhancing parent-child interactions in families experiencing maltreatment and can help improve parent-child relationships by fostering greater sensitivity to the emotional needs of children [15]. Moreover, research has shown that participating in an AVI parenting program can lead to notable improvements in parent-child interactions, enabling parents to more effectively monitor and evaluate their actions and cultivate positive connections with their kids [16].

Parent-child interaction plays a crucial role in the emotional, social, and psychological development of children. In vulnerable or maltreated families, these interactions can be disrupted, leading to negative impacts on the mental health and relationships of children. It is essential to have effective interventions in place to improve these interactions, especially in vulnerable situations [7]. While there have been many studies on enhancing parent-child interactions, there is limited research on attachment video feedback interventions in vulnerable and maltreated families. Additionally, there is a lack of research on the role of power-positive parents in moderating the treatment process and enhancing interactions in these families. Therefore, there is a need to explore these aspects and assess their effects in these particular areas. The main goal of this study was to examine the impact of video feedback intervention on enhancing parent-child interactions in vulnerable and maltreated families. Furthermore, the study aims to assess the influence of positive parental power as a moderating factor in the effectiveness of this intervention in improving the quality of parent-child interactions.

Method

The current research was an applied and quasi-experimental study with a pre-test, post-test, and a follow-up phase lasting three months involving both a control and experimental group. The study focused on vulnerable and maltreated families under the supervision of the Welfare Organization in Tehran and its surrounding areas, conducted during the summer and fall of 2023. The sample for the study consisted of 32 individuals (16 in the experimental group and 16 in the control group) from vulnerable and maltreated families (both parents), selected through convenience sampling and randomly assigned to either the experimental or control group using a coin toss method. Sample size adequacy was determined using G-Power software, with parameters set at $\alpha=0.05$, effect size=0.35, power test=0.80, and Number of groups=2 [17].

According to this calculation, the study had a sample size

of 32 individuals. The eligibility criteria for the research involved being over 20 years old, having the necessary physical and mental health for participation in the training sessions, providing consent, and not having taken part in similar programs in the previous three months. Individuals with conditions that hindered regular attendance at sessions, those who were divorced or living apart, and

those who had missed more than three training sessions were excluded. Families with children facing severe medical or developmental issues like autism were also not included. While some families had multiple children, only one child per family was chosen as the focus of the study. Child maltreatment categories encompassed sexual abuse, physical abuse, neglect, and emotional abuse.

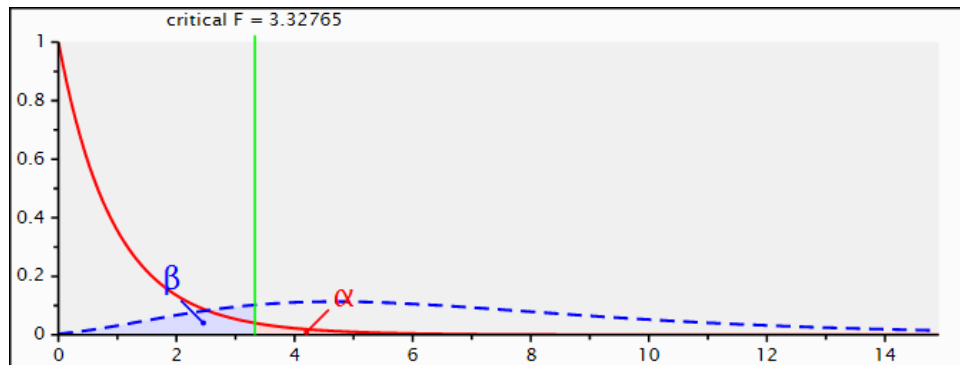


Figure 1. Sample size calculation with G*Power software.

Implementing the research involved obtaining permits from the university before seeking assistance from the Tehran Provincial Welfare Department. After finishing all the necessary preparations, the researchers were correlated with two organizations that focus on assisting families who are vulnerable and mistreated. Families who had a record of child abuse in their welfare files were reached out to and invited to participate in the study. The families had already undergone evaluations of their parenting abilities. Before beginning the initial interviews, the study organizers met with interested parents to provide a thorough explanation of the research. From the pool of willing participants, 20 families were chosen based on specific requirements to prevent any dropouts from the sample. The research team conducted an in-person interview at the center, outlining the research objectives and addressing any concerns raised by the families. Screening was done at this stage to exclude families unable to meet study requirements. After the research, there were a total of 32 individuals involved, half of whom were in romantic relationships as couples. The evaluation before and after the intervention required visits to a lab and the participants' homes. The scheduled visits took place one week before and one week after the intervention. The pre-test phase involved administering research tools to collect data from the 32 participants. Afterwards, individuals were grouped randomly, with the experimental group set to receive training.

