



“The Therapeutic Growth Factor: Principal Component Analysis, Unsupervised Clustering, And Hierarchical Regression Modeling Of Multi-Construct Outcomes In Himalayan Walk-And-Talk Therapy”

Mayur Raturi¹, Dr Rekha Sharma²

¹Research Scholar, Department of Psychology, Shri Venkateshwara University, Gajraula, UP.

²Research Supervisor, Department of Psychology, Shri Venkateshwara University, Gajraula, UP.

ABSTRACT

Research on nature-based psychotherapy frequently examines individual outcomes in isolation, often overlooking the foundational structure of therapeutic changes across various domains. This study employed advanced multivariate and machine-learning techniques—such as principal component analysis (PCA), K-Means and hierarchical clustering, and hierarchical multiple regression—to investigate the factor structure, participant profiles, and mechanisms influencing therapeutic outcomes from a walk-and-talk therapy intervention with 699 young adults (350 before, 349 after the intervention) in the Indian Himalayas. Four psychological constructs were assessed: emotional catharsis (10 items, $\alpha = .91$), self-aliveness (15 items, $\alpha = .93$), self-righteousness (7 items, $\alpha = .89$), and cognitive insight (7 items, $\alpha = .90$). PCA revealed a dominant first principal component (PC1) that explained 88.7% of the total variance, with nearly uniform loadings across all four constructs (.90–.98), suggesting a single latent Therapeutic Growth Factor. Unsupervised clustering (K-Means, $k = 2$; Ward hierarchical) independently identified participant profiles that closely aligned with the Before and After groups (adjusted Rand index = .96; normalized mutual information = .95; purity = .98), indicating that the pre/post distinction is an inherent data structure rather than a result of supervised modeling. Hierarchical regression identified self-aliveness ($\beta = .44$) and catharsis ($\beta = .24$) as the strongest unique predictors of cognitive insight after accounting for time, age, and gender (final $R^2 = .89$). Self-righteousness had a minor contribution ($\beta = .15$, $p = .09$), consistent with its lower PCA loading. These findings demonstrate that Himalayan walk-and-talk therapy induces a unified, coherent transformation across emotional, somatic, moral, and cognitive domains—a single-factor therapeutic shift so significant that unsupervised algorithms can detect it without labels. The implications for measurement efficiency, intervention theory, and the framework of nature-based therapeutic change are discussed.

Keywords: Principal component analysis, K-means clustering, Hierarchical clustering, Therapeutic growth factor, Walk-and-talk therapy, Himalayan psychology, Latent structure, Regression Modeling, Nature based intervention and Unsupervised learning.

INTRODUCTION

The Issue of Disjointed Outcome Evaluation

Traditionally, psychotherapy outcome research has focused on therapeutic change by examining individual constructs: reductions in depression scores, decreases in anxiety, and improvements in self-esteem. While this method provides clinical specificity, it overlooks a crucial question regarding the structure of therapeutic change itself: when an intervention is effective, do separate psychological domains improve independently, or does a single cohesive transformation occur across multiple outcome dimensions at once?

This inquiry is not just theoretical. If therapeutic change is fundamentally singular—driven by one underlying process that manifests across emotional, cognitive, somatic, and moral domains—then measuring multiple constructs separately might be unnecessary, and intervention design should concentrate on activating the core process rather than targeting individual symptoms. On the other hand, if change is multifaceted, with distinct mechanisms driving improvements in different domains, then targeted interventions and domain-specific assessments are warranted.

The current study explores this question using advanced multivariate and machine-learning techniques applied to data from a Himalayan walk-and-talk therapy intervention that evaluated four theoretically distinct psychological constructs: emotional catharsis, self-aliveness, self-righteousness, and cognitive insight.

Multivariate Methods in Psychotherapy Research: An Underutilized Approach

Despite the availability of powerful tools for dimensionality reduction and classification, their use in psychotherapy outcome research is surprisingly infrequent. Principal component analysis (PCA), which identifies the latent dimensions underlying correlated variables, is commonly used in scale development but rarely applied to multi-construct outcome profiles. Unsupervised clustering algorithms (K-Means, hierarchical/agglomerative), which identify natural groupings in data without external labels, are standard in data science but nearly absent from clinical intervention research. Hierarchical regression, while more common, is typically used to predict single outcomes rather than to reveal the mechanistic pathways through which multiple constructs interrelate.

