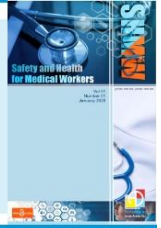




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Visual-Based Communication Training: Reducing Pediatric Induced Practitioner Stress and Enhancing Clinical Ergonomics

Ade Elza Buana ^{1*}, Desi Andriyani ²^a Department of Dental Health, Politeknik Kesehatan Tanjungkarang, Bandar Lampung, Indonesia, 35145^b Department of Dental Health, Politeknik Kesehatan Tanjungkarang, Bandar Lampung, Indonesia, 35145

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ABSTRACT

**Objective:** Drawing on psychology and cognitive theories, the current study explores visual-based communication training in order to alleviate stress among practitioners provoked by pediatric clinical experiences, and to improve clinical ergonomics.**Methods:** The research adopted a quantitative, theory-based design using a structured survey and variance-based structural equation modelling to explore the links between visual communication characteristics, practitioner self-efficacy and work-related stress. The project was nested in Cognitive Load Theory, Social Cognitive Theory and the Transactional model of stress and coping to describe how ergonomic communication tools influence practitioner outcomes.**Findings:** Results indicate that visual language doesn't significantly reduce the level of work-related stress; but on the other hand, it has an indirect effect which improves practitioners' self-efficacy. Communication interactivity and narrative depth, closely related to the practitioners' perceived ability of successfully handling pediatric clinical demands are a key factor in stress reduction. Self-efficacy is the major psychological process by which ergonomic communication design leads to well-being at work.**Novelty:** This research contributes to the ergonomics and occupational health literature by combining visual communication theory with psychological self-regulation mechanisms, while promoting 'self-efficacy' as a proximal mediator as opposed to considering the tools of communication as direct interventions on stress modification.**Research Implications:** These results provide direction for the development of practitioner-focused communication training and ergonomic interventions to enhance occupational well-being and sustained clinical performance.

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1. Introduction

Dental care for children is a stressful job that demands a lot mentally and emotionally, especially for dental therapists working in public primary health care, and this is even more so when they are under time pressure. When medical treatment is required for uncooperative pediatric patients, there are several factors to consider. These factors include the execution of technical procedures, management of the patient's mood, and the smooth flow of the procedure. All of these things become more difficult

due to limited resources. Research shows that healthcare workers who often have to handle multiple tasks at once in the same environment tend to have a higher mental workload and experience greater work stress (Di Lorenzo et al., 2025; Shemtob et al., 2022). This, in turn, can lead to fatigue, performance issues, and even safety concerns (Carayon et al., 2015; Holden et al., 2013). Large patient numbers and poor ergonomic comfort are two factors that exacerbate the demands of public dentistry.



In the field of paediatric dentistry, the emphasis at present is on patient-based techniques for reducing anxiety. These include audio-visual distraction, storytelling and behaviour management techniques. Although these methods may help to improve patient cooperation, they seldom address the cognitive and psychological pressure experienced by the doctor during the procedure (Agius et al., 2025; Mazurek et al., 2025). From an ergonomic perspective, stress is not only related to the difficulty of a task, but also how well work systems support human cognitive processing (Hancock & Szalma, 2019; Mazurek et al., 2025). Practitioners may experience anxiety and find tasks challenging for a number of reasons. These include ineffective information transfer, repetitive explanations and confusing dialogue flows, which can all add to the cognitive load.

The Transactional Model of Stress and Coping (Biggs et al., 2017; Folkman et al., 1986) provides a conceptual framework for understanding how dental therapists evaluate and manage challenging work environments. Stress occurs when service providers experience clinical pressure, that is, when clinical job demands exceed available coping resources, which include time, attention, and emotional regulation abilities (Cao et al., 2025; Otukoya et al., 2025). At the same time, questions are raised about excessive intrinsic and extrinsic cognitive load on performance and well-being (Kirschner et al., 2018; Sweller, 2020). This is due to Cognitive Load Theory in pediatric dentistry, excessive verbal communication and negotiating children's behavior with anxious patients can burden working memory (WM) and become a source of stress or ergonomic mismatch between workers and tasks.

Research on human factors and healthcare ergonomics now focuses on cognitive aids and visual tools as ways to help manage workload and support performance (Norman, 2013; Holden et al., 2020). Improved understanding, emotional control, and task coordination can be achieved through the use of image-based communication media, including those with narrative and interactive structures (Breckner & Mayer, 2022; Green & Brock, 2000; Mayer, 2020; Sweller, 2020). However, most clinical evidence categorizes these media as patient education tools rather than practitioner-focused ergonomic interventions. We need to learn more about how images, stories, and interactive tools can help dental workers and reduce their stress, especially in settings that treat children.

