Research Journal of Psychology (RJP)

Online ISSN: 3006-7219
Print ISSN: 3006-7200
Volume 3, Number 3, 2025, Pages 381 – 393
Journal Home Page
https://ctrjournal.com/index.php/19/index

Threats to Coping: The Combined Effects of Vicarious Trauma and Alarm Fatigue on Health Care Professionals

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ARTICLE INFO

Article History:

Received:	*June*	*17, 2025*
Revised:	*July*	*20, 2025*
Accepted:	*August*	*03, 2025*
Available Online:	*August*	*13, 2025*

Keywords:

vicarious trauma, alarm fatigue, coping self-efficacy, health care professionals, burnout, compassion fatigue

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ABSTRACT

Aim

This study examines the connection between vicarious trauma, alarm fatigue, and coping self-efficacy in healthcare workers. It aims to explore how these stressors impact healthcare workers' psychological resilience and capacity to manage workplace demands.

Method

A quantitative research methodology was employed, utilizing a structured questionnaire distributed to a sample of 200 healthcare workers. The questionnaire assessed levels of vicarious trauma, alarm fatigue, and coping self-efficacy.

Results

The findings revealed a strong negative correlation between vicarious trauma and coping self-efficacy. Additionally, alarm fatigue was shown to exacerbate this negative relationship. Specifically, healthcare workers experiencing higher levels of both alarm fatigue and vicarious trauma reported significantly lower coping self-efficacy.

Conclusion

These results are consistent with previous research highlighting the risks of burnout, compassion fatigue, and decreased job performance among healthcare professionals. The study emphasizes the urgent need for targeted interventions to mitigate the effects of vicarious trauma and alarm fatigue and to enhance healthcare workers' coping abilities.

Summary Statement

What is already known about this topic?

Vicarious trauma and related stress: Healthcare workers who care for traumatized patients often develop vicarious trauma (secondary traumatic stress), which leads to PTSD-like symptoms (e.g. anxiety, intrusive thoughts, sleep disturbance) and contributes to burnout and compassion.

Alarm fatigue: In high-acuity settings, constant clinical alarms cause alarm fatigue – staff become desensitized, stressed, and slower to respond. This sensory overload elevates mental stress, taxes cognitive resources, and can impair clinical performance.

Coping self-efficacy: "Coping self-efficacy" (confidence in one's ability to handle job stressors) is known to buffer these effects. Nurses with higher coping self-efficacy report significantly lower psychological distress, PTSD risk, and burnout.

What does this paper add?

New empirical links: This study provides quantitative evidence that higher vicarious trauma in healthcare workers is strongly associated with lower coping self-efficacy. In other words, clinicians who experience more secondary trauma report much less confidence in their ability to cope.

Combined stressors: It also shows that alarm fatigue exacerbates this effect: workers with high levels of both vicarious trauma and alarm fatigue had the lowest coping self-efficacy. Thus the combination of these stressors impairs coping ability more than either factor alone.

What are the implications of this paper?

Need for targeted interventions: The findings underscore an urgent need for interventions at both individual and organizational levels. Examples include resilience-building and stress-management training, trauma-informed leadership and peer support, and improved alarm management or system redesign. Such measures can help mitigate vicarious trauma and reduce alarm.

Protecting workforce and safety: Addressing these issues is critical for workforce sustainability and patient safety. Untreated trauma and alarm fatigue can erode coping skills, leading to higher burnout, turnover, and diminished care quality. By strengthening coping self-efficacy and reducing chronic stressors, healthcare organizations can improve both staff well-being and clinical outcomes.

Introduction

There have been many unexpected disasters in Pakistan that have had both immediate and lasting effects on the social change that has occurred (Branson, 2018). These consequences of disaster affect the victims directly as well as indirectly instilling fear and insecurity in those not directly affected; healthcare professionals are at the forefront of dealing with these consequences because they must manage a variety of responsibilities, from providing basic care to severely ill and traumatized patients that impact their own physical and psychological health (Iqbal, 2021).

Healthcare professionals are often dealing with trauma victims who need a great deal of care and attention, placing considerable emotional demands on these individuals. The combination of prolonged exposure to patient trauma along with long working hours and high patient volumes can result in emotional exhaustion, burnout, and decreased personal accomplishment (Figley, 2002), which can negatively impact the quality of life for healthcare workers and sometimes contributes to unintentional outcomes such as medication errors or inappropriate prescriptions (Iqbal, 2021).