This methodological gap means that the latent structure of psychotherapy outcomes—the factor architecture of therapeutic change—remains poorly understood. The few studies that have applied PCA to therapy outcomes generally find two to four factors (e.g., symptomatic improvement, interpersonal functioning, self-concept), indicating multidimensional change. However, these studies mostly involve conventional indoor therapies. Whether nature-based interventions, which engage whole-organism processes (somatic, emotional, cognitive, ecological) simultaneously, produce a more unified change profile is unknown.

The Himalayan Walk-and-Talk Context

Walk-and-talk therapy in the Himalayas provides a theoretically compelling test case for the unity-versus-multiplicity question. Eco-therapy theory suggests that immersion in a restorative natural environment activates broad-spectrum psychological recovery through phylogenetically conserved stress-reduction pathways (Ulrich, Stress recovery during exposure to natural and urban environments., 1991), attention-restoration processes (Kaplan R. e., 1989), and awe-induced cognitive reframing (Keltner D. a., Approaching awe, a moral, spiritual, and aesthetic emotion, 2003). Embodied cognition theory predicts that rhythmic bilateral locomotion simultaneously regulates emotional arousal, enhances somatic vitality, and facilitates cognitive flexibility (Lakoff, 1999); (Oppezzo, Give your ideas some legs: the positive effect of walking on creative thinking., 2014). The Himalayan setting further adds altitude-induced physiological challenge and cultural-spiritual significance. If any intervention is likely to produce a unified therapeutic shift, it is one that simultaneously engages body, emotion, cognition, and environment in this manner.

The Present Study

This research, involving 699 participants (350 prior to and 349 following a Himalayan walk-and-talk intervention), explores three related research questions:

RQ1 (Factor Structure): Do the four outcome constructs (catharsis, self-aliveness, self-righteousness, insight) represent a single underlying factor or multiple distinct dimensions? This is examined using PCA with eigenvalue decomposition, scree analysis, and interpretation of component loadings.

RQ2 (Participant Profiles): Can unsupervised clustering algorithms distinguish between Before and After groups without using group labels? This is investigated using K-Means ($k = 2$) and Ward hierarchical clustering, assessed with adjusted Rand index, normalized mutual information, silhouette coefficients, and purity metrics.

RQ3 (Mechanistic Pathways): Which constructs most strongly predict cognitive insight, and does the Time variable (Before/After) add unique variance beyond immediate predictors? This is analyzed through hierarchical multiple regression with diagnostic evaluation.

Collectively, these analyses go beyond the question of whether the therapy is effective (affirmed in previous analyses) to explore the deeper question: “what is the internal structure of the therapeutic change it produces?”

Method

Participants and Data

The dataset includes 699 observations: 350 participants evaluated before and 349 after a structured walk-and-talk therapy intervention in the Uttarakhand Himalayas (254 males, 96 females per cohort; ages 20–39). Each observation contains composite scores on four constructs: Catharsis (10-item ERQ adaptation, $\alpha = .91$), Self-Aliveness (15-item MAAS adaptation, $\alpha = .93$), Self-Righteousness (7-item Likert scale, $\alpha = .89$), and Insight (7-item BCIS adaptation, $\alpha = .90$), along with the Overall Index ($\alpha = .95$).

Analytic Strategy

The analysis was conducted in three stages, each addressing one research question:

Stage 1: Principal Component Analysis. PCA was performed on the 4×4 correlation matrix of the four construct composites across the entire sample ($N = 699$). Suitability was evaluated using the Kaiser-Meyer-Olkin (KMO) measure and Bartlett’s Test of Sphericity. Component retention was determined by the Kaiser criterion (eigenvalue > 1.0), scree plot inspection, and parallel analysis. Component loadings, eigenvalues, and cumulative variance explained were extracted. Additionally, an item-level PCA was conducted on all 39 individual items to examine whether the factor structure holds at the item level.

Stage 2: Unsupervised Clustering. Two clustering algorithms were applied to the z-standardized construct composites without access to group labels (Before/After): (a) K-Means with $k = 2$, initialized via `k-means++` and run 100 times to ensure stability; and (b) Ward hierarchical agglomerative clustering with Euclidean distance and Ward’s minimum-variance linkage. Cluster quality was assessed using the elbow method (inertia), silhouette coefficient, and dendrogram visualization. Cluster-to-group alignment was evaluated using adjusted Rand index (ARI), normalized mutual information (NMI), and purity—metrics that quantify how closely cluster assignments match the true Before/After labels.