This gap needs to be addressed, especially given the increasing emphasis on sustainable healthcare systems and practitioner well-being. This study developed a new ergonomic approach using pop-up visual media not as a distraction for patients, but as a cognitive diversion tool to facilitate task communication between dental therapists. The combination of media narrative depth, communication interactivity, and practitioner confidence has the potential to extend stress and cognitive load theory into the domain of applied clinical ergonomics. The aim of this study is to examine the impact of a visual-based communication training program on work-related stress among dental therapists working in public health centers in South Lampung. The findings of this study will contribute to the expansion of the field of applied ergonomics by offering scientifically supported insights into efficient and affordable human-centered design interventions. These interventions aim to improve the well-being of medical personnel and improve clinical workflows in the context of pediatric dental care.

2. Critical Review

2.1 Theoretical foundation

The Transactional Model of Stress and Coping theory, as well as Cognitive Load Theory, form the basis of our work. These theories inform a theoretical framing where WSD manifests in practitioner stress. According to the Lazarus and Folkman (1984) model, work stress is defined as resulting from the perception that demands at work exceed the resources available to cope with them. This makes communication clarity and control over the situation essential in clinical environments. Secondly, according to Cognitive Load Theory (Sweller et al., 2019), excessive extraneous cognitive load, such as repeated verbal explanations and behavioural negotiation, impairs performance and increases mental stress. Recent research in the field of ergonomics has revealed that both cognitive, visual and interactive artefacts have the potential to function as regulators of workload by means of information processing and emotional regulation (Holden et al., 2020; Carayon et al., 2021). In essence, visual communication tools are conceptualised as ergonomic control instruments that modify stress appraisal by decreasing cognitive load and augmenting practitioner coping resources.

2.2 Media story depth and stress at work

In-depth media narratives can support information organisation and knowledge formation, reduce ambiguity in complex clinical tasks, and alleviate cognitive load. Effective visual stories in healthcare ergonomics also facilitate understanding and minimise the need for continuous verbal descriptions, thereby avoiding redundancy effects (Mayer, 2020; Sweller et al., 2019). Recent empirical evidence shows that narrative-driven visual aids can improve task comprehension while reducing mental load in cognitively demanding healthcare environments (Holden et al., 2020; Lohmeyer et al., 2022). In paediatric dentistry, a more in-depth narrative structure can help practitioners organise interactions with patients more effectively and with less stress.

H1: Media narrative depth has a negative effect on work-related stress among dental therapists.

2.3 Communication Interactivity and work-related stress

Direct feedback, step-by-step definitions, and emotional regulation are all necessary for dealing with intensive clinical interactions, and intelligence in communication enables all of these. The use of interactive media in paediatrics has been shown to reduce patient anxiety and make workflows more efficient, ultimately reducing practitioner stress (Armfield & Heaton, 2013; Sundar et al., 2014). Social interaction has been shown to increase control and certainty at the work system level from a human and system factors perspective (Carayon et al., 2014). This, in turn, has been shown to reduce psychological burden. Interactive visual systems have been shown to result in smoother task performance and reduce perceived workload in healthcare (Zhang et al., 2023).

H2: Communication interactivity has a negative effect on work-related stress among dental therapists.

2.4 Practitioner self-efficacy and work-related Stress

Professional efficacy is a key personal coping resource in demanding work environments. People with high self-efficacy are more likely to evaluate demanding circumstances as manageable and have better control over their emotions when they are under stress (Bandura, 1997; Schwarzer & Jerusalem, 1995). Recent research in HCEM also demonstrates that self-efficacy is negatively related to both emotional exhaustion and cognitive load (Liu et al., 2022; van der Heijden et al., 2023). In pediatric

dentistry practice, high self-efficacy allows the practitioners to remain confident and persistent when rejecting uncooperative patients which might reduce job strain.

H3: Practitioner self-efficacy has a negative effect on work-related stress among dental therapists.

2.5 Media narrative depth and practitioner self-efficacy

Visual stories that are coherent and contextually appropriate can help to build confidence among practitioners by providing them with understanding, anticipation and procedural clarity. The field of cognitive ergonomics suggests that visualising stories can improve perceived competence by reducing uncertainty and facilitating decision-making (Mayer, 2020; Norman, 2013). Recent studies have indicated that medical practitioners' confidence can be boosted and their proficiency in clinical settings can be enhanced by the use of visual cognitive aids (Kalyuga & Singh, 2022).

H4: Media narrative depth has a positive impact on practitioner self-efficacy.

2.6 Communication interactivity and practitioner efficacy

Interactive communication systems convey a feeling of autonomy, reply, and competence when performing a task. Previous research indicate that stimulating interactivity boosts perceived agency and confidence in technology-mediated health work (Sundar et al., 2014; Zhang, Lim, & Xu., 2023). Through for example, giving better opportunity to communicate with child patients, interactive media could reinforce their belief that they can control a complex clinical situation.

H5: The communication interactivity has a positive impact on the practitioner self-efficacy.

