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ORIGINAL PAPER

Impact of Neuro-rhythmic Non-predictable Somatic Intervention on Kinaesthetic Associations of Unwanted Resources

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Abstract

Unwanted autobiographical memories often generate maladaptive affective and behavioural patterns sustained by heightened autonomic arousal and limited cognitive regulatory capacity. Existing interventions rely heavily on effortful top-down strategies, creating a need for methods that activate automatic regulatory mechanisms. Neuro-Rhythmic Non-Predictive Somatic Intervention (NRNPSI) was developed to disrupt stored emotional responses through spontaneous, unpredictable sensorimotor engagement and memory reconsolidation processes that separate emotional charge from factual content. A repeated-measures pretest–posttest design was used with 101 Indian adults experiencing distress related to unwanted memories. Participants completed the Positive and Negative Affect Schedule (PANAS) at baseline, immediately after NRNPSI, and again at a four-month follow-up. The intervention consisted of six progressively complex movement conditions incorporating bilateral coordination, rhythmic unpredictability, vocalisation, and vestibular activation while maintaining gentle awareness of a selected distressing memory. Data were analysed using repeated-measures ANOVA with trend analyses and Bonferroni-corrected pairwise comparisons. Positive Affect (PA) increased significantly from baseline to post-intervention and remained higher at follow-up, whereas Negative Affect (NA) decreased sharply post-intervention but partially rebounded at follow-up, with differences from baseline approaching non-significance. Trend analyses indicated strong linear and quadratic patterns for both PA and NA, reflecting immediate improvement and partial long-term stabilisation. Findings suggest that NRNPSI facilitates automatic emotion regulation by engaging bottom-up mechanisms involved in interoception, sensorimotor disruption, and memory reconsolidation. The intervention produced sustained increases in positive affect and substantial short-term reductions in negative affect, highlighting its potential as an accessible, low-effort alternative to cognitively demanding approaches.

Keywords: Somatic Intervention · Emotion Regulation · Positive Affect · Negative Affect · Bottom-Up Processing

Every method of intervention contains a way to disengage the person from emotional overcharge, the surplus of feeling that enters the shared field. The concern here is with the residues of unwanted emotion that persist in ordinary experience and keep the system in a loop of reaction. Prolonged catharsis often extends that loop, consuming time and energy that could instead open access to adaptive states. In this paper, the authors began to observe that when individuals engage through their language, soma, psychogeography, and sensory channels, change begins to take place. The shift is not dramatic, yet it is an enduring change. The study was designed from this observation, to examine with empirical precision how movement and sensory unpredictability could regulate emotional load and restore the system's natural adaptability.

Unresourceful and unwanted memories associated with distressing experiences can elicit maladaptive behavioural and emotional reactions, including overexpressions, anachronistic responses where past distress inappropriately dominates present contexts, and defensive reenactments that attempt to gain mastery through repetitive destructive patterns (Center for Substance Abuse Treatment, 2014; Van der Kolk, 2014). These intrusive experiences, which often resurface involuntarily as flashbacks or symbolic expressions in dreams, are linked to heightened autonomic arousal and stress dysregulation that gradually erode sleep, concentration, and relational stability (Brewin et al., 2010; Ehlers et al., 2004). Traditional cognitive approaches to emotional regulation, while foundational, require effortful conscious processing that many individuals struggle to sustain, creating a need for interventions that operate through automatic, non-conscious mechanisms (Mauss et al., 2007).

In this study, an "unwanted resource" refers to an internally stored affective experience that continues to evoke distress, interfere with adaptive functioning, or trigger maladaptive behavioural reactions. These may include memories, sensory imprints, contextual associations, or somatic residues that produce disproportionate emotional responses in present contexts.

The systematic understanding of psychological states traces back to James' (1890) foundational insight that psychological states arise from embodied experiences, later developed through therapeutic innovations systematised by Bandler and Grinder (1979). A psychological state represents a temporary mental-emotional-physical condition comprising cognitive processes, emotional responses, and physiological patterns that influence perception and behaviour at a given moment. Crucially, states are malleable, context-dependent,

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andtemporally bounded, distinguishing them from stable personality traits, and can be deliberately modified through automatic regulatory mechanisms that bypass conscious effort (Williams et al., 2009). Recent advances highlight embodied interventions that engage bottom-up processing to directly target subcortical structures implicated in affective regulation, complementing traditional cognitive frameworks (Van der Kolk, 2014; Porges, 2011). The present study introduces Neuro-Rhythmic Non-Predictive Somatic Intervention (NRNPSI) as a novel approach that may disrupt maladaptive emotional patterns by creating conditions consistent with memory reconsolidation processes. By employing spontaneous, non-linear patterns involving voice modulation, cognitive disruption, and somatic alterations, NRNPSI aims to reduce emotional charge associated with autobiographical content without requiring conscious processing of personal history (Beckers & Kindt, 2017).