Stage 3: Hierarchical Regression. Three nested regression models predicted cognitive Insight (DV) from construct and demographic predictors: Model 1 included Catharsis, Self-Aliveness, Age (centered), and Gender (0 = male, 1 = female). Model 2 added Self-Righteousness. Model 3 added Time (0 = Before, 1 = After). Assumptions were verified through residual plots (linearity, homoscedasticity), Durbin-Watson (independence), Q-Q plots (normality), and variance inflation factors (multicollinearity). Standardized coefficients (β) were compared to assess relative predictor strength.

All analyses were conducted using Python (scikit-learn, scipy, seaborn, statsmodels) and SPSS (v28).

Results

Stage 1: Principal Component Analysis

Suitability Assessment

The KMO measure of sampling adequacy was .87 (“meritorious” by Kaiser’s criterion), and Bartlett’s Test of Sphericity was highly significant ($\chi^2(6) = 4,215, p < .001$), confirming that the correlation matrix was suitable for PCA.

Eigenvalue Decomposition and Variance Explained

Table 1

PCA Eigenvalues and Variance Explained for the Four-Construct Outcome Matrix

Component	Eigenvalue	% Variance	Cumulative %
PC1	3.55	88.7	88.7
PC2	0.24	5.9	94.6
PC3	0.13	3.3	97.9
PC4	0.08	2.1	100.0

Note. N = 699. Only PC1 exceeds Kaiser criterion (eigenvalue > 1.0). Scree plot confirmed sharp elbow after PC1.

A prominent principal component (PC1) emerged with an eigenvalue of 3.55, accounting for 88.7% of the total variance. No other component surpassed the Kaiser criterion (eigenvalue > 1.0). The scree plot revealed a distinct elbow after PC1, with PC2–PC4 contributing residual variance of 5.9%, 3.3%, and 2.1%, respectively. Parallel analysis verified that only PC1’s eigenvalue exceeded the 95th-percentile threshold from random data.

Component Loadings

Table 2

PC1 Loadings for the Four Therapeutic Outcome Constructs

Construct	PC1 Loading	Communality (h^2)
Self-Aliveness	.98	.96
Catharsis	.96	.92
Insight	.94	.88
Self-Righteousness	.90	.81

Note. All loadings > .90. Self-Aliveness is the highest-loading construct on PC1.

All four constructs loaded very highly on PC1 (.90–.98), with communalities ranging from .81 to .96. Self-Aliveness had the highest loading (.98), followed by Catharsis (.96), Insight (.94), and Self-Righteousness (.90). These consistently high loadings indicate that the four constructs are not independent outcome dimensions but rather expressions of a single latent process, which we call the Therapeutic Growth Factor (TGF). The TGF represents a cohesive, unified transformation that includes emotional release, somatic vitality, moral realignment, and reflective clarity.

Item-Level PCA

An exploratory PCA conducted on all 39 individual items (10 catharsis + 15 self-aliveness + 7 self-righteousness + 7 insight) confirmed the construct-level finding. The dominant PC1 at the item level explained about 72% of the variance, with the top five principal components broadly corresponding to the four theoretical constructs plus a general factor. Biplots showed items clustering by their parent construct but all radiating in the same general direction along PC1, confirming the hierarchical structure: one broad factor with four subsidiary construct-level nuances.

Stage 2: Unsupervised Clustering

K-Means Clustering ($k = 2$)

Table 3

K-Means Cluster Centroids in Original Scale ($k = 2$)

Cluster	Catharsis	Aliveness	Righteousness	Insight	<i>n</i>
Low (Cluster 0)	2.48	2.28	2.11	2.09	353
High (Cluster 1)	5.86	5.01	4.27	4.19	346

Note. Cluster 0 corresponds to Before group; Cluster 1 corresponds to After group. Centroids computed on original (non-standardized) scales.

Table 4

K-Means Cluster-to-Group Alignment Metrics

Metric	Value	Range	Quality
Adjusted Rand Index (ARI)	.96	$[-1, 1]$	Near-perfect
Normalized Mutual Information	.95	$[0, 1]$	Excellent
Purity	.98	$[0, 1]$	Near-perfect
Silhouette Coefficient	.72	$[-1, 1]$	Strong
Inertia (within-cluster SS)	428	$[0, \infty)$	Low (good)

Note. ARI and NMI compare cluster labels to true Before/After labels. Purity = proportion of correctly classified participants. Silhouette $> .50$ indicates well-separated clusters.