2.7 Research Model Framework

The proposed research model also combines the Transactional Model of Stress and Coping with Cognitive Load Theory in explicating how visual - based communication can benefit practitioner well-being. Depth of media narratives and interactive communication are approached as ergonomic work system resources that serve to minimize extraneous cognitive load while maximizing practitioner self-efficacy. Higher self-efficacy, therefore, serves as an

individual coping resource which helps reduce work stress among DTs in the pediatric clinical setting.

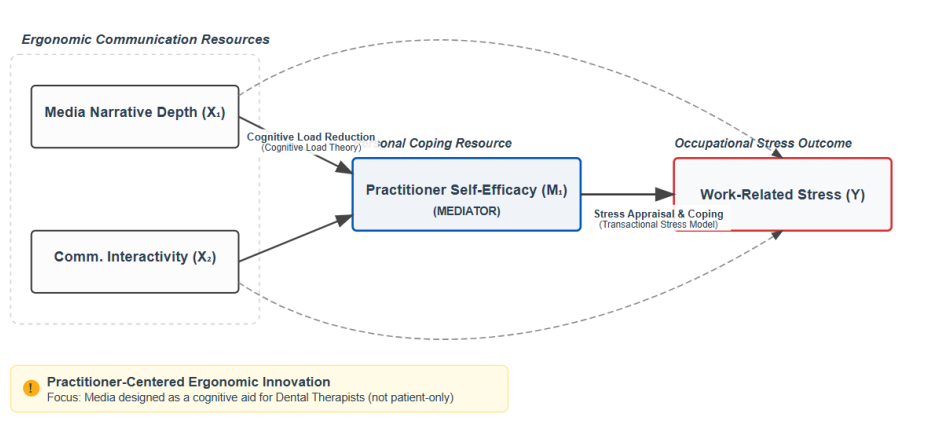


Figure 1. Visual-Based Communication, Self-Efficacy, and Work-Related Stress among Dental Therapists

3. Material and Method Innovation

3.1 Research design

This research used the quantitative cross-sectional observational design that is commonly used in healthcare ergonomics and occupational stress investigations to explore associations between work system factors, personal resources, and stress outcomes. Informed by the Transactional Model of Stress & Coping and Cognitive Load Theory, the design provides a framework for examination of how visual communication resources along with practitioner self-efficacy shape work-related stress. Recent ergonomic work suggests that cross-sectional designs are suitable to study cognitive workload, stress appraisal and human-system interaction in healthcare as it really happens (Holden et al., 2020; Carayon et al., 2021). This approach allows testing of theory-driven hypotheses while capturing where practitioners' perceptions fall in their natural clinical settings.

3.2 Population and sample

This cross-sectional study was carried out in 2024 involving dental therapists who worked at public primary health services (Puskesmas) in South Lampung Regency, Indonesia. The study sample was drawn from dental therapists who were licensed to

practice and provided routine pediatric care. A sample of 150 dental therapists was the required minimum for conducting multivariate analysis in applied ergonomics research. We used a census-based convenient sampling approach, since the population was small and available. This approach minimizes the sampling bias and increases the results' representativeness in research on public healthcare work system.

3.3 Data collection methods

A structured self-administered questionnaire was used to collect data, which were delivered in person (face-to-face) to DTs during their regular professional meeting and clinical coordination. The survey was performed following institutional approval and informed consent from each individual. Respondents were requested to rate their visual-based communication tools, self-efficacy and work-stress during pediatric dental care. To reduce common method variance, respondents were guaranteed that their responses would remain anonymous and confidential and items were phrased in neutral terms without an evaluative content. This approach follows best practice in occupational stress and human factors research (Podsakoff et al., 2012).

3.4 Measurement Instruments and Variable Indicators

All variables in this study were measured using scales (constructs with several items) based on questionnaires that have been validated in the fields of ergonomics, psychology, and health communication. The measurement items used a 5-point Likert scale, ranging from a score of 1 ('strongly disagree') to 5 ('strongly agree'). The independent variables (Media Narrative Depth and Communication Interactivity) represent ergonomic communication resources that mediate personal adjustment resources (Practitioner Self-Efficacy) and outcome variables (Work-Related Stress). Content validity and theoretical fit with previous leading research are ensured for each construct through detailed indicators, dimensions, and sources, presented in Appendix A1 (see Table of Research Variables and Indicators).

3.5 Data analysis research

Structural Equation Modeling (SEM) with a variance-based approach was used to analyze the data such that the measurement and structural models were analyzed simultaneously. This method is also highly applicable for theory driven models including mediation and latent variable activities in applied ergonomics, health care research studies, particularly when the leading focus of the analysis is to predict and expand on theory (J. Hair & Alamer, 2022; Sarstedt et al., 2022). The study employed a two-stage process: first, validation of the measurement model involved testing for indicator reliability, internal consistency, convergent and discriminant validity against accepted SEM standards (J. F. Hair et al., 2019). Second, the structural model was analyzed to examine relationships between the variables that were proposed in those hypotheses considering path coefficients and each variable's explained variance. The mediations of practitioner self-efficacy were examined via non-parametric bootstrapping

approaches and have been suggested as an approach for making robust inferences in behavioral sciences and health research arena (Hayes, 2015).

