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Exploring the Mutually Constitutive Relationship Between Psychological Processes of Emotion Regulation and the TCM Theory of "Liver Governing Free Flow"

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Abstract: ***Objective:*** *To examine the relationship between emotion regulation processes and the Traditional Chinese Medicine (TCM) concept of "liver governing free flow" from an interdisciplinary perspective and to propose an integrative theoretical framework.* ***Methods:*** *Drawing on the process model of emotion regulation and TCM theories of emotional activity, this study conducted an integrative theoretical analysis across three dimensions: emotion generation, emotion regulation, and emotion dysregulation.* ***Results:*** *Cognitive appraisal and cognitive reappraisal mechanisms in emotion regulation exhibit structural correspondence with the qi-regulating and emotion-regulating functions attributed to "liver governing free flow," particularly in terms of dynamic regulation and maintenance of homeostasis. Both emotion dysregulation and dysfunction of liver free flow reflect disturbances in regulatory balance, and their interaction may involve cross-level coupling and feedback mechanisms mediated through the hypothalamic–pituitary–adrenal (HPA) axis and the gut–brain axis.* ***Conclusion:*** *Emotion regulation theory and the TCM concept of liver free flow demonstrate complementary and mutually informative relationships at the levels of cognitive regulation and physiological regulation. This paper proposes a "cognition–qi dual-channel" conceptual framework, which expands current interpretations of emotion regulation by incorporating interactions between psychological processes and physiological regulatory states, and provides a theoretical basis for future empirical research.*

Keywords: Liver governing free flow, Emotion regulation, Cognitive reappraisal, Psychosomatic medicine, Qi dynamics.

1. Introduction

Emotional activity is closely associated with visceral function in Traditional Chinese Medicine (TCM). TCM theory holds that emotional dysregulation may disrupt the movement of qi and subsequently impair visceral functioning. Among the visceral systems, the liver is considered particularly important in regulating qi flow and maintaining emotional balance through its function of "liver governing free flow." When this function operates normally, emotional states remain relatively stable and coordinated; when impaired, symptoms such as depression, anxiety, irritability, and anger are more likely to emerge [1-2]. In modern psychology, emotion regulation refers to the processes through which individuals influence the occurrence, intensity, duration, and expression of emotional responses, involving mechanisms such as emotion generation, cognitive appraisal, and response modulation [3]. Although the two theoretical systems share notable similarities regarding the generation, regulation, and dysregulation of emotion, they are generally examined independently, with limited dialogue at the mechanistic level. Accordingly, this paper explores the theoretical correspondences and complementary relationship between emotion regulation processes and the TCM concept of liver governing free flow, with the aim of providing an interdisciplinary perspective for research on emotion-related psychosomatic disorders.

2. Psychological Processes of Emotion Regulation

Emotion regulation refers to the psychological processes through which individuals modulate emotional experiences and expressions. Contemporary psychological research has shifted from focusing primarily on emotion outcomes to emphasizing the dynamic processes underlying emotion generation. Gross's process model proposes that emotions unfold progressively through stages including situation selection, attentional deployment, meaning appraisal, and response formation, with regulation occurring throughout these stages.

Within this framework, individuals may reduce emotional triggers through situation selection or avoidance, alter emotional intensity by redirecting attentional focus, reinterpret situational meaning through cognitive reappraisal, or regulate behavioral and physiological responses after emotions have already emerged. The model distinguishes between antecedent-focused regulation, including situation selection, situation modification, attentional deployment, and cognitive change, and response-focused regulation, primarily involving response modulation [3-4].

Different regulatory strategies exert distinct influences on emotional experience and psychosomatic functioning. Cognitive reappraisal is generally associated with emotional adaptation and reduced distress, whereas long-term expressive suppression tends to increase internal psychological burden. More recent research further suggests that emotion regulation is not the rigid application of a single strategy, but rather a context-dependent and dynamically adaptive process involving continuous modulation of emotional generation, experience, and expression [5]. The effectiveness of emotion regulation is therefore closely related to an individual's ability to cope with environmental stressors, maintain internal stability, and achieve behavioral adaptation, and it provides an important theoretical basis for

understanding conditions such as anxiety, depression, and impulsivity.