NRNPSI integrates several mechanisms that operate synergistically during affective updating. First, sensorimotor unpredictability interrupts habitual response patterns by disrupting anticipatory motor planning and narrowing the influence of predictive emotional coding. Second, bilateral and cross-hemispheric movement increases dynamic neural communication associated with attentional flexibility and affective updating. Third, interoceptive awareness is heightened through rhythmic movement and vocalisation, creating a regulatory anchor that stabilises autonomic activation. Finally, vestibular shifts produced by rotation and spatial perturbation engage the cerebellum and limbic structures implicated in emotional adjustment. Together, these elements provide an environment in which emotional reactivity decouples from autobiographical content during memory activation, creating conditions that may support reconsolidation-based updating without requiring cognitive mediation.

This intervention may facilitate emotional updating by enabling changes in affective responses during memory activation, a process consistent with conditions that support reconsolidation-based change. The study examines NRNPSI's immediate and sustained effects on positive and negative affect among Indian participants using a repeated-measures design with four-month follow-up, contributing to understanding automatic therapeutic mechanisms that create lasting change without conscious effort.

Literature Review

Emotional Regulation

A substantial body of research highlights emotional regulation as a key process for managing stress and sustaining resilience. Self-regulation entails the capacity to direct attention, inhibit maladaptive impulses, and sustain adaptive behavioural responses, yet exposure to stress can impede these processes, producing persistent dysregulation that prevents individuals from accessing their innate potential for adaptive self-direction (Baumeister & Heatherton, 1996; McEwen, 2007). Strengthening regulatory skills buffers the physiological impact of stress, improves cognitive performance, and enhances coping across contexts (Salovey et al., 2002; Sapolsky, 2007). Across diverse therapeutic traditions, cognitive change strategies such as reappraisal and belief restructuring consistently reduce distress and improve psychological outcomes (Gross & John, 2003; Hofmann et al., 2012). Attention training, acceptance, and decentring cultivate stability of attention and non-reactivity, mechanisms associated with reduced rumination and greater cognitive flexibility (Bishop et al., 2004; Hölzel et al., 2011). However, traditional models have prioritised cognitive strategies, overlooking the role of sensorimotor mechanisms in shaping emotional experience, with regulatory breakdown often manifesting through embodied processes sustained by bodily states of hyperarousal or rigidity (LeDoux, 2012; Watkins, 2014).

Bottom-Up vs. Top-Down Processing Mechanisms

Contemporary research demonstrates that automatic emotion regulation operates through unconscious, bottom-up mechanisms that bypass conscious decision-making processes (Mauss et al., 2007; Williams et al., 2009). Unlike traditional cognitive approaches that rely on effortful conscious thought modification, bottom-up interventions target physiological and neurological processes directly, creating automatic neuroplastic changes through sensory disruption and non-conscious processing pathways (Kobylińska & Karwowska, 2015). This approach recognises that emotions are controlled and processed more at an unconscious level and that effective state change requires neurological rather than merely psychological modification.

Research demonstrates that individuals possess innate resourceful states (optimal psychological conditions characterised by calm, confidence, and cognitive clarity) that can be systematically accessed through unconscious, bottom-up mechanisms that bypass conscious resistance (Mauss et al., 2007; Williams et al., 2009). Automatic emotional control can effectively interrupt the development of emotional impulses before they unfold, consuming minimal attentional resources and avoiding the psychological costs associated with deliberate emotion regulation (Kobylińska & Karwowska, 2015).

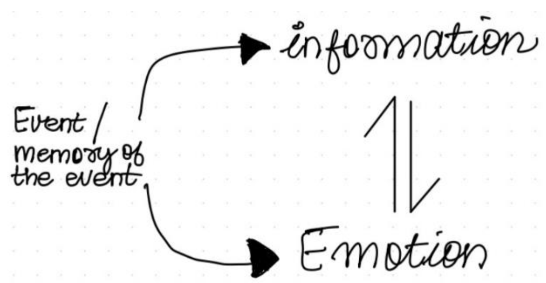

Figure 1
Memory that we access is composed of information and emotion.

Somatic Interventions and Automatic Regulation

The body and mind function as inseparable partners in emotional regulation, with contemporary research revealing emotions as deeply embodied experiences mediated by the autonomic nervous system (Craig, 2009; Porges, 2011). Research demonstrates that bodily positioning directly controls emotional access, e.g. stooped postures impair mood recovery while upright positions facilitate emotional regulation (Veenstra et al., 2017). Advances highlight embodied interventions that engage bottom-up processing to directly target subcortical structures implicated in affective regulation, complementing traditional cognitive frameworks (van der Kolk, 2014; Porges, 2011).

Somatic interventions access the body's innate regulatory wisdom through approaches such as Gendlin's (1978) focusing, which discovered that the body holds a "felt sense" (pre-verbal knowledge emerging through physical awareness). Somatic Experiencing views trauma as disruption of natural regulatory patterns, guiding clients to reconnect with bodily sensations and release trapped activation (Levine, 2010).