4. Research Innovation Results

4.1 Descriptive statistics and respondent profile

On average, the sample was comprised of younger to mid-career dental therapists at an average age of 35.0 years (SD=7.0) and representative of an active professional workforce. The majority of the sample was female (65.3%), consistent with gender distribution in dental therapy and other allied health professions. Regarding education, most respondents had a bachelor degree in dental health (60.0%) or professional program graduates were slightly highest (30.0%), showing high formal clinical training. The average years of clinical experience (7.9, SD = 6.1) has a significant range in terms of time spent in clinical practice and was used for interpreting perspectives from younger and older practitioners in public primary healthcare centers.

The descriptive statistics reveal that all of the balance scores are standardized latent variable scores generated as output by the PLS-SEM model, which means that we have mean centered at 0.000 and a standard deviation of 1.000* for all the constructs. The ranges observed indicate sufficient variation among the respondents to conduct further estimates of SEM. Specifically, **PSE has the highest dispersion (min = -3.127; max = 1.910), which means that there are significant differences among practitioners in their perception of how they can cope with stressors. " WRS " also shows a significant range of spread (min = -2.042; max = 2.685) and mirrors different amounts of work-related stress. Likewise, MND (-2.821 to 2.021) and CI (-2.422 to 2.160) exhibit ample variability in perceived visual narrative depth and communication interactivity that is necessary for the consideration of testing proposed structural relationships between them as well as other constructs in the model.

Table 1. Demographic Characteristics of Respondents

Characteristic	Category	n / Value
Age (years)	Mean ± SD	35.0 ± 7.0
Gender	Male	52 (34.7%)
	Female	98 (65.3%)

Characteristic	Category	n / Value
Education Level	Diploma (D3 in Dental Health)	15 (10.0%)
	Bachelor (S1 in Dental Health)	90 (60.0%)
	Professional Program	45 (30.0%)
Work Experience (years)	Mean ± SD	7.9 ± 6.1

Table 2. Descriptive Statistics of Research Constructs

Construct	Mean	SD	Minimum	Maximum
Media Narrative Depth (MND)	0.000	1.000	-2.821	2.021
Communication Interactivity (CI)	0.000	1.000	-2.422	2.16
Practitioner Self-Efficacy (PSE)	0.000	1.000	-3.127	1.91
Work-Related Stress (WRS)	0.000	1.000	-2.042	2.685

Source; Author 2025

4.2 Measurement model evaluation (Outer model)

The measurement model shows a good indicator reliability as all the standard outer weight loads being over 0.70 suggest that every item properly measures its corresponding underlying factor. Loadings for CI and MND as indicators are stable (0.755–0.843) in demonstrating the salience of visual communication constructs. Practitioner Self-Efficacy (PSE) demonstrates very high loadings, ranging from 0.690 to 0.873, indicating that the measurement of practitioners believed coping ability is reliable. To same extent, Work-Related Stress (WRS) indicators load highly on their construct (0.783–0.848), confirming stable representation of stress phenomenon. In general, reliability of indicators is supported by the results and we retain all items for further analysis of the structural model according to PLS-SEM standards.

Strong internal consistency and convergent validity are reflected in the results for all constructs. The Cronbach's alpha, the two composite reliability (ρ_a and ρ_c) coefficients are higher than the threshold value of 0.70, supporting acceptable reliability. Additionally, all constructs have AVE over

0.50 presenting a high proportion of variance in the construct factors related to their measures. Of the additional scales, PSE and MND show outstanding internal consistency and convergent validity which suggest that they are reliable measures of psychological and ergonomic factors. In sum, the results support that the measurement model has achieved reliability and validity standards, indicating its fitness for further structural and mediation analysis in PLS-SEM.

All constructs exhibit sufficient discriminant validity, as supported by the *Fornell-Larcker* criterion. For each latent construct, the diagonal element value of the factors (the square root of the AVE) is higher than the cross-loadings, demonstrating the superiority of the individual constructs over all other manifest variables. In particular, a clear separation is shown by CI, MND and PSE, although a strong negative correlation with the antecedent constructs is exhibited by WRS, as would be expected. The findings suggest that the visual communication resources, practitioner self-efficacy and work-related stress measures are distinct and valid. This supports the model's hypothesis.