The K-Means algorithm, operating without access to Before/After labels, independently identified two clusters that almost perfectly matched the actual intervention groups. The Low cluster ($n = 353$) corresponded to Before participants, while the High cluster ($n = 346$) corresponded to After participants. The ARI of .96 indicates near-perfect agreement, with only about 2% of participants being “misclassified.” A purity of .98 means that 98% of participants in each cluster belonged to the expected group. The silhouette coefficient of .72 indicates well-separated, internally cohesive clusters.

Hierarchical Clustering

Table 5

Ward Hierarchical Clustering: Dendrogram Summary

Feature	Description	Interpretation
Number of main branches	2	Binary Before/After split
Merge height	Very high (top of tree)	Groups maximally distinct
Within-branch variability	Low	Homogeneous profiles
Alignment with K-Means	$> 97\%$ concordance	Robust across methods

Note. Ward linkage with Euclidean distance on z-standardized composites.

The Ward dendrogram displayed two dominant branches that merged only at the very top of the tree, confirming the binary structure. Within-branch variability was low, indicating that Before and After participants formed internally cohesive, externally distinct profiles. Over 97% of participants were assigned to the same cluster by both K-Means and hierarchical methods, demonstrating robustness across clustering algorithms. The clustering results carry a profound implication: the therapeutic change produced by the Himalayan intervention is so significant and coherent across constructs that unsupervised algorithms—unaware of group labels—can identify it from the raw data alone. This is not a subtle effect requiring sophisticated statistical extraction; it is a structural reorganization of the outcome-space geometry, visible at the most basic level of data exploration.

Stage 3: Hierarchical Regression Predicting Cognitive Insight

Table 6

Hierarchical Regression Models Predicting Cognitive Insight

Predictor	B	SE	t	p	β	R ²	ΔR^2	VIF
Model 1						.84	.84	
Catharsis	0.32	0.04	8.0	< .001	.32			3.8
Self-Aliveness	0.62	0.05	12.4	< .001	.62			3.5
Age (centered)	−0.01	0.01	−1.0	.32	−.03			1.0
Gender (0/1)	−0.02	0.03	−0.7	.48	−.02			1.0
Model 2 (+S-R)						.85	.01	
Self-Righteous.	0.15	0.09	1.7	.09	.15			4.1
Model 3 (+Time)						.89	.04***	
Time (0/1)	0.57	0.08	7.3	< .001	.37			4.6
Catharsis (adj.)	0.37	0.03	14.9	< .001	.24			4.2
Aliveness (adj.)	0.40	0.05	8.0	< .001	.44			3.9

Note. N = 699. *** p < .001. S-R = Self-Righteousness. VIF < 5 for all predictors. DV = Insight composite. Durbin-Watson = 1.94 (acceptable).

Model 1, which included Catharsis, Self-Aliveness, and Demographics, accounted for 84% of the variance in Insight. Among these, Self-Aliveness emerged as the most significant predictor ($\beta = .62$), followed by Catharsis ($\beta = .32$), while Demographics did not show a significant impact. In Model 2, Self-Righteousness was introduced, adding a slight contribution ($\Delta R^2 = .01$; $\beta = .15$, $p = .09$), aligning with its lower loading in the PCA. Model 3 incorporated Time, which significantly increased the explained variance ($\Delta R^2 = .04$, $p < .001$; final $R^2 = .89$), indicating an overarching intervention effect beyond what the proximate construct scores could explain.

In the final model, the key predictors of Insight were Self-Aliveness ($\beta = .44$), Time ($\beta = .37$), and Catharsis ($\beta = .24$). The VIFs ranged from 3.5 to 4.6 due to high correlations among constructs identified by PCA, yet all were below the standard threshold of 5.0. Residual diagnostics confirmed that linearity was acceptable (no curvilinear pattern in residuals vs. fitted plots), homoscedasticity was maintained (scale-location plot evenly distributed), and residuals were nearly normal (Q–Q plot close to a 45° line).

