

## A Psycho-Oncological Model of Cancer according to Ancient Texts of Yoga

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### Abstract

**Background:** Several psycho-oncological models of cancer have been published. Integrated module of yoga has been found to be effective as an add-on to conventional management of cancer through randomized control studies.

**Objectives:** To develop a model of the aetiopathogenesis of cancer according to ancient yoga texts.

**Methods:** This process had four phases: 1) Review of modern scientific and original texts dating back to 5000 years, 2) Focused Group Discussions (8 members) to develop the model, 3) preparation of the module based on the proposed model and 4) field testing of yoga modules for patients with cancer.

**Results:** Yoga texts propose that cancer is disturbed homeostasis (an imbalance) based in the mind. Persistent, uncontrolled, fast recycling of thoughts in the mind due to wrong knowledge about the source of happiness is the origin. This activates wasteful release of vital energy, (prana), which in due course, expresses onto the physical body as habituated imbalance resulting in uncontrolled molecular (gene) level activity. This 'local violence', progresses by activating the chemical reactions, resulting in inflammation or uncontrolled mitosis. The goal of yoga therapy is 'mastery over inner chemical processes through mindfulness and alertful rest to reduce the inner violence'. Yoga modules were developed based on this understanding of the etiology of cancer. Review of literature and group discussions which also contributed to these modules, aided to keep the focus on scriptural relevance and clinical feasibility. These modules were used in patients with stage 2 and 3 breast cancer in randomized control studies between 2003 till 2008. The results of these studies pointed to the beneficial effects of yoga as compared to conventional management. During surgery, IAYT reduced hospital stay, faster wound healing and lower drain retention; during chemotherapy, practice of yoga demonstrated lower nausea intensity and frequency, anxiety, depression, better immunological status and quality of life; yoga practice during radiation therapy brought about lesser side effects, less stress levels, better cortisol rhythm, sleep. During and after the treatment period patients indicated better quality of life. Controlled studies on breast cancer patients provided the scientific evidence that these modules are effective in clinical settings.

**Conclusion:** This yoga based, workable model has incorporated the subtle aspects of mind (prana, mind and the self) into the psycho-neuro-immunological model of cancer. Evidence suggests that yoga techniques that are based on the models are effective in the management of breast cancer. Mechanism studies and intense dialogue are necessary to consolidate these concepts.

**Keywords:** Yoga; Psycho-neuro-immunological studies; Etiology of cancer

### Introduction

Cancer is a leading cause of death worldwide accounting for 7.4 million deaths (13% of all deaths worldwide) in 2008 [1]. Research to understand the etiology and eradicate the tumor burden without harming the host has progressed greatly and has resulted in successful cure (in a few cancers), improved longevity and quality life. But the world statistics indicates that the prevalence of the disease has not reduced which is intriguing. In India alone, 22.2% of women presently suffer from cancer which is expected to increase to almost 30% in the next five years [2]. This is one of the reasons that have led patients to resort to complementary and alternative medicine (CAM). According to a previous survey, approximately 21% of cancer survivors in the United States had engaged in CAM practices [3]. In India, approximately 56% of the cancer patients took recourse to alternative therapies [3]. Among these, yoga was the third most commonly accepted therapy [3]. These surveys have also compiled the reasons for resorting to CAM. They were: management of side effects, reduction of costs involved, avoiding poor quality of life, minimizing psychological ill-health and reducing recurrences in spite of undergoing such traumatic treatments [3]. The reason appears to stem from a more fundamental

cause than these. As treating professionals and researchers we seem to have missed a major factor, namely the mind, in our entire search for a solution. Conventional treatment has concentrated on dealing with pathophysiology at physical, physiological and molecular levels, but in reality the human system is governed by a more powerful subtle entity called the mind [4].

Life style and psychosocial stresses were recognized to be contributory to sickness, by a few researchers, as early as nineteen seventies [4,5], but it is only recently that enough data has been accumulated to propose a psycho-neuro-immunological model for

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cancer [6]. This has helped to create an awareness of the role of mind body relationship in the etiology and progression of cancer. Anderson et al. [7] proposed a model in 1994 that pointed to a relationship between mind and cancer. By 2006 they moved on to create a model that portrayed a linear progressive casual relationship between psychological stress, immune disturbance and cancer [8]. Further, in 2010 Ao P et al. [9] proposed a dynamic non linear mathematical model of the etiology and progression of cancer based on the interaction of the caspase-3 molecules to indicate the states of normalcy, disease and stress.