The systemic challenges in Pakistan such as poor infrastructure, shortage of essential medicines, and uneven doctor-patient ratio add to the distress experienced by healthcare professionals already

dealing with high workload, rigid schedules, limited resources, low incentives, lack of resources, excessive workload, administrative burdens, workplace conflicts (Aziz et al., 2015), which were found in a study conducted in Pakistan. During the COVID-19 pandemic, this stress was exacerbated as the healthcare system became more overloaded with patients and healthcare workers had to worry about their own health while facing overwhelming patient loads and fear and anxiety (Rana & Mukhtar, 2020).

Long work hours, emotional exhaustion, and having to make important decisions under pressure are examples of stressors that have been shown to cause burnout, which severely lowers healthcare workers' psychological well-being. Due to the seriousness of their work, healthcare professionals have little room for error in extremely demanding fields like emergency medicine and critical care. According to Coomber et al., the emotional strain of working in these environments can lower job satisfaction and raise the risk of psychological problems. (2002)).

Healthcare providers are especially susceptible to vicarious trauma (VT) if they treat patients with trauma, chronic illnesses, or severe physical injuries. VT is a condition in which clinicians' beliefs about themselves, other people, and the world change as a result of their sympathetic engagement with patients' traumatic experiences (Guitar and Molinaro, 2017). Healthcare workers who regularly interact with traumatized people may experience emotional tolls that change their cognitive schemas and personal belief systems, which can result in feelings of helplessness, low self-esteem, and negativity about their capacity to protect others (McCann & Pearlman, 1990; Pearlman & Saakvitne, 1995). According to Saakvitne and Pearlman (1996), mood swings, difficulty concentrating, intrusive thoughts, and a general feeling of emotional exhaustion are frequently the results of these cognitive disruptions.

According to Taylor et al., vicarious trauma is distinct from post-traumatic stress disorder (PTSD), but it shares some symptoms, such as reliving and avoiding traumatic events and feeling depressed. One important predictor of vicarious trauma is increased exposure to traumatized patients. A general feeling of emotional and physical exhaustion, intrusive memories of the patient's traumatic experiences, and negative mood states are some of the symptoms of VT (Saakvitne & Pearlman, 1996). Furthermore, working in environments where medical personnel must make life-or-death decisions under intense pressure, such as emergency rooms or intensive care units, can make these symptoms worse. Empathy can be a source of personal fulfillment as well as a risk factor for burnout, even though it is necessary for providing high-quality patient care. Research indicates that higher levels of burnout, particularly among women, are linked to empathic engagement with patients.

Less is known about vicarious trauma in healthcare providers, as the majority of research has historically been conducted in the context of social workers and mental health care providers. Investigating how vicarious trauma affects medical personnel who work in emergency situations is crucial. Healthcare workers are particularly vulnerable to burnout, compassion fatigue, and secondary trauma due to the demanding nature of their jobs, especially in high-stress settings like emergency and trauma units (Trumello, 2020). These issues were made worse by the pandemic, as front line healthcare workers reported much higher levels of burnout and emotional exhaustion (Jimenez-Labaig et al. 2021).

Healthcare workers' ability to deliver high-quality care may be impacted by a decline in their mental health as a result of the traumatic situations they encounter on a daily basis. According to studies, the main causes of burnout among healthcare workers are a poor work-life balance, a lack

of vacation time, and insufficient support networks (Jimenez-Labaig et al. 2021). The stress of working in such environments can impair patient care in addition to having an impact on the professionals' mental health. Burnout increases the likelihood that healthcare professionals will make bad choices and possibly make mistakes in judgment, which could further jeopardize patient outcomes (Bride et al. 2007).

Vicarious trauma is a compounding effect that gets worse over time as medical professionals continue to see and treat traumatized patients. Prolonged exposure to these stressors can have a major impact on their lives in both the personal and professional spheres. The emotional toll of their jobs can cause healthcare workers to feel cut off from their families and communities, which can strain relationships and impair their capacity for effective coping (Whitton, 2018; Mustafa et al. (2020). The disruption of cognitive schemas brought on by vicarious trauma affects not only the professional but also the personal spheres, impacting self-care skills and family relationships (Pearlman & McKay, 2008). This procedure is especially troubling in medical settings, where staff members are supposed to manage their own psychological discomfort while still maintaining an emotional connection with patients.

