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A Cognitive-Process Model of Childbirth-Related Posttraumatic Stress Following Cesarean Section: The Role of Psychological Flexibility, Perceived Threat, and Cognitive Appraisals - A Pilot Study in Kinshasa, Democratic Republic of the Congo

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Abstract

Background: Childbirth-related posttraumatic stress disorder (CB-PTSD) is an underdiagnosed public health challenge in sub-Saharan Africa, particularly following emergency surgical delivery. While standard theoretical models combine cognitive appraisals (Ehlers & Clark) and psychological flexibility (Hayes et al**.),** we still have very little real-world evidence showing how these ideas actually play out in under-resourced African hospitals.

Objective: This pilot study evaluated a cognitive-process model of CB-PTSD among women undergoing surgical delivery in Kinshasa, Democratic Republic of the Congo (DRC), examining relationships between perceived intrapartum threat, psychological flexibility, negative cognitive appraisals, and traumatic stress symptoms.

Method: A cross-sectional pilot investigation was conducted at Hôpital Général de Référence de Makala (ex-Sanatorium) in Kinshasa (N = 15). Ethical approval was granted by the Ethics Committee of Kinshasa School of Public Health (KSPH). Participants completed psychometric assessments between 4 and 8 weeks postpartum: City Birth Trauma Scale (City BiTS), Acceptance and Action Questionnaire-II (AAQ-II), Posttraumatic Cognitions Inventory (PTCI), Edinburgh Postnatal Depression Scale (EPDS), and Generalized Anxiety Disorder 7-item (GAD-7). Non-parametric analyses (Spearman rank correlations r_s) and descriptive metrics were executed.

Results: Psychometric tools demonstrated satisfactory internal consistency (alpha = 0.78 & 0.89). CB-PTSD symptom severity (City BiTS) correlated positively with psychological inflexibility ($r_s = .74$, $p < .01$), negative cognitions about self ($r_s = .68$, $p < .01$), and perceived intrapartum threat ($r_s = .61$, $p < .05$\$). Women undergoing emergency cesarean section ($n = 10$) exhibited significantly higher total CB-PTSD scores than those undergoing elective procedures ($n = 5$; $p = .021$). Elevated psychological flexibility served as a significant buffer against severe posttraumatic responses.

Conclusion: Findings support the applicability of cognitive and acceptance-based trauma frameworks in urban DRC. Psychological flexibility and cognitive appraisals represent key targets for early clinical screening and culturally adapted perinatal interventions such as Acceptance and Commitment Therapy (ACT).

Keywords: Childbirth-related PTSD, Emergency cesarean section, Psychological flexibility, Perceived threat, Cognitive appraisals, Acceptance and Commitment Therapy (ACT), Sub-Saharan Africa, Kinshasa, Hôpital Général de Référence de Makala

1. Introduction and Theoretical Framework

1.1 Childbirth-Related Posttraumatic Stress Disorder (CB-PTSD) in Global and Sub-Saharan Contexts

Childbirth is widely conceptualized as a profound physiological and psychosocial transition. However, for a significant proportion of women globally, it is experienced as an acute traumatic event capable of triggering Childbirth-Related Posttraumatic Stress Disorder (CB-PTSD). Defined by intrusive memories, hyperarousal, avoidance behaviors, and negative alterations in mood and cognition specific to the labor and delivery process, CB-PTSD affects approximately 3% to 4% of women in community samples globally, with prevalence rates surging to 15%–19% among high-risk clinical

populations, such as those experiencing emergency operative interventions or severe maternal morbidity (Dekel et al., 2017; Yildiz et al., 2017).

In sub-Saharan Africa, and specifically in the Democratic Republic of the Congo (DRC), maternal mental health research has historically focused on postpartum depression (PPD), leaving traumatic stress reactions under-researched. This gap in research is critical given what maternal healthcare actually looks like in resource-poor areas. Real-world challenges like shortages of basic medical supplies, overwhelmed doctors and nurses, poor pain management, and delayed emergency transport frequently make an already stressful birth much worse. As a result, African women facing complicated deliveries endure both higher medical risks and much deeper psychological trauma**.**

1.2 The Psychological Impact of Emergency Cesarean Section in Low-Resource Settings

An operative delivery especially an emergency C-section (EmCS) is an intense shock to both the body and the mind. Unlike a planned procedure, an emergency C-section comes with sudden threats to the survival of the mother or baby, severe pain, a complete loss of control, and virtually no time to prepare mentally.