Sensorimotor Psychotherapy integrates cognitive insights with physical cues through posture, breath, and movement to facilitate emotional processing (Ogden et al., 2006). Work on sensory submodalities (the finer distinctions within visual, auditory, and kinaesthetic processing of brightness, volume, texture) demonstrates that modifying specific sensory qualities can dramatically alter emotional responses without changing factual content (Andreas & Faulkner, 1994). These submodality alterations function as neurological switches that can instantly reorganise internal experience by targeting the specific sensory encoding patterns that maintain emotional associations.

Non-Predictive Somatic Approaches and Unconscious Competence

Extending somatic interventions, non-predictive approaches emphasise spontaneity and unpredictability as regulatory mechanisms. Rather than structured exercises, these introduce non-linear movements that disrupt habitual emotional and cognitive patterns, increase neural flexibility, and heighten sensory awareness. Grinder and DeLozier (1987) established that effective therapeutic change requires explicit collaboration with the unconscious mind, assigning it primary responsibility for selecting desired states and new behaviours. Their approach promotes heightened sensory awareness that brings individuals to the here-and-now or facilitates escape from present-moment constraints, cultivating adaptive regulatory mechanisms through unconscious competence while maintaining precise constraints that ensure new behaviours satisfy original positive intentions.

Unpredictable multisensory input temporarily reduces the influence of anticipatory cognitive filters, creating a state of functional cognitive suspension. This state reduces top-down interference and increases reliance on bottom-up regulatory pathways, creating conditions that may allow emotional associations to update when autobiographical memories are simultaneously active.

This approach leverages information overload principles whereby overwhelming critical cognitive filters through systematic confusion and distraction bypasses conscious resistance mechanisms (Erickson & Rossi, 1979). When multiple sensory channels are simultaneously disrupted, conscious analytical processes become temporarily suspended, creating optimal conditions for unconscious regulatory mechanisms to emerge and establish new neural pathways for adaptive responding.

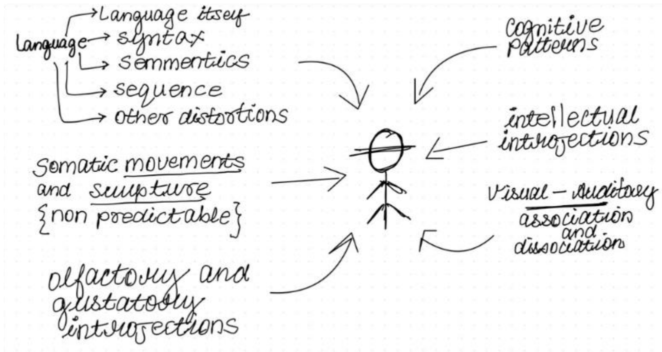

Figure 2
The configuration, structure and co-ordinates of experience.

Memory Reconsolidation and Content-Emotion Separation

Isham et al. (2022) discovered that pairing autobiographical memory recall with an 8-week online mindfulness-based stress reduction intervention reduced emotional suppression and rumination while strengthening cognitive flexibility in individuals with depression remission. This capacity to "hold two truths" reflects a fundamental shift in how autobiographical memories are processed and stored. Research demonstrates that emotional memories consist of separable components of the factual content (what happened) and the emotional charge (how it felt), which can be independently modified through therapeutic intervention (Beckers & Kindt, 2017). Memory reconsolidation studies show that accessing a memory while introducing contradictory emotional experiences can permanently alter the emotional associations without changing the factual content. This content-emotion separation enables individuals to retain important autobiographical information while releasing the associated distress, demonstrating that change occurs through emotional recoding (Beckers & Kindt, 2017).

Gaps and Rationale for NRNPSI

The existing literature demonstrates an evolution from traditional cognitive approaches to more integrative methods incorporating somatic engagement. While cognitive-based interventions remain foundational, they require **effortful conscious processing** that many individuals struggle to sustain. The ancient contemplative understanding of emotional balance finds empirical validation in modern neuroscience, with cross-cultural convergence demonstrating that embodied practices access regulatory mechanisms more directly than purely cognitive interventions.

Current gaps include: (1) limited interventions that create automatic, effortless emotional regulation without conscious effort, (2) insufficient understanding of memory reconsolidation mechanisms that enable content-emotion separation, (3) lack of personalised sensory protocols and (4) need for approaches that work exclusively with emotional charge rather than processing personal history to prevent distress. Accumulating evidence suggests that NRNPSIs may offer unique advantages, particularly for individuals struggling with emotional distress or rumination, by creating automatic neuroplastic changes through unconscious regulatory mechanisms that bypass the limitations of effortful cognitive strategies.

Methodology

Research Design

This study followed a repeated measures pretest-posttest design to evaluate the effectiveness and long-term impact of a NRNPSI on stored unwanted resources. Baseline data were collected before the intervention, followed by immediate post-intervention assessments and a four-month follow-up to examine sustained effects.