Mustafa et al. (2020) looked into how healthcare workers were affected by vicarious traumatization, specifically with regard to coping strategies and family ties. According to their research, VT is positively correlated with negative family dynamics, including higher levels of conflict, less emotional support, and lower levels of family satisfaction. Additionally, their study showed that while emotion-focused coping strategies were positively connected with deteriorating family relationships, problem-focused coping strategies were negatively connected with weak familial ties. Additionally, the study discovered that rather than using healthy coping mechanisms, healthcare workers with higher levels of VT were more likely to turn to unhealthy ones like avoidance and self-blame.

By examining VT's effects on social science researchers who work with trauma survivors, Wallace and County (2023) deepened our understanding of the condition. To identify the coping strategies these researchers used to deal with the symptoms of VT, their phenomenological study used a thematic analysis. Building resilience and debriefing with coworkers and superiors to process trauma-related feelings were recognized as crucial coping strategies. In order to discuss their experiences in confidence, many participants also created support networks and sought professional counseling. Another important stress-reduction tactic used by participants was spirituality, where they turned to hope and faith. Additionally, VT symptoms were lessened by partaking in non-research activities like reading or meditation. Despite the fact that these tactics seemed to support psychological well-being, some researchers found it difficult to avoid using less adaptive mechanisms, like negativity and anger.

These studies demonstrate the complexity of vicarious traumatization and the range of coping mechanisms employed by people in occupations that expose them to trauma. To deal with the overwhelming effects of trauma, some people resort to maladaptive coping mechanisms, even though many people use healthy, protective ones. It is essential to comprehend these dynamics in order to effectively support professionals who are at risk of VT and improve their capacity to preserve their personal and professional well-being.

Professionals who are exposed to traumatic content in any way tend to internalize any traumatic event they encounter, which is explained by constructionist self-development theory. The therapist's inner experience changes as a result of empathetic engagement with the trauma material

of their clients, which leads to vicarious traumatization, according to Pearlman and Saakvitne (1995). Negative cognitive changes in the therapist's views about the world, other people, and oneself could result from this metamorphosis.

According to CSDT, a person's psychological needs for autonomy, security, dignity, connection, and confidence will dictate how they respond to trauma (McCann & Pearlman, 1990). The need to feel safe and secure is at the heart of safety needs. The idea of trust includes faith in the outside world as well as faith in interpersonal relationships. Being able to respect and value others in addition to feeling valued and respected by oneself is a component of self-esteem. Being in charge of oneself and other people is a need for independence and power, which are later referred to as "control" demands. Finally, intimacy is about meeting the need for a sense of belonging and connection to other people. Through their self-capabilities, these requirements help people maintain inner stability by shaping their identity and perspective. The significance of health care workers' coping self-efficacy in managing vicarious trauma and alarm fatigue will be emphasized by this study.

Methodology

Objectives

1. To investigate the relationship between alarm fatigue, vicarious trauma and coping self-efficacy among healthcare professionals.
2. To study the impact of Socio-demographics on the study variables among healthcare professionals.

Hypotheses

1. Vicarious trauma will be negatively related to coping with self-efficacy among healthcare professionals.
2. Alarm fatigue will be negatively related to coping self-efficacy among healthcare professionals.

Study Design

The study employed a cross-sectional, quantitative design to examine how vicarious trauma, alarm fatigue, and coping self-efficacy are related among healthcare professionals.

Data Collection Method

A survey-based questionnaire was administered to healthcare professionals. The questionnaire included standardized scales for measuring vicarious trauma, alarm fatigue, and coping self-efficacy.

Vicarious Trauma Scale

Vicarious Trauma Scale (Vrklevski & Franklin, 2008) is an 8 items scale. It is 7-point likert scale ranging from from 1 (strongly disagree) to 7 (strongly agree). The score ranged from 1 to 56. The higher the score, the higher possibility that individual is having vicarious trauma.