3. Emotion-Regulating Functions of "Liver Governing Free Flow"

In TCM, emotional activities are understood within the broader framework of visceral qi dynamics. The Yellow Emperor's Inner Canon states that "the five viscera transform the five qi to generate joy, anger, sorrow, worry, and fear," and further notes that "all diseases arise from qi disturbance" [6]. These statements suggest that emotional changes originate from visceral qi transformation and that emotional dysregulation may in turn disturb qi movement and contribute to disease.

Among the five viscera, the liver is considered especially relevant to emotional functioning. The liver is said to "govern free flow," facilitate smooth and unobstructed qi movement, and promote ascending movement. These characteristics underlie its role in regulating qi circulation and emotional expression [1]. When liver qi flows smoothly, emotional expression is relatively flexible and coordinated; when liver free flow is impaired, qi stagnation and dysregulated ascending–descending movement may occur, often accompanied by symptoms such as depression, anxiety, irritability, anger, and chest discomfort. Excessive free flow may manifest as agitation and impulsivity, whereas insufficient free flow is more often associated with emotional inhibition and depressive states.

TCM theory further emphasizes a bidirectional relationship between emotional disturbance and liver qi dysfunction: emotional stress may impair liver qi movement, while impaired liver regulation may exacerbate emotional imbalance. This reciprocal interaction constitutes an important pathogenic basis for emotional disorders in TCM. Historically, many TCM approaches to emotional disorders have therefore focused on liver-related regulation. Contemporary research on TCM and psychosomatic medicine likewise frequently adopts "liver governing free flow" as a theoretical framework for explaining psychological stress, emotional fluctuation, and psychosomatic dysregulation [2].

Accordingly, liver governing free flow represents not only a physiological mechanism of qi regulation, but also a central conceptual framework for understanding emotional functioning and psychosomatic integration in TCM.

4. Intrinsic Relationship Between Emotion Regulation Processes and "Liver Governing Free Flow"

4.1 Emotion Generation and Free Flow Function

Emotion generation is a dynamic and continuous process involving perceptual encoding, cognitive appraisal, and coping responses. Psychological studies have shown that appraisal contexts simultaneously influence subjective emotional experience and physiological responses [7], while coping styles significantly shape the intensity and direction of negative emotional states [8]. Nevertheless, psychological models have not fully explained why identical appraisal contexts may evoke markedly different emotional responses across individuals or physiological states.

TCM approaches this issue from the perspective of systemic qi regulation. External stimuli are thought to first affect qi movement; when qi circulation remains smooth, emotional responses are relatively flexible and adaptive, whereas qi stagnation may contribute to emotional constraint and maladaptive emotional intensification [6]. The function of liver free flow is therefore understood as maintaining orderly qi circulation and physiological coordination. When this regulatory capacity remains intact, emotional responses are more likely to remain flexible and recoverable; when impaired, external stimuli may more easily produce persistent or exaggerated emotional states.

From this perspective, the TCM framework provides a complementary explanation for "state-dependent variability" in emotion generation. Psychological models identify the micro-level cognitive processing stages of emotion generation, whereas the TCM concept of liver free flow emphasizes broader physiological regulatory conditions influencing emotional responsiveness.

4.2 Emotion Regulation and Free Flow Function

The core of emotion regulation lies in the active modulation and transformation of emotional trajectories. Neurophysiological studies have demonstrated that cognitive reappraisal primarily recruits regions such as the prefrontal cortex, anterior cingulate cortex, parietal cortex, and parahippocampal gyrus, thereby reorganizing emotional meaning and reducing negative affective responses. In contrast, expressive suppression involves neural networks associated with behavioral inhibition, including the prefrontal cortex, temporal lobe, and insula [9]. Early activation of the ventromedial prefrontal cortex has also been shown to attenuate negative emotional responses during relatively early stages of emotional processing [10].

However, these strategies primarily rely on conscious cognitive modulation and may have limited efficacy in highly automatic or somatically embedded emotional states. In comparison, the TCM concept of liver governing free flow emphasizes broader systemic coordination, involving regulation of physiological rhythms, emotional flexibility, and psychosomatic balance. This function may be conceptualized as operating through three interconnected mechanisms: facilitating qi circulation, coordinating visceral functioning, and maintaining psychophysiological stability.