In 2021, van der Asdonk et al. discussed the implementation of educational interventions using the Moss protocol within the AVI program that took place in 2018 [18,19]. The Video-feedback Intervention to promote Positive Parenting (VIPP) is a method that focuses on observing and providing feedback to improve parent-child interactions, particularly in families facing challenges with inappropriate parenting behaviors. The goal of this intervention is to assist parents in gaining a better understanding and responding sensitively to the

emotional and behavioral signals of their children. The sessions involve recording parent-child interactions through video and providing feedback to parents. The program emphasizes highlighting positive aspects of parents' behavior and the beneficial impact it has on their child. Feedback is given through a 20-minute video of parent-child interactions, with pauses at positive moments to reinforce sensitive and responsive parenting. Parents are encouraged to share their observations and thoughts on their own and their child's behavior. In addition to promoting sensitive parenting, the program aims to decrease harsh and inappropriate parental behavior. The educational interventions consisted of four 60-minute sessions, one per week, held in appropriate settings with video recordings for the experimental group but not for the control group. Both groups underwent assessments at the end of the sessions and a follow-up stage three months later. Parents filled out questionnaires during the visits, and researchers observed parent-child interactions.

To adhere to ethical guidelines, the control group received training for one session post-study completion. Out of the participants, five individuals from the experimental group and three from the control group either withdrew or were excluded during the study. The ethical standards in this research involved obtaining informed consent from participants and ensuring confidentiality. While it is required by law to investigate instances of child maltreatment and welfare, parents had the choice to opt in or opt out of the study. Parents who agreed to take part signed an informed consent form. One of the main disadvantages of welfare programs is the lack of assessment of parents' ability to make changes, an issue addressed in this research. The information about the training sessions on handling marital conflicts is available in Table 1. The CONSORT flow chart is illustrated in Figure 2 as well.