In a city like Kinshasa, where patients must pay for healthcare out of pocket, needing an emergency surgery adds crushing financial stress on top of an already terrifying medical emergency.

The psychological burden of EmCS in this setting is multi-layered:

1. The subjective perception of imminent physical destruction (maternal or neonatal mortality).
2. The rapid transition from an anticipated unassisted vaginal birth to invasive surgical management under acute distress.
3. Post-surgical pain coupled with the social stigma surrounding the inability to give birth "naturally," a notion embedded in certain local cultural discourses.

These interacting factors make EmCS a potent catalyst for traumatic stress, characterized by acute threat, cognitive disorganization, and persistent post-event distress.

1.3 Cognitive Models of Trauma: Ehlers and Clark's Framework

To explain why certain individuals develop chronic PTSD following a traumatic event while others recover, Ehlers and Clark (2000) proposed a cognitive model centered on two key mechanisms:

- The presence of excessively negative appraisals of the trauma and/or its aftermath.

- A disturbance in autobiographical memory resulting in vivid, context-free intrusive re-experiencing.

According to this framework, persistent posttraumatic stress occurs when individuals process the trauma in a way that produces a sense of current, ongoing threat. Negative appraisals generally manifest in two primary domains:

- Negative cognitions about the self (e.g., "I am weak," "My body failed me").
- Negative cognitions about the world or others (e.g., "Medical staff cannot be trusted," "The world is entirely unsafe").

When it comes to childbirth, a woman who sees an emergency C-section as a personal failure or feels her body is permanently broken is much more likely to develop long-term post-traumatic stress. On the flip side, viewing medical care as unpredictable and unsafe fuels constant anxiety and hyperarousal, often driving women to avoid the healthcare they need in the future.

1.4 Third-Wave Behavioral Perspectives: Psychological Flexibility and Experiential Avoidance

While classical cognitive models focus on the content of thoughts and beliefs, third-wave behavioral approaches specifically Acceptance and Commitment Therapy (ACT; Hayes et al., 2006) focus on the *function* of psychological events and the individual's relationship to them.

Central to the ACT framework is the concept of **psychological flexibility**: the ability to remain in contact with the present moment, including distressing thoughts, bodily sensations, and emotions, while aligning behavior with chosen values.

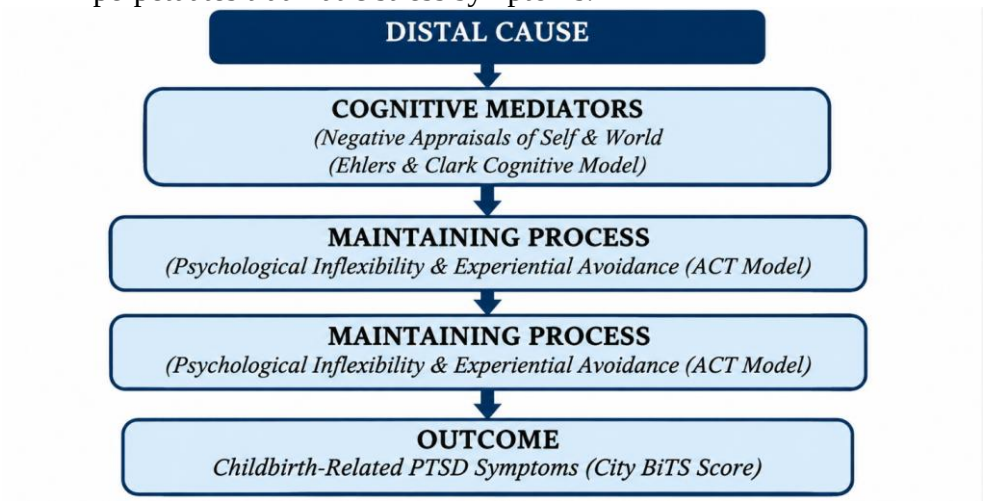
Its structural opposite, experiential avoidance, involves attempts to alter the frequency, intensity, or form of unwanted internal experiences (e.g., painful traumatic memories, surgical anxiety, feelings of inadequacy) even when doing so causes long-term psychological harm. In the context of childbirth trauma:

- An experiential avoidance response involves suppressing memories of the surgical room, avoiding contact with the infant if the baby triggers distress, or engaging in continuous mental rumination to escape feelings of vulnerability.
- Highly flexible individuals are better equipped to integrate painful intrapartum memories without resorting to dysfunctional avoidance strategies that maintain trauma symptoms over time.

1.5 Theoretical Synthesis and Conceptual Model Formulation

This study integrates Ehlers and Clark's cognitive appraisal model with Hayes et al.'s psychological flexibility framework to construct an integrative model of CB-PTSD. In this synthesized framework:

- Perceived intrapartum threat serves as the distal etiology.
- Posttraumatic cognitions (negative self/world appraisals) act as cognitive catalysts.
- Psychological inflexibility functions as a maintaining mechanism that perpetuates traumatic stress symptoms.



2. Research Objectives and Hypotheses

2.1 Primary Objective

The primary objective of this pilot study was to examine the empirical viability of an integrated cognitive-process model of CB-PTSD within a sample of postpartum women who underwent surgical delivery (cesarean section) at Hôpital Général de Référence de Makala in Kinshasa, DRC.

2.2 Specific Objectives

1. Adapt and evaluate the psychometric properties (internal consistency) of translated clinical instruments assessing CB-PTSD, psychological flexibility, posttraumatic cognitions, postpartum depression, and anxiety in Congolese French and Lingala contexts.
2. Quantify the relationships between perceived intrapartum threat, psychological flexibility, posttraumatic cognitive distortions, and CB-PTSD symptom severity.

3. Compare psychological outcomes between women undergoing emergency cesarean section (EmCS) versus elective cesarean section (ElCS).

2.3 Research Hypotheses

- Hypothesis 1: Perceived intrapartum threat will show a statistically significant positive correlation with total CB-PTSD symptom severity.
- Hypothesis 2: Psychological inflexibility (higher AAQ-II scores) will correlate positively with CB-PTSD symptom severity.
- Hypothesis 3 : Negative posttraumatic cognitions regarding self and world (PTCI) will correlate positively with CB-PTSD symptom severity.
- Hypothesis 4 :Women undergoing emergency cesarean section will report significantly higher levels of CB-PTSD symptoms, psychological inflexibility, and negative appraisals compared to women undergoing elective cesarean section.
- Hypothesis 5 : Psychological flexibility will correlate negatively with posttraumatic negative appraisals and general distress (depression and anxiety).

3. Methodology

3.1 Study Design and Methodological Rationale

This study utilized a cross-sectional, observational pilot design. We started with a pilot study to test our tools, see how practical it was to recruit participants, and get a baseline idea of the data variations in this under-studied group. This crucial first step prepares the ground for a larger, multi-center trial across the DRC.

3.2 Research Setting

The study took place at the Hôpital Général de Référence de Makala (formerly the Sanatorium), located in the Makala municipality of Kinshasa, DRC. This hospital serves a very crowded and economically diverse urban community, handling a high volume of surgical births. It provides maternal care under the resource limited conditions typical of public referral centers in Central Africa.

3.3 Participant Recruitment and Eligibility Criteria

A convenience sampling strategy was implemented through the hospital’s routine maternal and child health (MCH) follow-up and vaccination clinics.

Inclusion Criteria:

1. Adult women (age 18years of age).
2. Having delivered via cesarean section (emergency or elective) at Hôpital Général de Référence de Makala within the preceding 4 to 8 weeks.
3. Ability to provide informed consent and communicate fluently in French or Lingala.