From a neurobiological perspective, some scholars have suggested that these regulatory functions may correspond functionally to prefrontal–limbic regulatory networks [13]. In this sense, liver governing free flow may complement cognitive approaches to emotion regulation by incorporating physiological regulatory dimensions often underrepresented in conventional psychological models.

To avoid remaining at the level of conceptual analogy, the present study further proposes a structured correspondence framework between key emotion regulation mechanisms and

liver free flow functions (Table 1). This framework is not intended as a direct one-to-one mapping, but rather as an integrative model linking psychological processing stages with broader physiological regulatory states.

Table 1: Correspondence Between Emotion Regulation and Liver Free Flow

Emotion Regulation	Key Mechanism	Liver Free Flow Function	Psychophysiological Significance
Situational appraisal	Meaning attribution	Qi responsiveness and stress activation	Determines emotional direction and initial intensity
Attentional deployment	Attentional bias regulation	Regulation of qi ascending and descending	Modulates emotional information processing
Cognitive reappraisal	Meaning reconstruction	Free flow regulation (smooth qi flow)	Facilitates emotional transformation and relief
Expressive suppression	Behavioral inhibition	Qi stagnation (impaired free flow)	Increases emotional inhibition and physiological burden
Emotional recovery	Return to baseline	Restoration of qi balance	Reflects regulatory stability

4.3 Emotion Dysregulation and Dysfunctional Free Flow

Emotion dysregulation is typically characterized by persistent negative emotional activation, delayed recovery, and rigid response patterns, often manifesting clinically as anxiety, depression, irritability, and emotional instability. Previous research has shown that maladaptive coping strategies contribute to the persistence of negative emotional states [8], while excessive expressive suppression may increase physiological burden and alter neural activity in regions such as the insula and temporal cortex [9].

Within TCM theory, these phenomena correspond closely to dysfunction of liver free flow. Such dysfunction may manifest either as stagnation, characterized by emotional inhibition and constrained emotional expression, or as hyperactivity, characterized by irritability, agitation, and dysregulated emotional arousal. Both states reflect disturbances in the dynamic balance of emotional regulation systems [12-13].

Importantly, these disturbances extend beyond psychological processing and involve broader neuroendocrine and immune mechanisms. Chronic psychological stress activates the HPA axis, alters glucocorticoid secretion, affects intestinal permeability and gut microbiota composition, and subsequently influences gut–brain communication [14-15]. Persistent dysregulation may therefore contribute to reciprocal interactions between emotional dysfunction, physiological imbalance, and altered neural regulation, forming a self-reinforcing psychosomatic cycle [16].

From this perspective, emotion dysregulation and dysfunctional liver free flow may be understood as parallel descriptions of disrupted regulatory homeostasis from psychological and TCM perspectives, respectively.

5. Integrative Interpretation of Emotion Regulation and the Function of Liver Free Flow

From the broader perspective of emotion generation, emotion regulation, and emotion dysregulation, the psychological process of emotion regulation and the TCM concept of "liver governing free flow" may be understood as different theoretical representations of a shared psychosomatic regulatory process. Contemporary psychology explains how external stimuli gradually develop into emotional experiences through processes such as cue encoding, attentional bias, meaning appraisal, and response selection, and how these experiences are dynamically regulated through ongoing cognitive and behavioral modulation. The emotion–cognition integration model proposed by Wang Pei and colleagues suggests that emotional processes are involved throughout the entire course of information processing [19]. Research by Luo Qian et al. further demonstrated that emotion regulation involves dynamic integration across multiple brain regions and temporal stages [18].

From the perspective of holistic qi transformation, the TCM theory of "liver governing free flow" provides an overarching framework for understanding this process. External stimuli are considered to first induce changes in qi movement. When free flow function is maintained, emotional expression and recovery remain relatively balanced and orderly; when this function becomes dysregulated, emotional stagnation and disordered qi movement are more likely to emerge, disrupting the intrinsic rhythm of psychosomatic regulation. Related studies have shown that early-life stress may shape relatively stable emotional vulnerability by impairing emotion regulation ability, while the psychosomatic consequences of chronic stress are closely associated with dysfunctional free flow and may exert persistent physiological effects at the micro level [19-20].