Sample CONSORT Diagram with Exclusion Labels

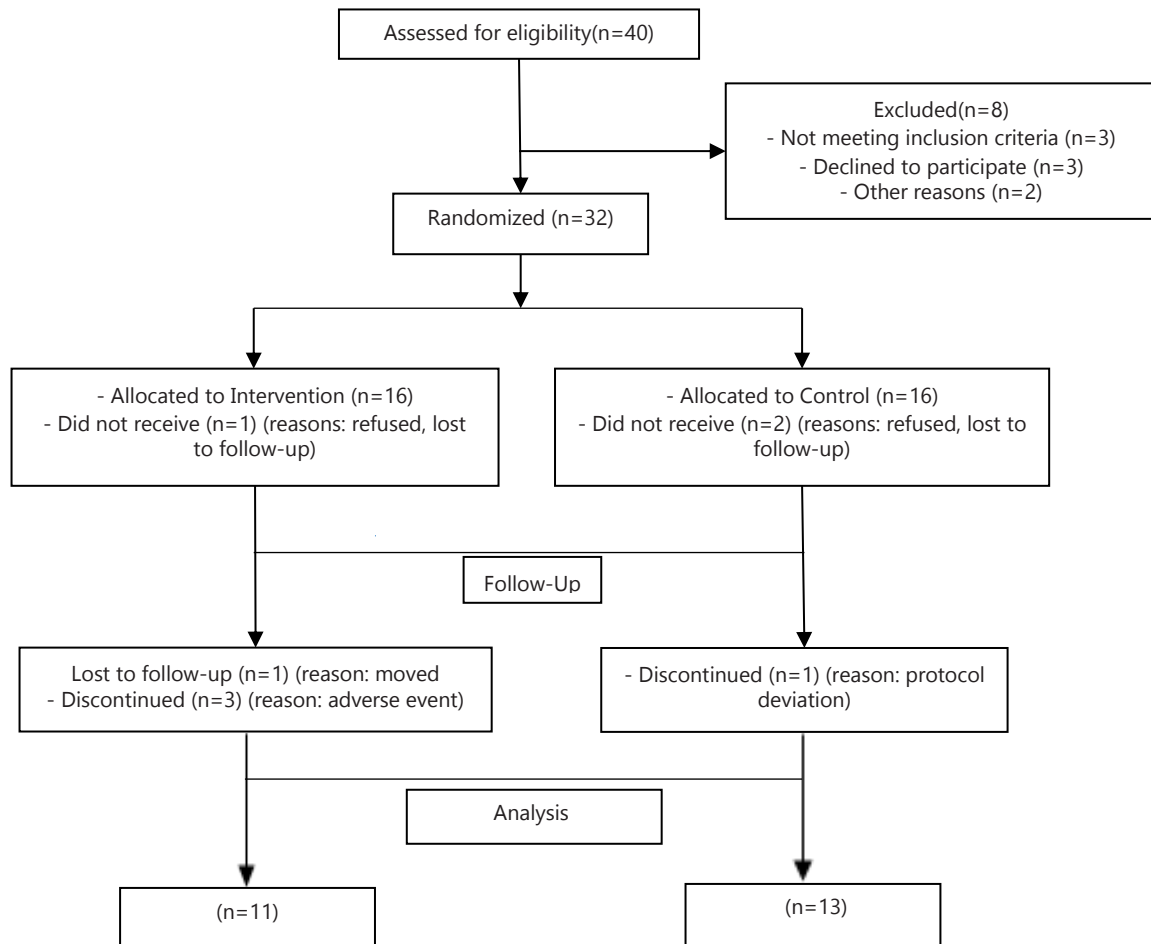


Figure 2. The flow diagram of the study

The tools used in this study were as follows:

Values in Action- Inventory of Strengths (VIA-IS): Peterson and Seligman created a questionnaire in 2004 to assess the personality strengths of individuals [20]. The scale aims to measure six universal virtues found in various religions and sects: wisdom, humanity, courage, justice, temperance, and transcendence. The main test consists of 240 self-report statements, with each strength evaluated by 10 statements. Participants must indicate their level of agreement or disagreement using a 5-point Likert scale. To tackle the issue of the large number of items, a condensed version with 24 items was also created. Previous studies have reported a Cronbach's alpha of 0.80 for this scale, while the present study found a Cronbach's alpha of 0.81 for the questionnaire [21].

Parent-Child Relationship Questionnaire (PCR): Fine et al. developed this survey in 1983 to assess the quality of the parent-child interaction. The survey includes 24 self-reported questions and has different versions for both fathers and mothers. For fathers, there are four subscales: positive affection, father involvement, communication, and anger. The

mother version also includes four subscales: positive affection, hatred/role loss, identification, and communication. Respondents rate each item on a 7-point Likert scale, with scores ranging from 0 to 144. The minimum score achievable is 0, the typical score is 72, and the maximum score is 144. The reliability of the questionnaire was found to be high, with Cronbach's alpha coefficients ranging from 0.89 to 0.94 for father-related subscales and from 0.61 to 0.94 for mother-related subscales. In this study, the internal consistency of the questionnaire was 0.83 for fathers and 0.84 for mothers.

This research utilized descriptive statistics including mean and standard deviation for analysis, along with statistical tests such as Kruskal-Wallis H, repeated measures analysis of covariance, and Mixed Model Analysis to examine the research hypotheses at a significance level of 0.05 using SPSS statistical software version 27. The normality of distribution was assessed using the Shapiro-Wilk test, while the homogeneity of variances was assessed using the Levene test. Moreover, the Bonferroni post hoc test was used to compare the means.

Table 1. Four-session Treatment Protocol for Improving Parent-child Interactions with Video Feedback Intervention

Session	
First	Introducing and familiarizing parents with the intervention, creating a welcoming and safe space for them
	Explanation of the objectives and steps of the program
	Observing the initial video of parent-child interaction with their child at home Talking about different ways of parenting and the difficulties faced
Second	Recognizing and comprehending a child's emotional cues
	Watching the second video
	Analyzing the first session video and giving feedback to parents
	Recognizing the emotional cues of children and how parents react
	Enhancing parents' ability to recognize and respond to their child's emotions Offering realistic ways to improve the child's response to their needs
Third	Enhancing parent-child interactions: Review and analyze a new video showing parent-child interactions
	Emphasize enhancing positive interactions and decreasing inappropriate parenting behaviors
	Teaching effective ways to improve the emotional bond between parents and children
	Teaching methods to decrease stress and improve collaboration between parents and children
	Watching the third video
Fourth	Assess progress and reinforce improvements
	Analyze the newest video and compare it to past videos
	Encourage parents to continue and apply positive changes in their behavior
	Develop a long-term plan to assist parents once the intervention is completed
	Give parents a summary and final feedback

Results

The study involved gathering information from parents in three stages (pre-test, post-test, and follow-up) from both vulnerable and maltreated families and control groups. Initially, the researcher analyzed the demographic factors of the study, dividing participants into groups based on Age: 20-30 years, 31-40 years, and 41 and above. Additionally, participants were categorized based on the number of children they had (1 to 2 children, 3 to 4 children, and more than four children). Simultaneously, individuals were divided based on their education level into four groups: Undergraduate, Diploma, Postgraduate, and Bachelor's degree. The Kruskal-Wallis Test results indicated that there was not a notable distinction between participants when it came to demographic factors ($P > 0.05$).