Table 3. Indicator Loadings and Indicator Reliability

Indicator	CI	MND	PSE	WRS
CI1	0.797			
CI2	0.755			
CI3	0.839			
CI4	0.843			
CI5	0.757			
MND1		0.791		
MND2		0.822		
MND3		0.837		
MND4		0.806		
MND5		0.825		
PSE1			0.843	
PSE2			0.847	

Indicator	CI	MND	PSE	WRS
PSE3			0.800	
PSE4			0.873	
PSE5			0.758	
WRS1				0.783
WRS2				0.835
WRS3				0.844
WRS4				0.848
WRS5				0.797

Source; Author 2025

Table 4. Internal Consistency Reliability and Convergent Validity

Construct	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
CI	0.859	0.871	0.898	0.639
MND	0.875	0.877	0.909	0.666
PSE	0.882	0.886	0.914	0.681
WRS	0.880	0.881	0.912	0.676

Source; Author 2025

Table 5. Fornell larcker criterion results

criterion	CI	MND	PSE	WRS
CI	0.799			
MND	0.539	0.816		
PSE	0.550	0.569	0.825	
WRS	-0.277	-0.280	-0.669	0.822

Source; Author 2025

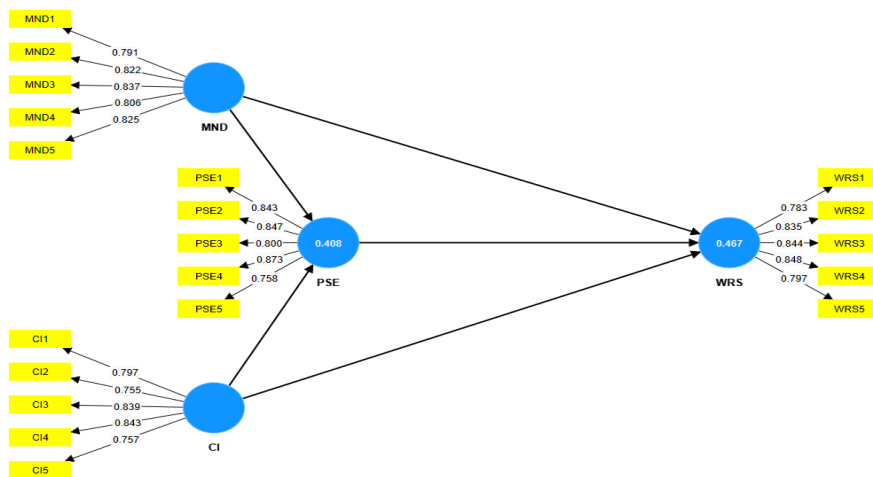


Figure 2. Measurement Model with Standardized Factor Loadings

4.3 Discriminant validity and collinearity assessment

The HTMT values for all pairs of constructs are less than the conventional cutoff value of 0.85, which demonstrates good discriminate validity. The findings also support the empirical independence of

each construct from all the others. Further, the highest HTMT is for the association between PSE and WRS (0.757), albeit close to expectations given their conceptual overlap and less than 1. Finally, the results are consistent with the discriminant validity of the measurement model and demonstrate that both constructs seem to represent sound related but conceptually different theoretical properties.



VIF values suggest that multicollinearity is not an issue for the structural model. All predictor–outcome associations exhibit VIFs well below the traditional cut-off point of 3.0, indicating that the independent and mediating variables are not overly redundant with each other. That is, CI and MND display low-multicollinearity in explaining PSE and

WRS for communication institute professionals, whereas PSE exhibits the appropriate multicollinearity on predicting WRS. Such evidence may also indicate that each predictor independently provides unique information for explanation to the model, which thus helps guarantee not only the stability and reliability but also the interpretability of path coefficients estimated in PLS-SEM analysis.

Table 6. HTMT results

Matrix	CI	MND	PSE	WRS
CI				
MND	0.612			
PSE	0.623	0.644		
WRS	0.316	0.318	0.757	

Source; Author 2025

Table 7. VIF Values

Variable	VIF
CI -> PSE	1.409
CI -> WRS	1.608
MND -> PSE	1.409
MND -> WRS	1.658
PSE -> WRS	1.688

Source; Author 2025

4.4 Structural model assessment (Inner Model)

Structural model testing shows that communication interactivity (CI) and media narrative depth (MND) have a significant positive effect on PSE. The beta values for these effects are 0.343 and 0.384, respectively, and both are significant at the 0.001 level (see table for details). However, the direct effects of CI and MND on WRS are not significant (CI > WRS: $\beta = 0.093$, $p = 0.153$; MND > WRS: $\beta = 0.118$, $p = 0.174$). In other words, communication-related factors do not directly reduce stress levels. A strong and negative relationship between self-efficacy and WRS was demonstrated by the findings ($\beta = -0.787$, $t = 12.68$, $p < 0.001$). This indicates that high self-efficacy

significantly reduces work-related stress among dental therapists.

This model has fairly good explanatory power ($R^2 = 0.408$ for PSE and 0.467 for WRS), meaning that the independent variables explain 40.8% and 46.7% of the variation in self-efficacy and work-related stress, respectively. Effect size analysis supports these findings, as the effect sizes for CI > PSE ($f^2 = 0.141$) and MND > PSE ($f^2 = 0.177$) are moderate; however, the direct effect on WRS is relatively small. A large effect ($f^2 = 0.688$) is the best way to describe the influence of PSE on WRS. Therefore, we suggest that practitioners' self-efficacy is the main explanatory mechanism in the structural model.