Exclusion Criteria:

1. Known pre-existing psychotic disorders, severe neurocognitive impairment, or active acute mania.
2. Critical, life-threatening maternal physical complications requiring ongoing intensive care unit (ICU) stabilization at the time of assessment.

A total of N = 15 eligible postpartum women were recruited and provided complete diagnostic profiles for this pilot study.

3.4 Psychometric Measures and Cultural Adaptation

Instruments were translated and adapted into standard French and spoken Lingala following a forward-backward translation protocol, supplemented by panel consensus reviews with clinical psychologists at the University of Kinshasa (UNIKIN) to ensure conceptual and semantic equivalence.

City Birth Trauma Scale (City BiTS): A 29-item self-report questionnaire aligned with DSM-5 criteria for PTSD specific to childbirth (Ayers et al., 2018). The tool looks closely at how the birth felt to the mother, checking if she felt her life or safety was threatened (Criterion A). It also evaluates key struggles like intrusive memories, avoidance, shifts toward negative thoughts or moods, and feeling constantly on edge.

1. Acceptance and Action Questionnaire-II (AAQ-II): A 7-item scale measuring experiential avoidance and psychological inflexibility (Bond et al., 2011). Responses range from 1 (*never true*) to 7 (*always true*), with higher scores indicating higher psychological inflexibility.
2. Posttraumatic Cognitions Inventory (PTCI**):** A 33-item scale assessing trauma-related dysfunctional cognitive appraisals across three subscales: Negative Cognitions About Self, Negative Cognitions About World, and Self-Blame (Foa et al., 1999).
3. Edinburgh Postnatal Depression Scale (EPDS): A widely validated 10-item screening tool for perinatal depression (Cox et al., 1987).
4. Generalized Anxiety Disorder 7-item (GAD-7): A 7-item measure of general anxiety symptom severity (Spitzer et al., 2006).

3.5 Ethical Considerations

Ethical clearance was formally granted by the Institutional Review Board of the Kinshasa School of Public Health (Approval Ref: ESP/CE/184/2023). Every woman gave written consent before joining the study or a thumbprint if they couldn't read or write. To protect their privacy, we strictly anonymized all personal details using ID codes. Most importantly, anyone who showed signs of severe depression, thoughts of suicide, or full PTSD was immediately connected with the clinical psychology unit at UNIKIN for specialized care.

3.6 Statistical Analysis Plan

Data analyses were performed using SPSS version 26.0 and R version 4.2.1. Given the pilot sample size (N = 15), non-parametric statistical methods were prioritized:

- Descriptive statistics (frequencies, percentages, means, standard deviations, medians, and interquartile ranges) characterized the socio-demographic and clinical sample properties.
- Internal consistency was evaluated using Cronbach's alpha (α).
- Bivariate relationships among continuous psychometric variables were calculated using Spearman's rank correlation coefficient (r_s).
- Differences between delivery type subgroups (EmCS vs. ElCS) were analyzed using Mann-Whitney U test statistics.

4. Results

4.1 Socio-Demographic and Obstetric Profile of the Sample

The sample comprised N = 15 postpartum women aged between 19 and 38 years (M = 27.40, SD = 5.32). A majority of participants were married or cohabiting (n = 11, 73.3%), and two-thirds had completed at least secondary education (n = 10, 66.7%). Ten participants (66.7%) underwent emergency cesarean sections (EmCS), while five (33.3%) had elective procedures (ElCS).

VARIABLE	SUB-CATEGORY	FREQUENCY (N)	PERCENTAGE (%)
AGE GROUP	18–24 years	5	33.3%
	25–31 years	7	46.7%
	32–40 years	3	20.0%
MARITAL STATUS	Single	4	26.7%
	Married / Cohabiting	11	73.3%
EDUCATION	Primary or lower	5	33.3%
	Secondary	7	46.7%
	Higher / University	3	20.0%

DELIVERY TYPE	Emergency (EmCS)	Cesarean	10	66.7%
	Elective (ElCS)	Cesarean	5	33.3%
PARITY	Primiparous		6	40.0%
	Multiparous		9	60.0%

4.2 Psychometric Properties and Internal Consistency

All translated instruments demonstrated acceptable to excellent internal consistency within this Congolese pilot sample, supporting their reliability for clinical assessment in Kinshasa.