Hypotheses

1. Participants' Positive Affect (PA) scores would significantly increase immediately after the intervention compared to baseline.
2. Participants' PA scores would remain significantly higher than baseline four months post-intervention.
3. Participants' Negative Affect (NA) scores would significantly decrease immediately after the intervention compared to baseline.
4. Participants' NA scores would remain significantly lower than baseline four months post-intervention.

Participants

The sample consisted of 101 Indian adults (53 female, 48 male), between the ages of 25 to 45, from Mumbai, Bangalore and Shivmogga, recruited through convenience and snowball sampling from community settings and online platforms. The inclusion criteria included the self-reported experience of distress related to unwanted memories or events and the ability to provide informed consent. The exclusion criteria included the diagnosis of major psychological disorders (e.g., schizophrenia, bipolar disorder, or severe PTSD), current engagement in other trauma-focused therapies and the use of psychotropic medication that could interfere with emotional regulation measures.

Measures

The study utilised the Positive and Negative Affect Schedule (PANAS), a 20-item self-report measure (Watson et al., 1988). It evaluated Positive Affect (PA), including enthusiasm, alertness, and energy, and Negative Affect (NA), including anxiety, sadness, fear, distress. PANAS demonstrated strong internal consistency ($\alpha = 0.85–0.90$ for PA; $\alpha = 0.84–0.87$ for NA) and is widely validated for assessing emotional shifts over time (Crawford & Henry, 2004; Heubeck & Wilkinson, 2019).

Procedure

1. **Pre-Intervention Assessment:** Participants completed the PANAS to establish baseline emotional states.
2. **Intervention**: The NRNPSI was administered. (For intervention and conditions, see Appendix)
3. **Post-Intervention Assessment:** PANAS was re-administered immediately after the final session.
4. **Follow-Up Assessment:** PANAS was completed again at a four-month follow-up to assess long-term effects.

Variables

1. **Independent Variable**: Neuro-Rhythmic Non-Predictive Somatic Intervention.
2. **Dependent Variables:** Positive Affect (PA) and Negative Affect (NA) scores, measuring changes in participants' emotional states.

Data Analysis

Data was analysed using repeated-measures ANOVA to compare pre-intervention and post-intervention scores and assess changes over time, including follow-up assessments. Effect sizes (Cohen's d) were calculated to determine the magnitude of the intervention's impact. Normality was assessed using Shapiro-Wilk tests and Q-Q plots, and sphericity was evaluated using Mauchly's Test of Sphericity.

Since Mauchly's test was not significant ($W = 0.955$, $p = .100$), the assumption of sphericity was met, allowing for interpretation of the standard RM-ANOVA results. Given the significant main effect of time, post-hoc pairwise comparisons with Bonferroni correction were conducted to determine specific differences between time points. Effect size was reported using partial eta squared (η^2) to assess the magnitude of the time effect. All analyses were conducted using IBM SPSS Statistics, with $\alpha = .05$ set as the threshold for statistical significance.

Ethical Considerations

The study adhered to ethical guidelines outlined by the American Psychological Association (APA, 2019). Informed consent was secured, ensuring participants understood the study's objectives, potential risks, and their right to withdraw at any time. All data was anonymised and securely stored. Emotional distress monitoring was implemented, with professional referrals available if needed. A debriefing session provided participants with post-study support and a summary of findings. Transparency in data reporting and ethical dissemination of results were prioritised.

Results

Positive Affect

Descriptive statistics for Positive Affect (PA) scores at baseline, post-intervention, and follow-up are presented in Table 1.

Table 1

Descriptive Statistics for Positive Affect Scores

	Mean	Std. Deviation	N
positive1	23.19	6.711	101
positive2	31.00	10.900	101
positive3	29.94	9.041	101

The mean PA score was lowest at baseline ($M = 23.19$, $SD = 6.71$) and increased immediately post-intervention ($M = 31.00$, $SD = 10.90$). At follow-up, PA scores slightly decreased ($M = 29.94$, $SD = 9.04$) but remained higher than baseline.

A repeated measures ANOVA was conducted to examine changes in PA scores across the three time points: baseline, post-intervention, and follow-up.

Table 2
Repeated Measures ANOVA for Positive Affect Scores

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
positiveaffect	Sphericity Assumed	3627.373	2	1813.686	36.662	.000	.268
	Greenhouse-Geisser	3627.373	1.913	1896.133	36.662	.000	.268
	Huynh-Feldt	3627.373	1.949	1860.705	36.662	.000	.268
	Lower-bound	3627.373	1.000	3627.373	36.662	.000	.268
Error(positiveaffect)	Sphericity Assumed	9893.960	200	49.470			
	Greenhouse-Geisser	9893.960	191.304	51.719			
	Huynh-Feldt	9893.960	194.946	50.752			
	Lower-bound	9893.960	100.000	98.940			

The RM-ANOVA revealed a significant effect of the NRNPSI ($F = 36.662$, $p < 0.001$, $\eta_p^2 = 0.268$), indicating that positive affect scores changed meaningfully across the three time points.