Table 8. Structural Model Path Coefficients and Hypothesis Testing

Hypothesis	Path	Path Coefficient (β)	t-value	p-value	Decision
H1	CI > PSE	0.343	4.763	0.000	Supported
H2	CI > WRS	0.093	1.429	0.153	Not Supported
H3	MND > PSE	0.384	6.064	0.000	Supported
H4	MND > WRS	0.118	1.36	0.174	Not Supported
H5	PSE > WRS	-0.787	12.68	0.000	Supported

Source; Author 2025

Table 9. Coefficient of Determination (R^2) and Effect Size (f^2)

Endogenous Construct	R^2	Adjusted R^2	Interpretation
PSE	0.408	0.400	Moderate explanatory power
WRS	0.467	0.457	Moderate to substantial explanatory power

Source: Author's computation (2025)

Table 10. Effect Size (f^2)

Structural Path	f^2	Effect Size
CI > PSE	0.141	Medium
CI > WRS	0.01	Small
MND > PSE	0.177	Medium
MND > WRS	0.016	Small
PSE > WRS	0.688	Large

Source: Author's computation (2025)

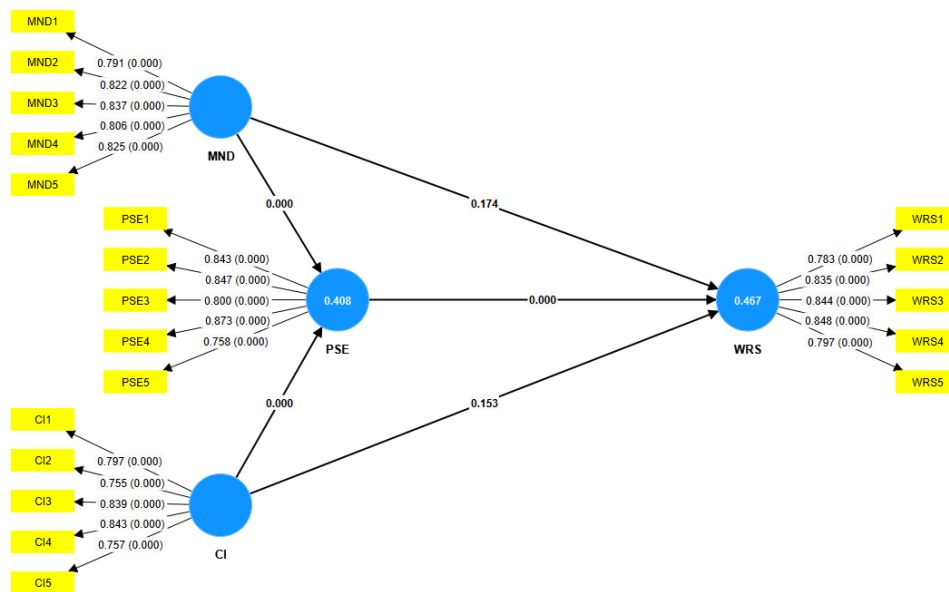


Figure 3. Structural Model with Standardized Path Coefficients

4.5 Mediation analysis results

Mediation analysis shows that PSE has a full mediating role between CI, MND, and WRS. Although the direct effects of CI and MND on WRS are also not statistically significant ($p > 0.05$), their indirect effects through PSE are negative and highly significant (CI: $\beta = -0.270$, $p < 0.001$; MND: $\beta = -0.302$, $p < 0.01$). This indicates that communication features reduce stress only by strengthening therapists' sense of self-efficacy, not through a direct stress-reducing effect.

Furthermore, the indirect effects of CI and MND on WRS were statistically significant. This suggests that self-efficacy is a psychological pathway that helps transform the benefits of visual-based communication into stress reduction. These results are consistent with social cognitive theory, which emphasises that increased cognitive control and work efficacy play a crucial role in how communication progress affects job satisfaction.

Table 11. Direct, Indirect, and Total Effects (Bootstrapping Results)

Pathway	Effect Type	Path Coefficient (β)	t-value	p-value	Interpretation
CI > WRS	Direct	0.093	1.429	0.153	Not significant
CI > PSE	Direct	0.343	4.763	0.000	Significant
PSE > WRS	Direct	-0.787	12.68	0.000	Significant
CI > PSE > WRS	Indirect	-0.270	4.414	0.000	Significant mediation
CI > WRS	Total	-0.177	1.986	0.047	Significant

Source: Author's computation (2025)

4.6 Discussion

The findings of this study indicate that visual resources used in communication have an indirect impact on the work stress experienced by dental therapists. This influence is believed to stem from the practitioner's self-efficacy, rather than a direct stress-reducing effect. These findings are consistent with recent developments in work stress research, which highlight that workplace demands cause stress outcomes through cognitive appraisals and personal resources, not just environmental conditions alone. Contemporary studies in health ergonomics confirm that work stress is shaped by practitioners' interpretations of task complexity, time pressure, and emotional demands. This highlights the central role of internal psychological mechanisms in stress regulation (Carayon et al., 2023; Nielsen et al., 2023; Day et al., 2024; Montgomery et al., 2025).