Based on Table 3, the mean father-child interactions showed no significant difference between the experimental and control groups at the beginning of the study. However, there was a discrepancy between the means in the post-test and follow-up periods for both groups. In general, the mean scores in the post-test and

follow-up stages were higher in the experimental group compared to the control group. Similarly, the mean mother-child interactions did not show a significant difference between the experimental and control groups at the pre-test, but there was a variance between the means in the post-test and follow-up stages for both groups. The experimental group had higher mean scores for mother-child interactions in the post-test and follow-up stages than the control group.

According to the analysis of covariance results in Table 4, there was a significant P-value of 0.002 in the between-subjects effects for father-child interactions. This indicates a notable difference in the research groups when the effects of the pre-test stage are held constant. Similarly, the within-subjects effects for mother-child interactions also showed significance in the interactive effects between time and group, with a P-value of 0.019. The P-value in the between-subjects effects for mother-child interactions was also significant, less than 0.001. Again, this points to a significant difference in the research groups while keeping the pre-test stage effects constant.

Table 2. Demographic Characteristics in the Experimental and Control Groups

Variables	Vulnerable and maltreated families		Control		Total		Kruskal-Wallis H	P	
	Demographic Information	N	%	N	%	N			%
Age	20 - 30	2	18.2%	3	23.1%	5	20.8%	0.08	0.773
	31 - 40	7	63.6%	6	46.2%	13	54.2%		
	41 and up	2	18.2%	4	30.8%	6	25.0%		
Number of Children	1-2	8	72.7%	9	69.2%	17	70.8%	1.77	0.183
	3-4	3	27.3%	2	15.4%	5	20.8%		
	+4	0	0.0%	2	15.4%	2	8.3%		
Education Level	Undergraduate	5	45.5%	3	23.1%	8	33.3%	0.16	0.689
	Diploma	3	27.3%	4	30.8%	7	29.2%		
	Postgraduate	3	27.3%	4	30.8%	7	29.2%		
	Bachelor's degree	0	0.0%	2	15.4%	2	8.3%		

Table 3. Description of Research Variables

	TIME	Groups	M	Std. Deviation	Skewness	Kurtosis	Shapiro-Wilk	P	Min	Max
Father-Child Interactions	Pre-test	Vulnerable and Maltreated families	52.00	2.53	0.49	-0.92	0.91	0.265	49	56
		Control	52.46	2.40	0.41	-1.01	0.90	0.167	49	56
	Post-test	Vulnerable and Maltreated Families	53.81	2.18	-0.07	-0.88	0.92	0.394	50	57
		Control	53.07	2.53	-0.21	-1.34	0.90	0.134	49	56
	Follow-up	Vulnerable and Maltreated Families	57.00	0.77	0.0001	-1.11	0.83	0.025	56	58
		Control	53.76	2.24	-0.55	-0.93	0.85	0.035	50	56
Mother-Child Interactions	Pre-test	Vulnerable and Maltreated Families	57.45	1.03	0.14	-0.85	0.90	0.205	56	59
		Control	57.30	1.18	0.36	-1.32	0.85	0.030	56	59
	Post-test	Vulnerable and Maltreated Families	58.36	1.43	-0.28	-1.40	0.88	0.128	56	60
		Control	57.15	1.06	0.61	-0.60	0.85	0.037	56	59
	Follow-up	Vulnerable and maltreated families	59.72	1.27	-0.80	0.52	0.88	0.054	57	61
		Control	56.92	1.38	-0.28	0.44	0.92	0.314	54	59