Among the various CAM treatments available, yoga offers a holistic model using an entirely different concept of understanding human body in health and disease states; it also offers self corrective techniques to restore normalcy. Ancient texts dating back to about 5000 years (Rig Veda, Patanjali Yoga Sutra and ayurveda) provide a highly evolved conceptual basis of aetiopathogenesis of disease and its management. The 'Integrated Approach of Yoga Therapy (IAYT) for Cancer', used as complimentary to conventional medicine in all studies conducted by Swami Vivekananda Yoga Anusandana Samsthana (S-VYASA) consisted of practices that were based on this model. The aim of the present study is to present a holistic model of etiopathogenesis of cancer using both the ancient and present knowledge.

## Methods

This retrospective scientific narrative has been classified under four phases (Table 1).

### Content generation

Research scholars reviewed traditional yoga and ayurveda texts for references to disease etiology and cancer specific pathology and progression [10–13]. A comprehensive list of all the attributes and treatment modalities were compiled for further discussion.

Scientific literature including empirical evidence and review articles were also scrutinized and hypothesized cancer etiology models [9] were noted apart from accumulating information regarding latest trials that had been done in the field of mind body medicine as a disease management strategy [14–18].

### Model development

**Focused Group Discussions (FGD):** The literature thus compiled was presented to a group of experts for deliberations. The participants of the focused group discussion (FGD) included eight members consisting of 3 yoga experts with in-depth scriptural knowledge who were practitioners of these techniques, one post graduate physician, two

oncologists who work with cancer patients and understand their major concerns and needs at physical, mental and emotional levels during the conventional therapies, and two research fellows.

For each item on the list, the experts were asked to mark 'useful', or 'not relevant' for understanding cancer etiology. The group was also asked to suggest more references regarding cancer and its etiopathology. In addition to this, in-depth discussions ensued which formed a major method for data generation. These discussions and suggestions thereof were noted and were added to the pre-existing list. Inputs by the experts were used to finalize the model for cancer etiopathogenesis.

The flexibility of the FGD structure facilitated exploratory discussions which made the outcome more humanized rather than a score based questionnaire method. Despite its time consuming characteristic, it helped the researchers to interact as contributors to the model. The probing questions and discussions facilitated the development of the model by sharing each others' experiences also. The entire process involved several small group meetings, correspondences, sitting together for meditation and visiting the experts in the field apart from the FGDs.

All the suggestions offered by the group of experts were deemed equally important and taken into consideration for designing the model. This was done by the research scholars under the guidance of the yoga experts.

### Module preparation

The FGD resulted in the formation of a etiopathological model of cancer. A check list of yoga practices which was developed based on this model were provided to the same team of experts for their opinion. This process followed a semi-structured format, using open-ended questions in a face-to-face conversational style and the focus was to document the interviews and discussions that were based on the literature review and experiential knowledge. Inputs regarding feasibility, need, relevance of several yoga techniques were used to develop the modules of integrated approach of yoga that formed the material for another publication [19].

### Field testing

The modules that evolved were initially administered to patients with different cancers as part of the pilot study. These subjects were recruited from the residential health home of the institution, admitted for two to three weeks to undergo integrated approach of yoga therapy. These modules were administered to them for the period of their stay by trained experts (two of the senior faculty who were involved in the FGD). Feedback from these patients was recorded immediately after each session. Based on this, further changes were made to the modules.

Further we conducted two randomized controlled studies that used the modules of IAYT for cancer as an add-on to conventional management of breast cancer (stages 2 and 3) results of which formed the material for the eight publications on the complimentary role of IAYT in breast cancer [20–27].