Recent research in social cognition and human-system interactions is supported by the significant positive effects of media narrative depth and communication interactivity on practitioners' self-efficacy. High-quality visual narratives and interactive communication tools enhance situational awareness, reduce uncertainty, and support clinical meaning-making. These factors strengthen perceived competence and professional confidence. Empirical studies show that narrative-rich visual systems and interactive digital media can increase confidence, task mastery, and perceived control among healthcare professionals in complex care environments (Zhang et al., 2023; Kalyuga & Singh, 2024; Holden & Carayon, 2024; Benda et al., 2025). These findings extend cognitive load theory, which suggests that task efficiency and psychological empowerment are not only influenced by the reduction of irrelevant cognitive demands through visual structure and interactivity.

The absence of a direct relationship between communication interactivity and media narrative

depth and work-related stress may have significant theoretical implications and is supported by the latest occupational health literature. Several studies suggest that improvements in technology and ergonomics do not always lead to reduced stress unless they result in increased coping resources and/or psychological flexibility (Bakker & de Vries, 2023; Taris et al., 2024; Lesener et al., 2024). For healthcare workers, even devices that maximise workflow efficiency may have little impact on clinicians' stress levels if they do not feel capable of coping with the emotional and cognitive load. This reflects calls in the ergonomics literature to shift from technology-based solutions towards resource-based models for worker well-being (Carayon et al., 2023; Holden et al., 2024).

The study results provide evidence of the role of practitioners' self-efficacy as a primary protective resource in challenging care contexts and show that it is the most significant predictor of work stress. Current high-quality studies show that self-efficacy alleviates emotional exhaustion, cognitive load, and psychosocial stress among healthcare workers by encouraging the adoption of adaptive coping strategies, emotion regulation techniques, and perseverance under pressure (Liu et al., 2023; van der Heijden et al., 2023; García-Sierra et al., 2024; Xu et al., 2025). Enhancing self-confidence is crucial for paediatric dentists to maintain psychological stability and work ability, given the high level of emotional labour and patient management required.

The findings of this study make a valuable contribution to existing knowledge on this topic, as they provide a clear and empirical illustration of how practitioners' self-efficacy effectively mediates the impact of visual communication resources on stress and attitudes. Recent research in occupational psychology has found that job resources can have a positive impact on well-being, particularly through motivational and cognitive factors such as self-confidence, work engagement, and perceived control (Schaufeli et al., 2023; Lesener et al., 2024; Richter et al., 2024; Bakker et al., 2025). This pathway is



supported by mediation-based research. The integration of visual communication design into self-efficacy theory enriches its development by providing insights into how digital and ergonomic measures can generate psychological value rather than directly reducing physiological stress.

The research highlights the need to connect technological innovation with human-centred empowerment approaches, both practically and theoretically. Recent literature on health management emphasises that digital tools are most effective when integrated with training, participatory design, and organisational support, thereby fostering professional confidence in autonomy (Montgomery et al., 2023; Holden & Carayon, 2024; World Health Organisation, 2024; Benda et al., 2025). In summary, the results of this study are consistent with the growing consensus on the sustainability of stress reduction in healthcare. This is achieved by enhancing internal cognitive resources through well-designed work systems. The study also identifies practitioners' self-efficacy as a central mechanism linking communication innovation with work well-being.

5. Conclusion

This study demonstrates that video-based cognitive-behavioural therapy is effective in reducing work-related stress among dental therapists, thanks to its role in boosting practitioners' self-confidence. Although the interactivity of communication and the depth of media narratives do not directly reduce stress, both represent ergonomic and cognitive tools that strengthen therapists' self-confidence and sense of control when dealing with difficult paediatric patients. These results support modern stress theory, which proposes that cognitive appraisals and personal resources, rather than task characteristics alone, determine work stress outcomes. The results indicate that confidence among practitioners is a key psychological factor that can link visual communication design to well-being.

When therapists perceive themselves as competent and feel capable of handling clinical and emotional demands, stress is significantly reduced, even in high-pressure care contexts. This emphasises the need to shift innovation strategies in healthcare from purely technical interventions to human-

centred designs that facilitate practitioners' cognitive and emotional aspects.

The Transactional Model of Stress (Lazarus & Folkman, 1984) and Cognitive Load Theory are theoretically expanded upon by this research. How external cognitive load is reduced and adaptive appraisals are promoted by visual narrative structures and interactivity is demonstrated. This research also contributes to the fields of ergonomics and health communication by conceptualising visual pop-up media not only as a patient-focused distraction tool, but also as a practitioner-centred cognitive aid – an aspect that has been underrepresented in previous research.