Table 4. Covariance Analysis Test

Variable	Source	SS	MS	F	P	Eta Squared
Father-Child Interactions	TIME	1.36	1.36	0.26	0.612	0.01
	TIME * Pre-test	0.75	0.75	0.14	0.707	0.00
	TIME * Group	17.57	17.57	3.40	0.079	0.13
	Between Subjects Effects (Group)	46.47	46.47	11.95	0.002	0.36
Mother-Child Interactions	TIME	0.06	0.06	0.05	0.821	0.00
	TIME * Pre-test	0.08	0.08	0.06	0.795	0.00
	TIME * Group	7.43	7.43	6.41	0.019	0.23
	Between Subjects Effects (Group)	47.87	47.87	20.55	< .001	0.49

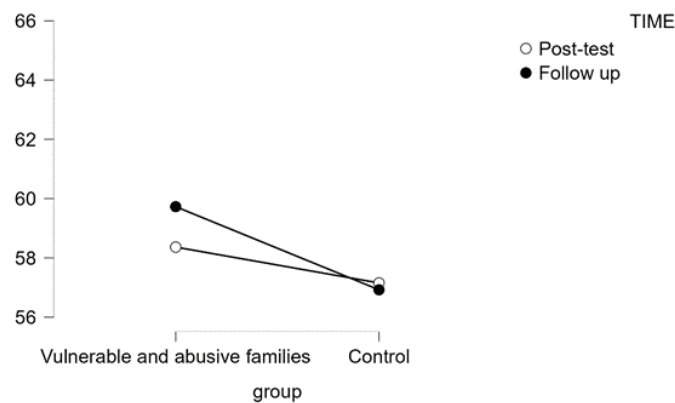


Figure 3. Pairwise analysis of the interaction effects between TIME and groups for the mother-child interactions variable.

According to the findings of Table 5 and Figure 3, there was a significant difference in mother-child interactions between the vulnerable and maltreated families and the control group during the follow-up stage ($p < 0.001$). The increase in mean scores suggests that the intervention method used in the study impacts the mother-child interactions, causing them to improve gradually over time rather than immediately after the interventions were implemented. Additionally, there was a significant difference between the vulnerable and maltreated family's

group in the post-test stage compared to the follow-up stage ($p = 0.046$), indicating that the effects of the interventions were consistent and became more pronounced over time. Analysis of Table 5 also revealed a significant difference in father-child interactions between the vulnerable and maltreated family's group and the control group ($p = 0.002$). The higher mean scores in the experimental group compared to the control group suggest that the intervention method employed in the study influenced father-child interactions, leading to an

improvement in this variable. However, this effect was not long-lasting.

The researcher developed two regression models to analyze the impact of parental positive power. The first model focused on the main effects of the research variables, such as group, time, and gender, on parental interaction levels. Covariance analysis in Tables 4 and 5 confirmed that these variables

influenced parental interaction, but parental positive power did not have a significant effect ($p=0.615$) in this model. In the second model, the researcher investigated the moderating role of parental positive power but found that it did not have a significant impact. Similarly, none of the cases examined in relation to parental positive power showed significance during the paired analysis (Table 6).

Table 5. Post Hoc Comparisons - Group * TIME

Variable		MD	SE	t	pbonf	
Mother-Child Interactions	Control, Post-test	1.21	0.52	2.32	0.181	
	Vulnerable and Maltreated Families, Post-test	-1.35	0.46	-2.95	0.046	
	Control, Follow up	1.44	0.54	2.67	0.086	
	Vulnerable and Maltreated Families, Follow-up	-2.57	0.54	-4.73	< .001	
	Control, Post-test	0.22	0.42	0.53	1.000	
	Vulnerable and Maltreated Families, Follow-up	2.80	0.56	4.99	< .001	
Post Hoc Comparisons - Group						
Father-Child Interactions	Vulnerable and Maltreated Families	Control	1.98	0.57	3.45	0.002

Table 6. Tests of Mixed Model Analysis

Source	Numerator df	Denominator df	F	P	
Model 1	Intercept	1	138	158.96	$p<0.001$
	Group	1	138	12.07	0.001
	Time	2	138	9.57	$p<0.001$
	Gender	1	138	78.91	$p<0.001$
	VIA	1	138	0.25	0.615
Model 2	Group * VIA	1	134	0.56	0.454
	Time	2	134	1.05	0.350
	Time * VIA	2	134	0.77	0.465
	Gender	1	134	0.00	0.931
	Gender * VIA	1	134	0.10	0.743

Discussion

The goal of the current research was to enhance parent-child interactions in vulnerable and maltreated families using an attachment video-feedback intervention, with positive parental influence potentially influencing the treatment outcomes. The findings of the study indicated that the intervention employed improved parent-child interactions in vulnerable and maltreated families. Nevertheless, the role of positive parental power as a moderator did not show substantial significance in the study.