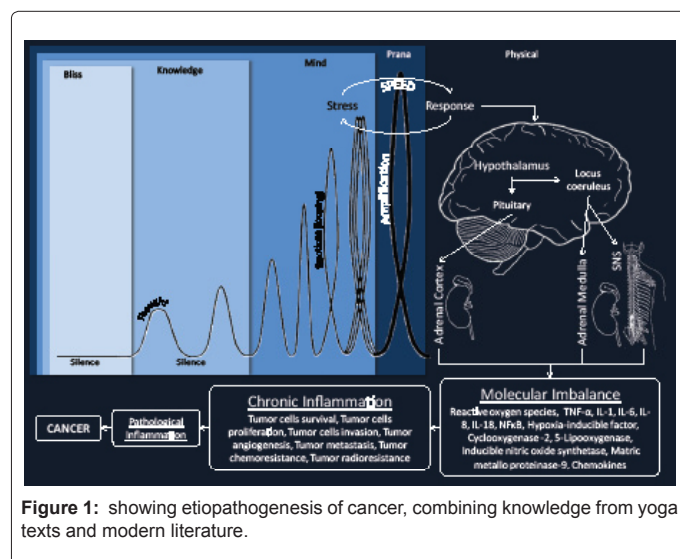
## Results

Contents of the model: Panchakosha viveka (the five components of human being).

According to yoga texts (Taittereya Upanishad), the human system consists of five components [pancha kosha]: Physical body (Annamaya Kosha), Subtle Energy or Prana (Pranamaya kosha), Instinctual mind (Manomaya kosha), Intellectual or discriminative mind (Vignanamaya kosha) and bliss-full silent state (Anandamaya kosha) (Figure 1).

Content Generation	<ul style="list-style-type: none"> <li>o Review of traditional texts</li> <li>o Review of scientific literature on cancer pathology</li> <li>o Interactions and discussions with experienced yoga gurus</li> </ul>
Model Development	<ul style="list-style-type: none"> <li>o Focused Group Discussions and semi structured interviews</li> <li>o 8 experts from yoga or oncology field</li> <li>o preparation of yogic model for cancer management</li> </ul>
Yoga Module Preparation	<ul style="list-style-type: none"> <li>o List of practices based on etiopathology and need</li> <li>o Validation of yoga modules</li> </ul>
Field Testing	<ul style="list-style-type: none"> <li>o Pilot studies on patients with cancer in stages 2-4 in sites such as breast, cervix, stomach, colon cancers included</li> <li>o Randomized controlled studies on patients with breast cancer( stage 2-3)</li> </ul>

**Table 1:** Stages in the development of yogic model for the aetiopathogenesis of cancer.



Shvetashvatara Upanishad [10] describes that a human being is in perfect harmony with nature and healthy when he is established in Anandamaya kosha which is the unchanging state of being, the self (called Brahman) and the causal state of beings from where all other (ever changing) Koshas emerge [28]. Analogies to explain that Ananda/perfect health is the unchanging core of one's personality include 'this kosha is like the string in a necklace of beads' (Bhagavad Gita 7.7), like the gold in all jewels (Chandogya Upanishad, 6.1.6) [12] or the clay in different shaped pots (Chandogya Upanishad, 6.1.3) [12]. This state is experienced as a state wherein one reaches a state of inner quietitude with awareness and the knowledge that 'I am made of the same universal consciousness and bliss that forms the base material of the entire creation'.

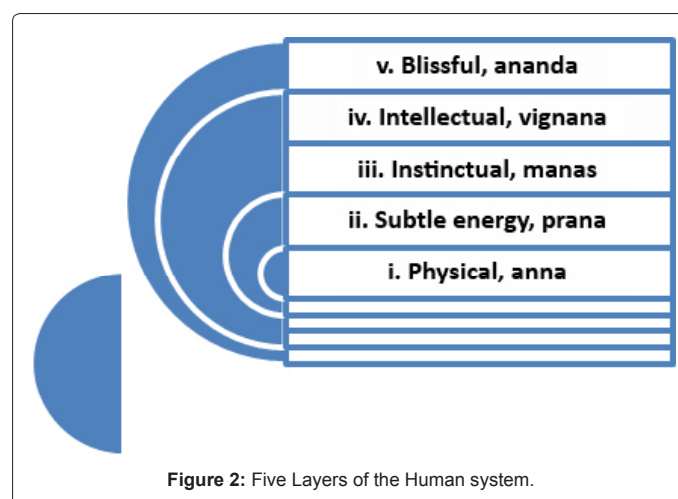
(Mandukya Upanishad 2) [29]; e.g. a salt doll dives into the ocean to understand the depth of the ocean but gets the joy of becoming the ocean itself by losing its individual entity [30].