Coping Self-Efficacy

It is a 26-items scale by Chesney et al., 2006. It measures one's confidence in performing coping behaviour when faced by life challenges. The participant has to rate from 1-10, Cannot do all=0, 1,2,3,4,5= Moderately Certain can do,6,7,8,9,10= at certain can. An overall score is created by summing up the scores of the ratings. It has 3 sub scales: problem focused coping, emotion focused coping and social support.

Charite Alarm Fatigue Questionnaire (CAFq)

CAFQ is a 9 items questionnaire (Wunderlich et al., 2023) for measuring alarm fatigue in nurses and physicians. It has two sub scales. The alarm stress scale measures the psychological and physiological effects of alarm. The other sub-scale is the alarm coping scale that measures the influence of systemic variables and alarm management practices on an ICU's alarm situation. The score ranges from low score of 0 (no alarm fatigue at all) to highest of 36 (extreme alarm fatigue), with 18 being the midpoint.

Ethical Considerations

Ethical approval was sought from an institutional review board or an ethics committee of the relevant institutional ethic committee. Participation in the study was on a voluntary basis, and participants were informed about the purpose of the study, the anonymity of their responses were retained, and their right to withdraw was given at any consequence. Informed consent was obtained from all participants prior to participation.

Procedure

200 Participants were recruited from healthcare institutions (e.g., hospitals, clinics, emergency units) based on convenience sampling. The survey was distributed via email or administered in person, depending on the institution's preference and feasibility. The survey took approximately 20-30 minutes to complete. Data collection was completed within a specific time frame of 6 months.

Results and Discussion

Table 1: ***Demographic Characteristics of Sample (N = 200)***

Demographic	n	%	Demographic	n	%
Gender			**Age**		
Men	80	40	19-51 (M= 28, 5.75)	200	100
Women	120	60			
Qualification			**Professional Title**		
MBBS	134	67	House officer	57	28.5
FCPS/FRCS	43	21.5	Medical officer	65	32.5
MCPS/MRCS	8	4.0	Post Graduate Resident	36	18
MS/MD	15	7.5	Professor	7	3.5
			Consultant	35	17.5
			Hours of Duty per Week		
			More than 40 hours	32	16
Practice			More than 40 less than 80	118	59

Government	145	72.5	More than 80 less than 120	48	24
Private	21	10.5	**Traumatic Experience**		
Both	34	17	Yes	79	39.5
Job Experience			No	121	60.5
1-5years	128	64	**Marital Status**		
5.1-10 years	46	23	Single	100	50
More than 10 years	23	11.5	Married	100	50
Have u dealt with any traumatic case in your job experience					
Yes	161	80.5			
No	39	19.5			

Table 1 displays demographic details regarding a cohort of 200 healthcare practitioners from various cities. The sample consisted of 200 participants, with a gender distribution of 40% male (n = 80) and 60% female (n = 120). Participants' ages varied from 19 to 51 years, with a mean age of 28 years (SD = 5.75). Regarding qualifications, most possessed an MBBS degree (67%), with 21.5% having FCPS/FRCS, 4% holding MCPS/MRCS, and 7.5% achieving MS/MD. The professional designations were diverse, comprising 28.5% House Officers, 32.5% Medical Officers, 18% Post Graduate Residents, 3.5% Professors, and 17.5% Consultants.

64 percent of respondents had 1–5 years of work experience, 23 percent had 5–10 years, and 11–5 percent had more than 10 years. Eighty-three percent of participants had no health problems, while seventeen percent reported having any. When it came to prior work experience, 79% of respondents had it, while 21% did not. Seventy-two percent of participants worked for the government, ten percent worked for a private practice, and seventeen percent did both. Finally, compared to 19% of participants, 80% of them experienced traumatic cases during their work experience.

Table 2: ***Pearson Product Moment Correlation Between Study Variables (N = 200)***

	Scales	**1**	**2**	**3**	**4**	**5**	**6**
1	Vicarious Trauma	-	.12*	-.13*	-.34**	-.23**	-.21**
2	Alarm Fatigue		-	-.10*	-.12*	.13*	-.11**
3	Coping Self efficacy			-	.87**	.81**	.70**
4	Problem Focused Coping				-	.64**	.52**
5	Emotion Focused Coping					-	.41**
6	Social Support						-

P<0.05*

Table 2 illustrates the relationships among the study's variables. The findings show numerous important connections among the variables studied. Vicarious Trauma exhibits a minor positive correlation with Alarm Fatigue, indicating a subtle yet significant relationship between the two variables. Nonetheless, Vicarious Trauma has negative associations with Coping Self-Efficacy, Problem-Focused Coping, Emotion-Focused Coping, and Social Support, indicating that as individuals face increased vicarious trauma, they are likely to report diminished coping skills and less social support, which supports hypothesis 1.