The results of the current research indicate that using attachment video-feedback attachment can enhance parent-child interactions, and these findings are consistent with previous studies [15, 16, 24]. Prior research has demonstrated that video feedback interventions are effective in improving parent-child interactions within families affected by maltreatment, leading to better relationships and increased sensitivity to children's emotional needs [15]. A different research study proposed that participating in a remote video feedback parenting program can improve parent-child interactions by assisting parents in observing and evaluating their behavior, resulting in more positive interactions with their children [16]. Initial research findings have shown that

implementing attachment video-feedback interventions can increase parents' sensitivity, awareness of their children's needs, and understanding of the effects of caregiving [24]. There have not been any specific research studies that have focused on the lack of significance of positive parental influence, as this topic is fairly recent within the current academic research. However, the results of this study are inconsistent with some prior research [11-12]. For instance, one study found a positive and significant correlation between parental emotional warmth, parental attachment, peer attachment, and personality strengths [11]. Another study confirmed that experiencing maltreatment during childhood directly influences socio-emotional competencies and personality strengths [12].

The AVI, which is based on attachment theory and positive parent-child interaction principles, aims to improve family relationships by modifying interaction patterns. This intervention helps parents in vulnerable families to observe and analyze their interactions with their children, leading to more effective behaviors and sensitive responses. Vulnerable families often struggle with establishing healthy relationships with their children due to various factors like environmental stress, psychological issues, and ineffective parenting methods. Interventions

that target changing inappropriate interactions are essential for improving parent-child interaction [25]. In families experiencing psychological challenges or extreme stress, this intervention helps enhance parent-child interaction by increasing awareness and introducing alternative interaction patterns. Unlike traditional methods, personalized feedback and a focus on actual behaviors enable parents to implement positive changes in their daily interactions, ultimately benefiting family relationships and the child's mental health [26]. The lack of significance in the moderating role of parents' positive power could be due to various factors. It is possible that the low overall level of positive power in vulnerable and maltreated families did not allow enough variation to produce a moderating effect. Alternatively, the strong impact of the intervention may have overshadowed the moderating role of positive power in parents.

Other contextual variables, such as parental stress levels, quality of social support, and cognitive flexibility, could have influenced the results and weakened the moderating effect of positive power. The complex nature of parent-child interactions suggests that individual variables like positive power alone do not significantly impact moderating outcomes [9,10,27].

The current research had limitations that could impact the generalizability and accuracy of the results. The study focused on specific vulnerable families, so the findings may not apply to other cultural and social groups. Conducting similar studies in diverse communities with varying characteristics is essential to confirm the findings. To address the potential bias in parental self-reporting, independent observations by trained raters should be utilized and compared with self-report data. The study also acknowledged the impact of being observed on parental behavior, suggesting that recording sessions should be conducted in natural settings to minimize this effect. Parents' unique characteristics were viewed as a barrier, prompting the suggestion to offer pre-intervention readiness sessions in order to enhance acceptance and motivation. The study did not explore the role of other family members, such as grandparents or siblings, in parent-child interactions, suggesting that future research should expand the scope of the study to include these relationships. Furthermore, the research did not explore how children interact with other adults, such as mentors or teachers, who also play a role in the growth and development of children. Future research should also explore the effects of these interactions. Furthermore, the study did not examine the intervention's effectiveness in families with varying levels of vulnerability, indicating a need for research to compare the intervention's effectiveness in groups with different levels of problems.

Conclusion

The study findings demonstrated that incorporating video feedback interventions had a positive impact on enhancing parent-child interactions within vulnerable and maltreated families, although the level of parental positive power did not play a significant moderating role in this association. This finding is significant for experts in the

field of child and family psychology, as well as for therapists, counselors, and policymakers. The research highlights that parents, particularly those in vulnerable families, can enhance their interactions with their children irrespective of their initial level of positive power through interventions like video feedback. Based on these findings, social workers and policymakers can design supportive programs for at-risk parents.

Conflict of Interest

The authors declare no conflicts of interest.

Ethical Approval

This article is based on research conducted under Ethics Code IR. IAU. R. REC1403.211.

Declaration of Generative AI and AI-Assisted Technologies

During the preparation of this work the authors used AI sizer / Translation for better language standards. After using this tool, the authors reviewed and edited the content as needed and takes full responsibility for the content of the publication.

Acknowledgment

The authors would like to thank the families who kindly participated in this study.

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