Waves begin in this ocean of blissful quietitude and become grosser and grosser to form the other four components of the body (Ch3v3-6) [28]. The first wave (spandana) that appears is the 'I' (self awareness) followed by several varieties of waves that form a template of right knowledge, the Vignanamaya kosha. In this state man is in perfect health as he is in tune with nature [28] and leads a healthy life style with complete mastery over his mind (Ch1v3) [31]. As these waves gather momentum with higher amplitude and rewinding speed (ch5v26) [11], (ch8v88) [13] it gathers energy to become the Manomaya kosha in which likes and dislikes begin (Tattva Bodha v49) [32]. As the process of grossification continues it goes on to become the vital energy (pranamaya kosha) and the physical molecules (Annamaya kosha) (Ch3 v5) [28]. Yoga techniques offer techniques of mastering the gross [13] to reach the subtle layers of one's existence by introspective slowing down of thoughts. The subtle controls the gross e.g. if one masters prana he can manipulate the functions of physical body; mind can manipulate prana; vignana can master the mind and prana (Ch1v40) [31]. The goal of life is to establish in a state of complete mastery by remaining in a state of vignana, a state of complete freedom and contentment, freedom from all distress and disease (shvetashvatara Upanishad ch2v12) [10]. This is a state in which one develops the ability to manipulate the laws of nature within the body and outside the body (ch1v4) [31].

The model proposes the ability to master the law that governs programmed cell cycle. Mind is the most highly evolved and the

most powerful entity in the manifest universe. A living human body is a flux of continuous changes that is programmed to live a full life span of about a century in perfect health if it is not disturbed by major calamities. As man goes through the ups and downs of life (be it exposure to external onslaughts like injury or infection, or emotionally challenging situations), it sets off an imbalance. The scriptures are very emphatic when they say that this imbalance occurs due to lack of mastery over mind which is the starting point of any mind body disease. Sage Vasistha describes the progression of this imbalance that results in cancer (and/or other lifestyle related disorder) in the text yoga Vasistha (ch9 v82-117) [13]. The search for happiness in outside objects continues with unresolved conflicts due to wrong notion about the meaning of life and nature of happiness. The nature of this conflict or distress is described as 'uncontrolled recycling of sentences in the mind' (yogic definition of stress) (ch5v23) [11], the Manomaya kosha. This imbalance due to uncontrolled speed (udvega) of suppressed emotions when unchecked results in an imbalance and percolates into pranamaya kosha. This is detectable as disturbed pattern of breathing (increased rate and irregular rhythm) and poor digestion. As this imbalance and loss of mastery goes on for some time it becomes an involuntary habit, a reflex. Chronic constipation or irritable bowel (alternate constipation and diarrhea), fatigue and generalized body aches are the other general (non-specific) manifestations at this level. When unattended by correcting the imbalance at the root cause (the Manomaya and Vignanamaya koshas) the process continues and localizes to a specific zone in the physical body (Annamaya kosha). Thus, the uncontrolled rush of prana (vital energy) results in uncontrolled electro-chemical processes in the physical body, the annamaya kosha. This appears to mean that the physical fight (tissue inflammation) is a reflection of the violence or fight in the mind. We know today that inflammation is a feature of cancer. Thus, the uncontrolled excessive prana (subtle energy) flow seems to cause the changes in the molecular level that goes on to alter the apoptotic programming resulting in immortal cells and perpetuation of cancer cells (Figure 2). Further, the texts go on to describe that the localization of the disease (cancer) depends on external (insult by carcinogenic agents, trauma, toxins, and infections) or internal (genetic) factors.

Thus, the yogic model proposes that the entire problem is due to repetitive onslaught by uncontrolled thoughts (suppressed emotions) at the mind level (Manomaya kosha) which causes excessive prana activity and manifests as violence (inflammation) at annamaya kosha to show up as cancer.