Integration Across Three Stages

Table 7

Convergence of Evidence Across PCA, Clustering, and Regression

Method	Key Finding	Implication
PCA	PC1 = 88.7% variance; loadings .90–.98	Single latent Therapeutic Growth Factor
K-Means	ARI = .96; Purity = .98; Silhouette = .72	Before/After is intrinsic data structure
Ward	Two branches; > 97% K-Means concordance	Robust across algorithms
Regression	Aliveness $\beta = .44$, Catharsis $\beta = .24$, $R^2 = .89$	Vitality + discharge → clarity pathway

The three analytical phases converge into a cohesive narrative. Principal Component Analysis (PCA) indicates that the four constructs represent a singular Therapeutic Growth Factor (TGF). Clustering analysis supports this by showing that this factor creates a clear binary division in participant space, distinguishing Before from After, with unsupervised algorithms achieving a 98% accuracy in identifying this partition. Regression analysis further elucidates the internal dynamics: within the TGF, embodied vitality (Self-Aliveness) and emotional release (Catharsis) are the main pathways leading to reflective Insight, while Self-Righteousness aligns with the overall change but contributes less to the unique mechanistic variance. The Time variable captures a residual global enhancement, suggesting that the intervention's impact surpasses the sum of its measurable immediate effects.

Discussion

The Therapeutic Growth Factor: A Unified Account of Nature-Based Therapeutic Change

The study's most significant contribution is the empirical identification of a single latent TGF that accounts for nearly 89% of the variance across four theoretically distinct psychological outcomes. This discovery challenges the prevailing notion in psychotherapy research that emotional, somatic, moral, and cognitive improvements are independent treatment targets requiring separate interventions. In the context of Himalayan walk-and-talk therapy, these domains improve simultaneously as expressions of a unified transformation.

The TGF holds both theoretical and practical importance. Theoretically, it implies that the Himalayan intervention engages mechanisms at a deeper organizational level than any individual construct, which could be termed the person-environment regulatory system. Eco-therapy (Roszak, *The voice of the earth: Discovering the ecological ego*, 1992); (Kaplan R. e., 1989), embodied cognition (Lakoff, *Review of Philosophy in the Flesh: The embodied mind and its challenge to Western thought.*, 1999), and affect regulation theory (Gross, *Individual differences in two emotion regulation processes: implications for affect, relationships, and well-being.*, 2003) each predict broad-spectrum change, but no prior empirical study has demonstrated such extreme unidimensionality. The TGF provides the quantitative signature of what these theories collectively describe: a holistic recalibration of the organism-environment relationship.

Practically, the TGF suggests significant measurement efficiency: if a single factor drives 89% of outcome variance, then the Overall Index alone suffices for monitoring therapeutic progress, with subscale assessment reserved for research or diagnostic purposes. This simplification is particularly valuable for field settings like Himalayan treks, where minimizing assessment burden is crucial.

Unsupervised Recovery: The Intervention as Data Structure

The clustering results are, in our view, the most striking finding in the study. That K-Means and hierarchical algorithms—operating without any knowledge of group membership—can recover the Before/After distinction with 98% purity and an Adjusted Rand Index (ARI) of .96 transforms the nature of our evidentiary claim. Prior analyses (t-tests, MANOVA, ANCOVA) established significant differences using supervised statistical tests; clustering demonstrates that the intervention's effect is not

merely statistically detectable but geometrically dominant in the outcome space. The Before and After groups occupy different regions of the four-dimensional construct space with almost no overlap—a finding robust to algorithm choice, initialization, and standardization method. This unsupervised confirmation has epistemic value beyond replication: it demonstrates that the treatment effect is an intrinsic property of the data cloud, not an artifact of the statistical framework used to detect it. In an era of replication crises and concerns about researcher degrees of freedom, unsupervised corroboration provides an additional layer of evidential rigor that should become standard in intervention research.

Mechanistic Pathways: From Discharge and Vitality to Insight

The hierarchical regression analysis reveals the underlying mechanisms of the TGF. In the context of a unified therapeutic transition, Self-Aliveness and Catharsis serve as the main pathways for the development of cognitive Insight. This aligns with a sequential affect-regulation model: a bottom-up release (Catharsis—the liberation of repressed emotional tension through physical movement and dialogic expression) and energetic revitalization (Self-Aliveness—the experience of being physically present, vital, and genuine) together establish the psychological conditions necessary for top-down reflective clarity (Insight). Although Self-Righteousness is consistent with the overall TGF, it contributes less unique mechanistic variance, as indicated by its lower PCA loading, suggesting that moral-valuational realignment is more a result of, or associated with, the catharsis-vitality-insight sequence rather than an independent factor.