Table 3
Linear and Quadratic Trend Analysis for Positive Affect

Source	positiveaffect	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
positiveaffect	Linear	2302.594	1	2302.594	39.841	.000	.285
	Quadratic	1324.779	1	1324.779	32.197	.000	.244
Error(positiveaffect)	Linear	5779.406	100	57.794			
	Quadratic	4114.554	100	41.146			

Further analysis of linear and quadratic trends indicated a significant linear effect ($F = 39.841$, $p < .001$, $\eta^2 = .285$), confirming that PA scores increased significantly from baseline to post-intervention. Additionally, a significant quadratic effect ($F = 32.197$, $p < .001$, $\eta^2 = .244$) suggested that PA scores followed a curvilinear pattern, with an initial sharp increase post-intervention, followed by a slight decline at follow-up.

Table 4
Pairwise Comparisons for Positive Affect Scores

(I) positiveaffect	(J) positiveaffect	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b] Lower Bound	Upper Bound
1	2	-7.812*	1.004	.000	-10.257	-5.367
	3	-6.752*	1.070	.000	-9.357	-4.148
2	1	7.812*	1.004	.000	5.367	10.257
	3	1.059	.887	.705	-1.099	3.218
3	1	6.752*	1.070	.000	4.148	9.357
	2	-1.059	.887	.705	-3.218	1.099

To better understand these changes, pairwise comparisons with Bonferroni correction were conducted. The results revealed that PA scores significantly increased from baseline ($M = 23.19$, $SD = 6.71$) to post-intervention ($M = 31.00$, $SD = 10.90$), $p < .001$. The increase remained significant at follow-up ($M = 29.94$, $SD = 9.04$) compared to baseline ($p < .001$). However, the slight decrease between post-intervention and follow-up was not significant ($p = .705$), indicating that PA remained relatively stable rather than returning to pre-intervention levels. These findings demonstrated that the intervention had a lasting positive effect on participants' affective states.

Negative Affect
Descriptive statistics for Negative Affect (NA) scores at baseline, post-intervention, and follow-up are presented in Table 5.

Table 5
Descriptive Statistics for Negative Affect Scores

	Mean	Std. Deviation	N
negative1	31.27	8.477	101
negative2	19.05	7.859	101
negative3	27.20	12.958	101

The mean NA score was highest at baseline ($M = 31.27$, $SD = 8.48$) and decreased immediately post-intervention ($M = 19.05$, $SD = 7.86$). At follow-up, NA scores increased slightly ($M = 27.20$, $SD = 12.96$) but remained lower than baseline.

A repeated measures ANOVA was conducted to examine changes in NA scores across the three time points: baseline, post-intervention, and follow-up.

Table 6
Repeated Measures ANOVA for Negative Affect Scores

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
negativeaffect	Sphericity Assumed	7818.502	2	3909.251	40.670	.000	.289
	Greenhouse-Geisser	7818.502	1.429	5469.733	40.670	.000	.289
	Huynh-Feldt	7818.502	1.444	5413.156	40.670	.000	.289
	Lower-bound	7818.502	1.000	7818.502	40.670	.000	.289
Error (negativeaffect)	Sphericity Assumed	19224.165	200	96.121			
	Greenhouse-Geisser	19224.165	142.941	134.490			
	Huynh-Feldt	19224.165	144.435	133.099			
	Lower-bound	19224.165	100.000	192.242			

The results indicated a significant effect of the NRNPSI on Negative Affect (NA) scores across the three time points ($F = 40.67$, $p < .001$, $\eta^2 = .289$).

Table 7
Linear and Quadratic Trend Analysis for Negative Affect

Source	negativeaffect	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
negativeaffect	Linear	836.243	1	836.243	5.419	.022	.051
	Quadratic	6982.259	1	6982.259	184.039	.000	.648
Error (negativeaffect)	Linear	15430.257	100	154.303			
	Quadratic	3793.908	100	37.939			

Scores
Further analysis of linear and quadratic trends indicated a significant quadratic effect ($F = 184.039$, $p < .001$, $\eta^2 = .648$), suggesting that NA scores did not decrease in a simple linear fashion but followed a curvilinear pattern, with the largest reduction occurring immediately post-intervention, followed by a partial increase at follow-up. The linear trend was also significant but with a smaller effect size ($F = 5.419$, $p = .022$, $\eta^2 = .051$).

Table 8
Pairwise Comparisons of Negative Affect Scores

(I) negativeaffect	(J) negativeaffect	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b] Lower Bound	Upper Bound
1	2	12.218*	1.014	.000	9.748	14.688
	3	4.069	1.748	.066	-.187	8.326
2	1	-12.218*	1.014	.000	-14.688	-9.748
	3	-8.149*	1.275	.000	-11.253	-5.044
3	1	-4.069	1.748	.066	-8.326	.187
	2	8.149*	1.275	.000	5.044	11.253

Post hoc comparisons using Bonferroni correction showed that NA scores significantly decreased from baseline (M = 31.27, SD = 8.48) to post-intervention (M = 19.05, SD = 7.86, $p < .001$). However, while NA scores increased at follow-up (M = 27.20, SD = 12.96) compared to post-intervention ($p < .001$), the difference between baseline and follow-up was not statistically significant ($p = .066$).