INSTRUMENT	NUMBER OF ITEMS	SAMPLE RANGE	CRONBACH'S ALPHA ($\ALPHA$)
CITY BITS (TOTAL SYMPTOMS)	20	4–48	.88
AAQ-II (INFLEXIBILITY)	7	12–42	.84
PTCI (TOTAL APPRAISALS)	33	45–182	.89
EPDS (DEPRESSION)	10	2–24	.81
GAD-7 (ANXIETY)	7	1–19	.78

4.3 Descriptive Statistics of Clinical Variables

Descriptive parameters across key clinical variables revealed substantial psychological distress in this pilot group, with elevated scores for traumatic stress, depression, and anxiety observed across the cohort.

VARIABLE	MEAN	SD	MEDIAN	IQR	THEORETICAL RANGE
PERCEIVED THREAT (CITY BITS CRITERIA A)	3.80	1.42	4.00	2.00	0–6
CITY BITS TOTAL SYMPTOMS	24.60	11.25	22.00	18.00	0–60
AAQ-II SCORE	26.47	8.16	25.00	12.00	7–49
PTCI TOTAL SCORE	108.20	32.10	102.00	48.00	33–231
EPDS TOTAL SCORE	11.87	5.22	11.00	8.00	0–30
GAD-7 TOTAL SCORE	9.40	4.15	9.00	6.00	0–21

4.4 Spearman Rank Correlation Analysis

Bivariate Spearman rank correlation analyses (r_s) were performed to test H1, H2, H3, and H5.

VARIABLE	1	2	3	4	5	6
1. PERCEIVED THREAT	1.00					
2. CITY BITS TOTAL	**.61***	1.00				
3. AAQ-II (INFLEXIBILITY)	.52*	**.74****	1.00			
4. PTCI TOTAL	.48	**.68****	**.71****	1.00		
5. EPDS (DEPRESSION)	.41	**.65****	**.63****	**.59***	1.00	
6. GAD-7 (ANXIETY)	.39	**.58***	**.56***	.49	**.72****	1.00

** p < .05, ** p < .01 (two-tailed).*

- H1 Supported: Perceived threat correlated significantly with total CB-PTSD symptoms ($r_s = .61$, $p = .016$).
- H2 Supported: Psychological inflexibility correlated strongly with CB-PTSD symptoms ($r_s = .74$, $p = .002$).
- H3 Supported: Negative cognitive appraisals correlated strongly with CB-PTSD symptoms ($r_s = .68$, $p = .005$).
- H5 Supported: Psychological flexibility showed inverse associations with negative appraisals and general distress (positive correlation with AAQ-II/inflexibility: $r_s = .71$ for PTCI, $r_s = .63$ for EPDS, $r_s = .56$ for GAD-7).

4.5 Exploratory Sub-Group Comparison: Emergency vs. Elective Cesarean Section

Non-parametric Mann-Whitney U testing evaluated differences in psychological outcomes between women undergoing emergency versus elective surgical deliveries (H4).

CLINICAL VARIABLE	EMERGENCY CS (N=10) MEDIAN (IQR)	ELECTIVE CS (N=5) MEDIAN (IQR)	MANN-WHITNEY U	P-VALUE
PERCEIVED THREAT	4.50 (1.50)	2.00 (1.00)	6.5	**.012**
CITY BITS TOTAL	29.50 (12.00)	13.00 (8.00)	8.0	**.021**
AAQ-II SCORE	30.00 (9.00)	18.00 (6.00)	9.5	**.034**
PTCI TOTAL	122.00 (35.00)	78.00 (22.00)	11.0	**.048**
EPDS TOTAL	14.00 (6.00)	7.00 (4.00)	10.0	**.038**

- H4 Supported: Women undergoing Emergency CS reported significantly higher median scores for perceived threat ($p = .012$), CB-PTSD symptoms ($p = .021$), psychological inflexibility ($p = .034$), negative appraisals ($p = .048$), and depressive symptoms ($p = .038$) than those undergoing Elective CS.