From a practical standpoint, our findings suggest that managers and decision-makers in healthcare should consider incorporating visual-based communication tools into professional education programmes, particularly in paediatric settings and those involving high emotional load. Such tools should aim to promote understanding, procedural clarity, and professional confidence rather than patient engagement. In short, this study shows that if healthcare professionals are given new insights into how to reduce ongoing stress, it will help them improve their well-being and become more resilient. A key part of this is ensuring that they believe in their own abilities.

Limitation

The study has some limitations, which should be considered when interpreting the findings. The cross-sectional design means that no causal relationships about the state of visual-based communication, practitioner self-efficacy and work-related stress can be indicated as they were measured at only one time; further longitudinal or intervention studies should collect information that better reflects the development of chronic stress and coping. Secondly, the reliance on self-reported questionnaire can trigger common method variance and social desirable bias, despite that anonymity was applied, validated measurement instruments were utilized – in line with the best practices for occupational/ergonomics studies. Third, the sample was limited to dental therapists working in public primary health care services in one region, which may limit the transferability of findings to other professions or private clinical settings and other contexts within the health system. Last, the model

that we used considered only practitioner self-efficacy as a mediating mechanism, and other similar and important psychological (e.g., resilience), as well as organizational (job autonomy or support) factors were not taken into account, which might have limited the range of explanation.

Author Contributions

Conceptualization, A.E.B.; methodology, A.E.B.; instrument development, A.E.B. and D.A.; data collection, A.E.B. and D.A.; data analysis, A.E.B.; writing—original draft preparation, A.E.B.; writing—review and editing, D.A.; supervision, A.E.B. All authors have read and agreed to the published version of the manuscript.

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Data Availability Statement

The data supporting the findings of this study are available from the corresponding author upon reasonable request.

Appendix Data A1. Table Research

Variable	Code	Dimension	Indicator	Source
Media Narrative Depth (MND)	MND1	Narrative Structure	The pop-up media presents a clear and logically structured storyline	Green & Brock (2000)
		Cognitive Engagement	The media helps practitioners cognitively engage with the clinical situation	Slater & Rouner (2002)
	MND3	Clinical Relevance	The narrative content is relevant to pediatric dental care contexts	Dahlstrom (2014)
		Cognitive Load	Visual narratives reduce the need for repetitive verbal explanations	Sweller et al. (2019)
	MND5	Symbolic Clarity	Visual symbols and cues are easy for practitioners to interpret	Mayer (2020)
Communication Interactivity (CI)	CI1	Information Efficiency	The media enables faster transfer of clinical information	McMillan & Hwang (2002)
		Patient Anxiety	The media helps reduce anxiety in pediatric patients	Armfield & Heaton (2013)
	CI3	Regulation Procedural	The media makes clinical procedures easier to perform	Norman (2013)
		Simplicity Clinical Time	The media helps shorten clinical treatment time	Valacich et al. (2007)
	CI5	Operator Satisfaction	Practitioners feel satisfied when using the media during treatment	Sundar et al. (2014)
Practitioner Self-Efficacy (PSE)	PSE1	Professional Confidence	Practitioners feel confident in managing uncooperative pediatric patients	Bandura (1997)
	PSE2	Situational Control	Practitioners feel able to control challenging clinical situations	Schwarzer & Jerusalem (1995)

Conflicts of Interest

The authors declare no conflict of interest.

Ethical Approval

This study was conducted in accordance with ethical standards for research involving human participants. Ethical approval was obtained from the relevant institutional ethics committee of Politeknik Kesehatan Tanjungkarang prior to data collection.

Informed Consent Statement

Informed consent was obtained from all participants involved in the study. Participation was voluntary, and respondents were assured of anonymity and confidentiality.

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Variable	Code	Dimension	Indicator	Source
Work-Related Stress (WRS)	PSE3	Clinical Decision-Making	Practitioners are confident in making clinical decisions	Holden et al. (2011)
	PSE4	Emotional Regulation	Practitioners can effectively regulate their emotional responses at work	Luszczynska et al. (2005)
	PSE5	Task Persistence	Practitioners remain persistent when facing demanding work conditions	Stajkovic & Luthans (1998)
	WRS1	Psychological Pressure	Practitioners experience psychological pressure during clinical work	Lazarus & Folkman (1984)
	WRS2	Emotional Exhaustion	Practitioners feel emotionally exhausted after treating pediatric patients	Maslach et al. (2001)
	WRS3	Cognitive Overload	Practitioners feel cognitively overloaded during clinical procedures	Paas et al. (2003)
	WRS4	Physiological Strain	Practitioners experience physical tension during clinical work	Ganster & Rosen (2013)
	WRS5	Performance Disruption	Work-related stress interferes with clinical performance quality	Parker & DeCotiis (1983)

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