These findings suggest that while the intervention had an immediate and substantial impact on reducing negative affect, the effects were not fully sustained at follow-up, as NA scores rebounded close to baseline levels.

Discussion

The findings are discussed below in terms of intervention effects, theoretical relevance, affective mechanisms, and implications for somatic regulation models. The sustained increase in PA scores align with previous findings on embodied cognition and affect regulation, which suggests that somatic interventions could enhance emotional flexibility and resilience (Porges, 2011; Röhricht, 2009). However, the lasting improvements likely reflect NRNPSI's capacity to create automatic emotion regulation, defined as unintentional, relatively effortless control of emotional responses that occurs without conscious decision-making or deliberate effort (Mauss et al., 2007). The intervention's emphasis on spontaneous, non-predictive movement likely facilitated neurophysiological mechanisms associated with positive emotional states, particularly via interoceptive pathways and vagal regulation (Critchley & Garfinkel, 2017). Research demonstrates that automatic emotional control can effectively interrupt the development of emotional impulses before they unfold, consuming minimal attentional resources and avoiding the psychological costs associated with deliberate emotion regulation (Kobylińska & Karwowska, 2015). This process may have contributed to participants' heightened alertness, enthusiasm, and overall positive engagement, as reflected in PANAS scores.

Similarly, the initial reduction in NA scores support prior evidence that rhythmic, body-based interventions can interrupt maladaptive emotional patterns and downregulate stress responses (Mehling et al., 2011). The strategic induction of confusion and cognitive overload appears central to NRNPSI's effectiveness, as overwhelming conscious expectation creates temporary suspension of analytical defenses, allowing automatic memory reconsolidation processes to proceed without interference from habitual cognitive patterns. The engagement of sensorimotor networks may have disrupted negative affective loops, reducing immediate distress (Van der Kolk, 2014). However, the partial rebound of NA scores at follow-up suggests that while automatic regulatory processes provide immediate emotional relief, negative emotional patterns may require additional reinforcement due to their deeper encoding.

An additional explanation for the partial rebound may involve the durability of affective encoding. Negative affective imprints are often strengthened through repeated retrieval, attentional bias, and rumination cycles that consolidate distress over time. Interventions that introduce short-term sensorimotor disruption may interrupt these cycles temporarily but may require reinforcement to stabilise long-term outcomes. It is also possible that the novelty and guided structure of the intervention amplified short-term relief while the absence of follow-up sessions limited the consolidation of new affective patterns.

The intervention addresses a fundamental limitation of traditional cognitive approaches: while individuals can change how they feel and behave by changing how they think, this represents an effortful process that requires sustained conscious effort (Gyurak et al., 2011). NRNPSI circumvents this limitation by activating non-conscious regulatory mechanisms that automatically modify emotional responses without subjective feelings of effort, intentionality, or awareness (Williams et al., 2009). These regulatory shifts may reflect conditions that support memory updating during emotional activation, potentially allowing affective responses to change without requiring conscious processing. Participants reported reduced emotional intensity while recalling the

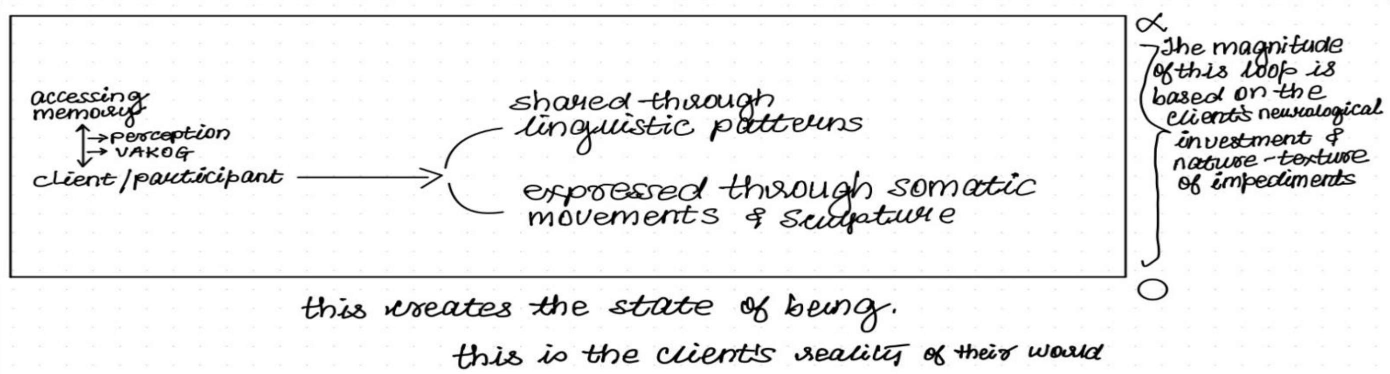

Figure 3
Impact of an event (or memory) is directly proportional to the emotional investment on the neurology.

selected memory. This automatic processing explains why positive affect improvements persisted without ongoing cognitive effort or deliberate emotional management, while negative affect showed partial rebound as old negative associations, though weakened, were not completely eliminated.