4.6 Synthesis of Pilot Findings

The empirical findings confirm all five research hypotheses within this pilot framework:

1. The load of posttraumatic stress symptoms after having a C-section is a major predictor of how much post-traumatic stress a mother might experience after giving birth.
2. The more negatively a woman perceives the trauma (measured by the PTCI) and the harder it is for her to adapt emotionally (measured by the AAQ-II), the more severe her childbirth-related PTSD (CB-PTSD) symptoms tend to be.

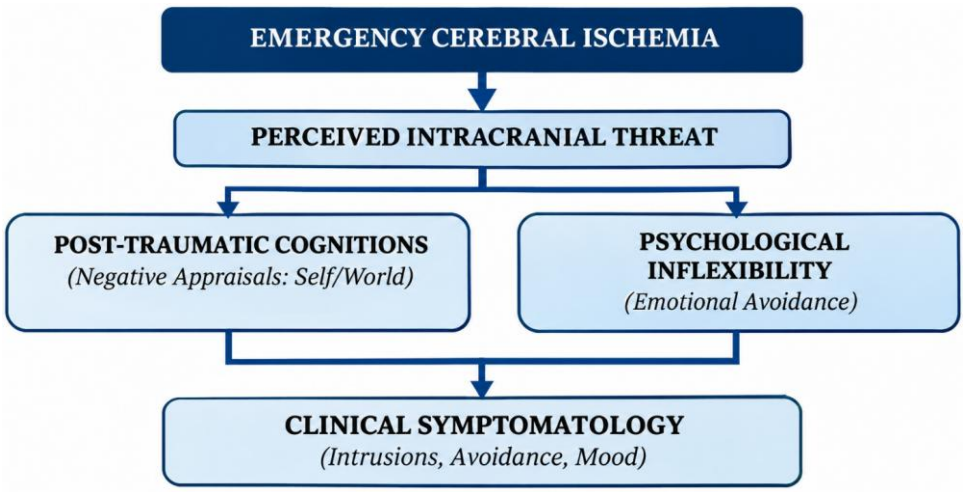
3. The circumstances of the birth matter deeply: emergency C-sections carry a much heavier psychological burden than planned ones.

5. Discussion

5.1 Interpretation of Findings in Light of Cognitive and Third-Wave Models

The results of this pilot investigation support the integrated cognitive-process model of CB-PTSD within an urban African clinical context. The strong correlation between posttraumatic cognitive appraisals (PTCI) and CB-PTSD symptoms (r_s = .68) aligns with Ehlers and Clark's (2000) assertion that persistent trauma reactions are driven by negative appraisals of the event and its consequences. Women who perceived the medical setting as unfriendly or interpreted their surgical birth as a personal bodily failure showed higher levels of posttraumatic stress disorder.

Concurrently, Hayes et al.'s (2006) hypothesis of experiential avoidance is supported by the strong connection between psychological inflexibility (AAQ-II) and the severity of CB-PTSD symptoms (r_s =.74). Higher symptom profiles were reported by women who firmly opposed or repressed intrusive thoughts and upsetting physical recollections. Over time, hyperarousal and intrusive symptoms seem to be sustained by experiential avoidance, which seems to impede the normal processing of birth-related trauma.



5.2 Specificity of Obstetric Trauma in the Congolese Clinical Context

To contextualize these findings, local healthcare delivery conditions must be considered. Public referral centers in Kinshasa, like as Hôpital Ríoâtre de México de Makala, are underfunded. Prolonged labor, delayed referrals from primary health institutions, or financial disputes over medical expenses are frequently the causes of emergency surgical procedures.

In these circumstances, "perceived threat" represents actual medical hazards and procedural anxiety rather than just being a subjective distortion. In this context, the trauma of an emergency surgical birth includes a complex combination of systemic vulnerabilities, loss of personal control, physical suffering, and a threat to life.