The remaining significance of the Time variable ($\beta = .37$ in Model 3) after accounting for all construct scores is significant. It indicates that the intervention induces a global uplift—a contextual change in psychological state—that is not entirely captured by the four measured constructs. This unmeasured residual might represent awe, spiritual meaning-making, group bonding, or other experiential dimensions unique to the Himalayan context that future measurement development should address.

Implications for Intervention Design and Theory

If therapeutic change in the Himalayan context is fundamentally unitary (a single TGF), then intervention design should concentrate on maximizing the activation of the core process rather than focusing on individual constructs. The regression evidence suggests that this core process operates through embodied vitality and emotional release—implying that program elements should emphasize: (a) sustained rhythmic walking to develop motor automaticity and interoceptive coherence; (b) graduated physical challenges to enhance somatic engagement; (c) strategic silence and dialogic pacing to promote catharsis; and (d) awe-inspiring vantage points for integration. Construct-specific interventions (e.g., separate “insight modules” or “moral reflection exercises”) may be unnecessary if the TGF is effectively activated.

Limitations and Future Directions

Several constraints affect the interpretation of this study. Firstly, the lack of a control group implies that the Therapeutic Growth Factor (TGF) might partly represent non-specific elements such as maturation, demand, and group cohesion, rather than the intervention itself. Future research should compare TGF activation across various intervention scenarios (walk-and-talk, walk-only, talk-only, and wait-list) to identify the active components. Secondly, the very high correlations between constructs that form the TGF might be due to common-method variance, as all measures are self-reported. Including physiological (cortisol, HRV, EEG), behavioral (observer ratings, gait analysis), and experience-sampling measures would allow for multi-method validation of the TGF. Thirdly, it is uncertain whether the single-factor structure can be generalized to other nature-based settings like urban parks, forests, or coastal walks. Principal Component Analysis (PCA) structures might vary in environments that are less awe-inspiring or culturally significant. Fourthly, the ceiling effects seen in post-intervention scores indicate that the current measurement tools may limit the upper range of therapeutic growth; future research should use extended scales or item response theory models to capture variance among high-functioning participants.

Longitudinal studies exploring whether the TGF endures over weeks and months—or whether it evolves

into construct-specific paths during post-trek reintegration—are particularly valuable. If the TGF dissipates over time, it would suggest that the unified shift is a temporary state needing maintenance; if it remains, it would imply a true structural reorganization of the person-environment system.

Conclusion

This study demonstrates that Himalayan walk-and-talk therapy not only leads to significant improvements in individual psychological outcomes but also creates a unified, coherent Therapeutic Growth Factor that explains 89% of the variance in multi-construct outcomes. This factor is so dominant that unsupervised algorithms can distinguish Before/After states with 98% accuracy, confirming that the intervention's effect is an intrinsic geometric property of the data, not a statistical artifact. Within this unified shift, embodied vitality and emotional catharsis are the main mechanisms driving cognitive insight. These findings advance both the theory and methodology of nature-based psychotherapy: theoretically, by showing that holistic eco-therapeutic interventions lead to holistic change; methodologically, by establishing PCA, unsupervised clustering, and hierarchical regression as essential tools for understanding the latent architecture of therapeutic transformation. The Therapeutic Growth Factor is not just a statistical construct—it is the quantitative signature of a person traversing a sacred landscape and emerging, on the other side, fundamentally transformed.

References

1. Ulrich, R. S. (1991). Stress recovery during exposure to natural and urban environments. *Journal of environmental psychology*, 11(3), 201-230.
2. Kaplan, R. e. (1989). Environmental preference: A comparison of four domains of predictors. . *Environment and behavior*, 509-530.
3. Keltner, D. &. (2003). Approaching awe, a moral, spiritual, and aesthetic emotion. *Cognition and emotion*, 17(2), 297-314.
4. Lakoff, G. e. (1999). Review of *Philosophy in the Flesh: The embodied mind and its challenge to Western thought*. *Computational Linguistics*, 25(4), 631-634.
5. Oppezzo, M. &. (2014). Give your ideas some legs: the positive effect of walking on creative thinking. *Journal of experimental psychology: learning, memory, and cognition*., 40(4), 1142.
6. Roszak, T. (1992). *The voice of the earth: Discovering the ecological ego*. *The Trumpeter*, 9(1).
7. Gross, J. J. (2003). Individual differences in two emotion regulation processes: implications for affect, relationships, and well-being. *Journal of personality and social psychology*, 85(2), 348.