There is a slight inverse relationship between alarm fatigue and coping self-efficacy, indicating that higher alarm fatigue is associated with somewhat lower self-reported coping confidence. Similarly, Alarm fatigue and Problem-Focused Coping have an inverse relationship, meaning that higher alarm fatigue is associated with less utilization of these coping mechanisms. On the other hand, there is a modest but positive link between alarm fatigue and emotion-focused coping, suggesting that those who experience more alarm fatigue are more likely to rely on emotion-focused strategies. There is a small inverse relationship between alarm fatigue and social support, indicating that higher alarm fatigue may be a sign of lower social support.

Both Problem-Focused Coping and Emotion-Focused Coping have strong positive correlations with Coping Self-Efficacy, a crucial component of coping effectiveness, suggesting that people who have higher coping self-efficacy also tend to use both strategies more successfully. Furthermore, there is a positive correlation between Coping Self-Efficacy and Social Support, indicating that people who are more confident in their ability to cope are more likely to perceive or receive higher levels of social support. There is a positive correlation between problem-focused coping and emotion-focused coping, indicating that people who use problem-solving techniques are also more likely to employ emotion-regulation techniques. Additionally, there is a positive correlation between problem-focused coping and social support, suggesting that people who employ problem-focused coping techniques are more likely to have access to or utilize social support. Lastly, Emotion-Focused Coping is positively correlated with Social Support, showing that individuals who use emotion-focused strategies shows higher social support.

Table 3: ***Multiple Linear Regression for the Effect of Demographics and Study Variables on Well-being Among Health Care Professionals***

			Coping Self-Efficacy (Model 2) 95% CI		
	Model1		***B***	***LL***	***UL***
Variables	***β***	***β***			
Constant			31.69	39.75	66.21
Age	-.28	-.15	-.22	-.88	.04
Number of Siblings	-.08	.01	.09	-.25	1.01
Job Experience	.61**	.35**	.63	.57	1.61
Hours of duty per Week	-.21	-.25**	-.15	-.25	-.05
No. of Traumatic Cases	-.71**	-.30**	-.50	-.75	-.25
Vicarious Trauma		-.22**	-1.21	-.14	-.24
Alarm Fatigue		.02	.03	-.13	.21
R^2	.15	.44			
ΔR^2		.29			
F	5.21	9.21			
ΔF	4.0				

The findings of a regression analysis looking at the factors influencing well-being are shown in Table 3. Two models are used in the analysis. The R2 value in Model 1 is 0.15, meaning that the predictors in this model account for 15% of the variance in coping. The addition of more variables in Model 2 explains 44% more variance in well-being, which is a significant improvement over Model 1, according to the change in R2 (ΔR^2) of 0.44. In Model 2, well-being is significantly predicted by a number of variables. More job experience is linked to coping self-

efficacy, as evidenced by the strong positive prediction of job experience ($\beta = 0.35$, $p < 0.01$). A useful indicator of the strength of the relationship between the number of traumatic cases and coping self-efficacy is the β value of -0.30; a negative value indicates that coping self-efficacy is negatively correlated with the number of traumatic cases.

However, vicarious trauma is a significant negative predictor of coping self-efficacy ($\beta = -1.21$, $p < 0.01$), suggesting that higher exposure to vicarious trauma is linked to lower coping self-efficacy. Age, the number of siblings, and alarm fatigue were among the other variables that this model did not significantly predict. Both models are statistically significant overall, according to the F-values of 5.21 and 9.21; however, Model 2 fits better because it includes more predictors that increase the model's explanatory power.