5.3 Practical and Clinical Implications for Postpartum Maternal Care

The strong associations observed between psychological flexibility, cognitive appraisals, and traumatic distress point to actionable clinical interventions:

1. Perinatal Screening: Routine implementation of brief screening tools (such as the City BiTS or AAQ-II) during postpartum infant vaccination clinics could facilitate early detection of maternal psychological distress.
2. Targeted Psychotherapeutic Interventions: The strong performance of the AAQ-II supports the utility of Acceptance and Commitment Therapy (ACT) adapted for perinatal care. Short, culturally tailored ACT therapies that emphasize values-based parenting, emotional acceptance, and mindfulness may help moms process traumatic birth experiences and lessen experiential avoidance.

   3. Training for Maternity workers: Teaching maternity workers the concepts of respectful maternity care (RMC) and trauma-informed care helps lessen secondary traumatization brought on by clinical communication failures during emergency procedures.

5.4 Methodological Strengths and Limitations

Strengths:

- First study to evaluate an integrated cognitive-process trauma model (Ehlers & Clark + ACT) for childbirth trauma in the Democratic Republic of the Congo.
- Psychometric validation of localized French and Lingala adaptations of standardized instruments (City BiTS, AAQ-II, PTCI).
- Rigorous ethical framework approved by the École de Santé Publique de Kinshasa (ESPK).

Limitations:

- Sample Size: As a pilot study (N = 15), the sample limits statistical power and the ability to run complex multivariate path analyses or structural equation models (SEM).
- Sampling Technique: Reliance on convenience sampling at a single hospital setting introduces potential selection bias.

- Cross-Sectional Design**:** Data collection at 4–8 weeks postpartum precludes definitive causal inferences regarding the directionality of psychological flexibility and cognitive appraisals over time.

5.5 Roadmap for a Scale-Up Prospective Multicenter Study

To build upon these preliminary findings, a large-scale, prospective research project is planned:

- Target Sample Size: N= 150 postpartum women across multiple clinical sites in Kinshasa (e.g., Cliniques Universitaires de Kinshasa, Hôpital Général de Kinshasa, and regional mother-child centers).
- Longitudinal Methodology**:** A three-wave longitudinal design evaluating participants at T1 (24–48 hours post-delivery), T2 (6 weeks postpartum), and T3 (6 months postpartum).
- Advanced Analytics**:** Structural Equation Modeling (SEM) to formalize mediation and moderation pathways between intrapartum threat, posttraumatic cognitions, psychological flexibility, and CB-PTSD trajectories.

(T1: 24-48 Hours Postpartum) ; (T2: 6 Weeks Postpartum)
(T3: 6 Months Postpartum)

Baseline Threat & Acute Distress Appraisals & Flexibility Chronic PTSD & Functioning.

6. Conclusion and Recommendations

6.1 Summary of Main Findings

This pilot study demonstrates that Childbirth-Related Posttraumatic Stress Disorder (CB-PTSD) following cesarean section in Kinshasa, DRC, is closely linked to perceived intrapartum threat, negative posttraumatic cognitions, and psychological inflexibility. Compared to women undergoing planned procedures, individuals undergoing emergency surgical births had far greater risk profiles for cognitive-behavioral discomfort. The translated scales' psychometric qualities validate their clinical usefulness and dependability in urban Congolese healthcare environments.

6.2 Clinical and Policy Recommendations

1. Ministry of Public Health Integration**:** Integrate maternal mental health assessments into standard national perinatal care packages across the DRC.
2. Clinical Training: Train midwives, nurses, and obstetricians in communication techniques during emergency surgical procedures to reduce acute perceived intrapartum threat.

3. Psychological Service Provision: Establish clinical psychology services within tertiary referral hospitals to deliver brief, culturally adapted acceptance- and cognitive-based interventions (ACT/CBT) for postpartum women.

6.3 Concluding Remarks

Preventing and addressing childbirth trauma is essential for both maternal well-being and infant development. This study lays the groundwork for culturally appropriate, empirically supported psychological therapies in sub-Saharan Africa by identifying psychological flexibility and cognitive appraisals as modifiable cognitive targets. The Democratic Republic of the Congo's maternal mental health policies will benefit from the expansion of this research.

Conflict of Interest: The authors reported no conflict of interest.

Data Availability: All data are included in the content of the paper.

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