## Integrated approach of yoga therapy for cancer

The integrated approach of yoga offers a comprehensive means to overcome the damage by achieving mastery at all levels through deep cellular rest (reducing the speed, violence and inflammation). At the physical level (Annamaya kosha) there are practices that include: cleansing the body (yogic kriyas) of the endotoxins (Aama as portrayed in ayurveda) both at the gross (fecal matter) and subtle (molecular toxins e.g. free radicals) levels [33]; correcting the life style through yogic diet and injunctions for healthy behavior (sleep, activity, speech, righteousness); and providing deep rest (reduce the speed) to the damaged/sick tissues through physical postures (asanas). Pranayama or breathing techniques corrects the imbalances in pranamaya kosha through voluntary reduction in the rate of breathing (Ch2 v49) [34]. Meditation (Dharana, Dhyana, Samadhi and Sanyama), the Manomaya kosha practice is the most important as it aims at direct mastery over the mind, the root cause of the problem by establishing in an introspective state of blissful awareness (dhyana=effortless flow of a single thought) (Ch2 v2) [31] (Ch3 v2) [34]. Devotion (bhakti yoga or emotional culture) is another important component that helps in harnessing the uncontrolled surge of violent suppressed emotions through using 'pure love'. At the vignanamaya kosha level (intellectual) correction of the false notion is achieved through understanding that 'I am made of the universal consciousness and bliss (Ananda) which is independent of the mind'. At anandamaya kosha level, karma yoga helps in achieving blissful awareness free from all fears (including fear of death). Thus the highlight of this model is the possibility of the practitioner to de-identify and dissolve oneself in the universal consciousness that is described as existence (sat), consciousness (chit) and bliss (ananda), through right knowledge and awareness. All practices including yogic diet, kriyas (cleansing), asanas, pranayama, dharana, dhyana, devotion and self analysis prepare the system to stop the turbulent fluctuations (superficial and deep seated subconscious activities) and allow the mind to rest in a state of inner quietitude (wakeful sleep). A single positive thought (a resolve) dropped in the ocean of blissful quietitude (sanyamah) has the ability to reverse the imbalances at all levels [31]. Thus the process of reversing the structural and functional abnormalities at the tissue level is described through this model.

## Field testing

The major changes suggested by the patients, after having undergone sessions of the yoga module, as part of the pilot study, were: (a) the duration of each module of the practice had to be reduced from 60 to 30 minutes, (b) there was a need for recorded audio CDs/cassettes to help them continue the practice and (c) some of the imageries used during the practice had to be replaced. E.g.: the 'death experience' had to be replaced by 'surrender to the divine lord' which gave much more confidence to face the disease.

The results of randomized control trials on stage 2 and 3 breast cancer patients have shown beneficial effects of IAYT, throughout the entire treatment phase, as an add-on to conventional treatment.

Stage 2 and 3 breast cancer patients undergoing surgery showed shorter hospital stay, suture removal and lower drain retention in the group that were administered IAYT. Patients receiving IAYT along with radiotherapy showed significantly lower levels of anxiety, depression distress, fatigue, insomnia, and appetite loss, negative effect and stress and improved activity levels, positive effect, emotional and functional quality of life while the amount of change in DNA damage was significantly lower as compared to controls. Cortisol rhythms also showed restorative changes in yoga group. Breast cancer patients

receiving chemotherapy and IAYT reported lower nausea intensity and frequency apart from lower state and trait anxiety, depression, symptom severity, distress and better quality of life. Higher immune parameters like NK cells, CD8+ and CD56+ counts were also observed for this group.

## Discussion

This narrative summary of a pre-clinical process, presents a model of the aetiopathogenesis of cancer that has evolved over 5000 years of research in the east by yoga masters as an introspective science. This model of origin and progression of cancer takes into account the existence of subtle aspects of the personality such as prana, mind, and the self (the soul). The holistic model proposes that the root cause of the disease is the wrong mindset or incorrect notion viz. 'the source of happiness is the external agents of enjoyment'. The life's ambitions and plans are all based on this notion. Frustrations occur when these are not fulfilled. Emotional suppressions become mandatory to carry on with life. This results in chronic imbalance that disturbs homeostasis and culminates to cancer. This analysis provides the logical basis for using corrective techniques that are used in yoga practices.

Our studies that used intervention modules called IAYTC (integrated approach of yoga therapy for cancer) based on this model as an add-on during the entire course of conventional management of breast cancer (stages 2 and 3) have shown the beneficial effects [20–27]. The results of these studies indicate that the IAYT modules complement conventional treatment and are clinically relevant to cancer patients. However, they do not provide direct evidence for the etiopathological model that is proposed in this article and is a working hypothesis that has been suggested.