One potential explanation for the differential trajectory of the Positive and Negative Scores is the Negativity Bias, a well-established phenomenon in which negative emotions and experiences are processed more deeply and retained longer than positive ones (Baumeister et al., 2001). While the somatic intervention successfully disrupted negative affect in the short term, participants may have re-engaged in habitual negative thought patterns over time, allowing NA scores to partially rebound. Further, participants who experienced chronic distress prior to the intervention may have had deeply ingrained negative affect processing patterns, making it more difficult to sustain long-term reductions. In contrast, positive affect may have been more responsive to intervention-based reinforcement, as positive emotions broaden cognitive flexibility and create upward spirals of well-being (Fredrickson, 2001).

The divergence between PA stability and NA rebound may reflect the asymmetric nature of affective encoding. Positive affective states often broaden attentional scope and reinforce adaptive behavioural patterns, increasing the likelihood that changes consolidate over time. Negative affective states, however, are typically encoded more strongly due to their survival relevance, which may explain the partial return of NA despite initial reductions.

These findings suggest that interventions targeting negative affect may require additional cognitive strategies to prevent relapse into habitual distress processing.

Implications

Theoretical and Empirical Contributions

These findings advance our understanding of embodied cognition and affect regulation by demonstrating that automatic, bottom-up mechanisms can create lasting emotional change without conscious effort or cognitive engagement. While traditional approaches emphasise effortful, top-down regulation, NRNPSI reveals that sensorimotor disruption can directly influence affective states through unconscious processing pathways (Mauss et al., 2007). This paradigm shift from effortful to effortless regulation offers new theoretical insights into how neurological rather than merely psychological change can be achieved through embodied interventions. Particularly significant is the demonstration that content-emotion separation can occur automatically, allowing individuals to retain autobiographical continuity while losing emotional reactivity to distressing memories. This finding extends memory reconsolidation research by showing that sensory disruption patterns can permanently alter emotional associations without requiring conscious memory processing or therapeutic insight (Beckers & Kindt, 2017).

Intervention Applications and Accessibility

From an intervention perspective, NRNPSI addresses fundamental limitations of conventional therapeutic approaches. The intervention's effortless nature makes it particularly valuable for participants experiencing "regulation fatigue" from sustained conscious emotion management or those who struggle with cognitive demands of traditional interventions (Kobylińska & Karwowska, 2015). Automatic emotional updating occurs without ongoing mental effort, making it suitable for individuals with limited cognitive resources, treatment resistance, or verbal processing difficulties. The intervention's multi-modal flexibility enables interventionists to personalise protocols based on participants' dominant sensory processing patterns (visual, auditory, kinaesthetic) without extensive assessment. This adaptability makes NRNPSI accessible across diverse populations, including those with language barriers, cultural resistance to talk-based interventions, or developmental differences that limit verbal processing capacity.

Crucially, the content-emotion separation mechanism enables therapeutic progress without detailed trauma processing, reducing retraumatisation risk while maintaining autobiographical integrity. This makes NRNPSI particularly suitable for participants with complex trauma, dissociative tendencies, or resistance to exposure-based interventions.

Implementation and Training Advantages

The focus on sensory disruption patterns rather than content processing reduces training complexity while maintaining intervention effectiveness. Interventionists can learn to identify individual evidence procedures and adapt techniques accordingly without requiring extensive trauma training or the therapeutic relationship building typically needed for cognitive interventions. This accessibility may facilitate broader dissemination of effective emotional regulation interventions across diverse intervention settings. Given the partial rebound of negative affect, interventionists should consider integrating maintenance strategies that target individual sensory preferences to sustain automatic regulatory benefits over time. This might include brief sensory disruption sessions or personalised self-practice techniques that maintain memory reconsolidation effects.

Limitations

Several limitations must be acknowledged. First, the study relied on self-reported PANAS scores, which, while widely validated, are subject to response biases and individual differences in affective self-perception (Watson et al., 1988). Future studies could incorporate physiological markers of affect regulation, such as heart rate variability (HRV) or cortisol levels, to provide a more objective measure of intervention effects. Second, the study did not include a control group, limiting causal inferences regarding the intervention's effectiveness. While the within-subjects design strengthens conclusions about pre-to-post intervention changes, future research should employ randomised controlled trials (RCTs) to rule out alternative explanations. A further limitation is the absence of control conditions that would account for expectancy effects, novelty of the activity, researcher influence, or general engagement effects. These factors may partially account for immediate affective improvements and should be isolated in future controlled studies. Finally, while the sample was drawn from a diverse Indian adult population, the generalisability of findings to other cultural and demographic groups remains uncertain. Future research should explore cross-cultural applications of somatic interventions, particularly in contexts where verbal psychotherapy is less culturally normative.