Discussion

Vicarious trauma is evident in Constructivist Self-Development Theory, as cognitive schema transformations happen due to engagement with the client's narrative and the counselor's individual traits. Overall, vicarious trauma is a typical adjustment encountered by counselors as a response to clients' trauma narratives (Trippany et al., 2004). This irrational viewpoint arises as a defense mechanism against traumatic emotional experiences, making it crucial for counselors to possess strong self-resilience to minimize vicarious trauma. This study found out that vicarious trauma is negatively related to coping self-efficacy supported by many researches (Ali et al., 2023; Cai et al., 2024). Research also examined that health care professionals face significant levels of alarm fatigue, which affects their ability to utilize coping self-efficacy, as indicated by various studies that demonstrated alarmingly high burnout rates among health care workers due to the emotionally and physically taxing nature of their jobs; previous studies revealed that burnout rates can hit 54.3% for professionals and 45% for medical students (Bauer et al., 2006; Dyrbye et al., 2014).

In 2019, a meta-analysis of 22,778 residents' data revealed that one in two had suffered from burnout (Low et al. 2019). Health care workers with higher levels of vicarious trauma and alarm fatigue also have lower levels of coping self-efficacy, according to a study. These results are consistent with numerous studies that demonstrate that healthcare professionals are vulnerable to both alarm fatigue and vicarious trauma, which happens when professionals lose their sensitivity to frequent and severe stressors (Muhammad et al. 2017; Bowling et al. 2023).

The repeated exposure to traumatic or life-threatening situations causes alarm fatigue (Soares & Chan, 2016), which impairs one's ability to effectively respond to crises (Coomber et al. 2002). Decreased job performance, poor decision-making, and an increased risk of burnout can result from this desensitization. In clinical settings, healthcare professionals frequently have to deal with the twin challenges of compassion satisfaction, the good feelings that come from helping others and compassion fatigue, which is the emotional exhaustion brought on by the ongoing demands of empathetic engagement (Okolai et al. (2020). Among the predictors, job experience emerged as a strong positive factor, indicating that individuals with more professional experience tend to report higher levels of coping self-efficacy. This finding aligns with previous research (Mir et al., 2021; Mathew & Thomas, 2019), suggesting that prolonged exposure to workplace challenges and accumulated skill sets may bolster individuals' confidence in managing stress and adversity (Nazir et al., 2022).

In contrast, exposure to traumatic cases and vicarious trauma were significant negative predictors of coping self-efficacy (Lu et al., 2019). These results suggest that greater exposure to trauma, whether directly through difficult cases or indirectly through the experiences of others can undermine individuals' perceived ability to cope effectively. Notably, vicarious trauma had the most substantial negative impact, highlighting the profound psychological toll that secondary exposure to trauma can have, particularly in healthcare or care giving settings (Guo et al., 2019).

Limitations and Implications

In order to encourage positive change after trauma, future research must focus on psychological aspects. Achieving post-traumatic growth requires effective coping, and cognitive strategies, as well as problem- and emotion-focused approaches, play a major role. Increased occurrences of post-traumatic growth are associated with adaptive coping strategies like humor, self-care, and focusing on the good. With most studies using simple statistical techniques like one-way or multi-factor analyses, there is a reliance on narrow perspectives, limited theoretical models, and crude analytical techniques. According to the current study, a few demographic characteristics are the main determinants of healthcare workers' intentions to quit. Further research can be done on a number of other factors that may also contribute to unfavorable organizational outcomes, such as turnover intentions. A number of factors can be taken into consideration in this regard, including challenges with leadership, low motivation, an unhealthy work environment, and professional inadequacy. Furthermore, a similar research model to the one described in this study could be investigated in other relevant sectors of the country that are under similarly high levels of stress, according to the contextual framework. To understand the complex interactions of factors affecting vicarious trauma, more in-depth, theory-based research is needed that takes into account a variety of perspectives and uses advanced analytical techniques. Results could be enhanced by developing interventions based on a deeper understanding of these components. In order to improve nurses' development after trauma, practitioners should investigate multifaceted approaches that incorporate psychological, social, and environmental factors.

Conclusion

The findings support the need for strong, theory-based interventions that target systemic elements in healthcare settings, such as organizational support, leadership styles, and work environments, in addition to addressing individual resilience. Healthcare systems must implement a multifaceted approach that encourages psychological safety, cultivates compassion satisfaction, and provides professionals with flexible coping mechanisms in order to reduce burnout and turnover intentions. In order to capture the complex realities of healthcare work and create specialized interventions that promote long-term well-being and professional development, future research must go beyond superficial analysis and use cutting-edge methodologies.

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