## Comparisons with other psycho-oncological models

Anderson et al. [7] proposed a bio-behavioral model of the relationship between stresses of cancer based on several publications up until 1994.

Her study highlighted the mechanisms by which psychological and behavioral responses may influence biological processes and the health outcomes and gave insights into the role of mind in compliance to standard therapies. Further, based on a decade long (between 1995 and 2005) explosive discoveries on the relationship between psyche and the immune modulation the same researchers Thornton and Anderson [8] presented a psycho-neuro-immunological model of cancer. This model, for the first time, hypothesized a causal linear relationship between the chain of events starting from stressors, psychological stress response that may lead to physiological stress response going on to immune changes and the disease processes. They could also incorporate many molecular mediators and moderators in the model. There has been continuing debate on this psycho-neuro-immunological model of the genesis and progression of cancer. A robust study by Surtees et al. [35] investigated the associations between lifetime social adversity measures that included stressful life events in childhood and adult life, stress adaptive capacity, and perceived stress over a 10-year period. Looking at the Incidence through the cancer registry data showed no evidence that social stress exposure or individual differences in its experience are associated with the development of breast cancer [35].

Research in the last decade identified several mediators involved in the genetics of cancer that has led to successful drug discoveries. Based on these, Ao et al. [9] proposed a non linear mathematical physical (stochastic dynamic) model. According to this model, the oncogenes and other molecular and cellular agents form pathways and modules

that cross talk to each other to form endogenous networks. The nonlinear dynamical interactions among these generate many locally stable states of which some states may be normal such as cell growth, apoptosis, arresting, etc.; others may be abnormal, such as growth with elevated immune response and high energy consumption, likely the signature of cancer; some may be useful to deal with rare stressful situations.

Similar to basic discoveries at molecular levels that led to safer drugs to scavenge for cancer cells, the eastern yoga model offers a sound conceptual basis for psycho-oncological processes that leads to techniques of yoga with the potential of returning to normalcy.

Since the first published research article evaluating the benefits of a support group therapy [36] in 1981, several researchers have used techniques like mindfulness-based stress reduction (MBSR), progressive muscle relaxation, Tibetan yoga as alternative forms of mindful and proactive non-pharmacological methodologies in combination with conventional treatment and seen a plethora of benefits in cancer care. To date there are three metaanalyses [37–39] of all published papers on yoga in cancer, that provide consistent evidence to the strong beneficial effects on distress, anxiety and depression, moderate effects on fatigue, general HRQoL, emotional function and social function, small effects on functional well-being, and no significant effects on physical function and sleep disturbances. Looking at the results of all these studies, it raises a question as to how all these studies could show similar results although they had used different practices ranging from only physical practices to meditative practices. The answer lies in the understanding that all these (asanas, pranayama, meditation etc) are only techniques to help the patient arrive at an internal mastery over the mind and prana that helps in correcting the imbalances. As the premise for calling any practice ‘yoga’ is clarified in ancient Indian literature, researchers had the freedom to modify the intervention to suit the desired objectives.

## Summary

The scriptural basis of the IAYTC has been discussed. The model incorporates all aspects of the personality with mind as the starting point with cancer as the end point of the process.

## Limitations of the study

This work refers a retrospective presentation of the steps that were followed over the years and not a prospective planned study to assess the validity and reliability of the model. Statistically acceptable check lists and scoring were not used during all group discussions and the format was semi structured. Not all members of the focused group met during all discussions and there were several meetings that were not documented. Statistical calculations of split half reliability were not planned.

The clinical trials performed using yoga techniques developed based on the proposed model cannot directly validate the model but indicate that yoga is an effective tool for the management of cancer. Although cancer patients and yoga teachers would greatly benefit from the knowledge of this model, it is not a necessity that this model be the only mechanisms of action.

## Strengths

This is the first proposed model that explains the role of imbalances at several levels of existence (physical body, prana and mind). It forms the basis for self corrective techniques. RCTs that led to eight publications [20–27] provide the evidence. This offers new direction to research on cancer at subtler levels.

## Conclusion

This study offers a model for holistic approach to cancer research as it incorporates the subtle components into the psycho-neuro-immunological model of cancer. More robust studies to understand the mechanism are to be designed, in the future, in order to find evidence for each process in the hypothesized model.

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