Conclusion

The findings demonstrate that NRNPSI supports automatic, effortless emotion regulation, and may engage processes similar to those involved in memory updating during emotional activation. By reducing emotional charge during memory activation through automatic processing pathways, this approach offers a non-effortful alternative to traditional cognitive interventions that require sustained conscious effort (Beckers & Kindt, 2017; Williams et al., 2009). The sustained improvements without ongoing maintenance suggest that automatic regulatory mechanisms may provide more durable emotional relief than effortful cognitive strategies. This work contributes to understanding automatic therapeutic mechanisms that create lasting change without conscious effort (Mauss et al., 2007).

Future research should investigate individual differences in automatic processing capacity and develop personalised sensory protocols to maximise effortless emotional regulation and unconscious memory updating. Studies should examine which sensory disruption patterns most effectively activate automatic regulatory processes and whether targeting individual sorting styles enhances effortless emotional change without requiring conscious cognitive engagement. Longitudinal studies should explore which specific sensory modalities (visual, auditory, kinaesthetic) produce optimal memory reconsolidation for different types of emotional distress, and whether targeting individual sorting styles enhances automatic state access and content-emotion separation outcomes.

These findings indicate that NRNPSI offers a promising bottom-up pathway for affective updating, particularly for individuals who experience difficulty with cognitively demanding approaches. While the intervention produced clear short-term emotional shifts and sustained enhancement in positive affect, further research is needed to examine long-term stabilisation, sensory-specific optimisation, and controlled comparisons with existing somatic interventions. Together, these directions can clarify how non-predictive multisensory disruption may support durable emotional change across diverse populations.

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Declarations

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Appendix

Intervention

The NRNPSI involved movement-based therapeutic techniques that engaged participants in unstructured, spontaneous, and non-predictive rhythmic movements to activate adaptive neurophysiological responses. The intervention was delivered by a trained researcher. The session focused on spontaneous movement, interoceptive awareness, and sensory integration, encouraging participants to develop novel somatic responses to stress. Participants were continuously guided to maintain awareness of a self-selected unwanted event or memory throughout the activity to facilitate emotional processing and somatic integration.

At the outset, participants were invited to recall an unwanted event that continued to evoke mild to moderate emotional distress. Events involving severe trauma (for instance, bereavement, sexual assault, or exposure to catastrophic incidents) were excluded to ensure emotional safety. Participants rated their current emotional state using the Positive and Negative Affect Schedule (PANAS) to establish baseline affective intensity.

Each movement condition lasted approximately two to three minutes, with the full intervention lasting 12–18 minutes depending on participant rhythm and coordination. All participants completed all six conditions, although pacing was adjusted individually to maintain safe challenge without inducing fatigue. The researcher maintained consistent throw frequency, verbal cue timing, and rotational intervals across participants to ensure reproducibility.

The researcher then conducted the NRNPSI, a structured series of six movement conditions, each designed to introduce increasing levels of novelty, coordination complexity, and sensory unpredictability. Two lightweight rubber balls were used to elicit continuous engagement, cross-hemispheric activation, and rhythmic variability.

1. **Condition 1 (C1):** The researcher initiated bilateral coordination by tossing the ball to be caught with the participant's opposing hand (e.g., researcher's right to participant's left). The task established a foundational rhythm and motor engagement.
2. **C2:** Verbal prompts specifying the catching hand ("Right", "Left", or "Both") were introduced to enhance sensorimotor unpredictability and cognitive flexibility.
3. **C3:** Participants incorporated contralateral limb movement by lifting the opposite leg while catching the ball (e.g., right hand catch with left leg lift). Bilateral knee flexion was used for dual-hand catches.
4. **C4:** A clapping action was added immediately after each throw, promoting rhythmic sequencing and embodied coordination.
5. **C5:** Participants maintained continuous vocalisation (humming or singing, typically "Happy Birthday") throughout the activity to integrate breath, sound, and motor control, enhancing vagal regulation and emotional expression. Vocalisation served dual purposes: it introduced rhythmic breath regulation associated with vagal activation, and it added an auditory-motor load that further reduced cognitive predictability, supporting the intervention's emphasis on multisensory disruption.
6. **C6:** The sequence concluded with participants adding rotational movement by spinning after every two throws, amplifying vestibular engagement and proprioceptive adaptability.

Throughout all conditions, the researcher varied the timing and trajectory of throws to prevent predictability and sustain non-habitual motor activation. Adjustments were made in real time based on each participant's capacity and coordination, ensuring that the experience remained safely challenging without inducing frustration. Participants were reminded intermittently to retain gentle awareness of the selected memory or context during movement. Upon completion of the activity, participants again recalled the event and rated their emotional state using the PANAS to capture immediate post-intervention affective change. The same assessment was repeated at a four-month follow-up to evaluate the persistence of effects.