Furthermore, a bidirectional interaction may exist between emotion regulation processes and free flow function. On the one hand, long-term impairment of emotion regulation may continuously activate the stress-response system, thereby altering physiological regulatory states and contributing to dysfunction of free flow. On the other hand, physiological dysregulation associated with impaired free flow may weaken emotion regulation ability by influencing functional connectivity within the prefrontal–limbic system. Thus, the two systems may interact dynamically through neuroendocrine–immune pathways and exhibit positive feedback characteristics under conditions of chronic stress.

Psychological theories of emotion regulation provide observable process-level mechanisms and neurobiological correlates for the TCM concept of liver free flow, allowing it to move beyond a purely holistic construct toward a more dynamically testable framework. Conversely, TCM offers emotion regulation research a holistic perspective and clinically oriented pathway by situating emotional regulation within the broader system of qi dynamics and visceral coordination. This integrative perspective may offer useful implications for interventions targeting psychosomatic conditions such as anxiety and depression, thereby forming a dual-path framework that combines cognitive processing with the regulation of qi dynamics. Integrating cognitive reappraisal with interventions aimed at soothing the liver and relieving qi stagnation may help disrupt maladaptive emotional cycles, improve therapeutic outcomes, shorten recovery time, and reduce recurrence risk, highlighting the potential advantages of integrating Chinese and Western approaches in holistic and individualized psychosomatic care.

6. Discussion

The present study explored the theoretical correspondence between emotion regulation processes and the TCM function of “liver governing free flow” from the perspectives of emotion generation, regulation, and dysregulation. Cognitive appraisal, cognitive reappraisal, and related mechanisms emphasized in contemporary emotion regulation theory exhibit conceptual parallels with the TCM understanding of maintaining smooth qi movement and facilitating emotional expression. The integration of these two perspectives is not intended as a simple conceptual analogy, but rather as an attempt to address a shared underlying issue: how organisms respond to external stimuli while maintaining internal stability.

Emotion regulation theory provides a process-oriented interpretation of the TCM concept of liver free flow by translating traditional descriptions such as emotional “stagnation” or “hyperactivity” into operational psychological mechanisms, including attentional deployment, cognitive appraisal, and response modulation. In turn, the theory of liver free flow contributes a holistic psychosomatic perspective to emotion regulation research. Through pathways involving the HPA axis, autonomic nervous system, and gut–brain axis, it highlights the physiological foundations and systemic regulatory dimensions of emotional functioning. This bidirectional interpretive framework not only offers a modern psychological perspective for understanding TCM emotional theory, but also provides an integrative approach for explaining the persistence and recurrence of psychosomatic conditions such as anxiety and depression.

Future studies may further investigate the relationship between emotion regulation strategies, stress responses, physiological indicators, and neural activity patterns in conjunction with syndrome characteristics associated with liver free flow dysfunction. Such work may promote empirical dialogue between TCM emotional theory, psychology, and neuroscience, and facilitate the transition of the concept of “liver governing free flow” from a traditional descriptive framework toward a more observable, analyzable, and empirically testable model.

Based on the above theoretical integration, the present study proposes the following hypotheses for future empirical investigation:

1) Interventions aimed at soothing the liver and regulating qi may be positively associated with cognitive reappraisal performance during emotional tasks, and this relationship may be mediated by improvements in physiological regulatory function.

2) Compared with healthy controls, individuals with impaired free flow function may exhibit altered functional connectivity between the prefrontal cortex and amygdala during emotion regulation, particularly reduced connectivity.

3) Long-term reliance on emotion regulation strategies such as expressive suppression may be associated with sustained activation of the HPA axis, which may further contribute to alterations in physiological regulation and difficulties in emotion regulation.

7. Conclusion

The process of emotion regulation and the TCM concept of “liver governing free flow” demonstrate substantial conceptual correspondence across the stages of emotion generation, regulation, and dysregulation. Contemporary emotion regulation theory elucidates the cognitive and neurobiological mechanisms underlying emotional processes, whereas the TCM theory of liver free flow emphasizes the holistic regulation of qi dynamics and psychosomatic coordination. The integration of these two perspectives may not only deepen the modern interpretation of TCM emotional theory, but also provide an integrative conceptual framework for future research and intervention in emotion-related psychosomatic disorders.

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