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**LUCID DREAMING IN A SAMPLE OF COLLEGE STUDENTS:
INCIDENCE, CORRELATES, AND POTENTIAL FOR HEALING**

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Part I

Exploring the Healing Potential of Dreams: A Literature Review of

Mind/Body Medicine and Lucid Dreaming

“That which the dream shows is the shadow of such wisdom as exists in man, even if during his waking state he may know nothing about it. . . . We do not know it because we are fooling away our time with outward and perishing things, and are asleep in regard to that which is real within ourself.”

—Philippus Aureolus Paracelsus (1493-1541)

Introduction

It has long been suggested by non-Western medical traditions that mind and body are intimately connected, and that psychological states can affect both the propensity to become ill and the potential for healing. Surprisingly, however, until approximately 1975 the biomedical community in the United States considered the immune system to be an autonomous system of defense with no connection to the nervous system (Ader, 2000). Since the mid-1970s, key animal and human experiments have allowed for a more complete and complex understanding of the immune system and its relationship to the central nervous system (CNS). An entire research discipline, named “psychoneuroimmunology” to reflect connections and interactions among mental and behavioral processes, endocrine functions, and immune responses (Ader, 1980), is now devoted to studying these relationships. Although many experimental observations are still not mechanistically understood, the important experimental contributions to this field have established conclusively that “mind and body” are, in fact, inextricably connected. This paper will review the nature of the body’s immune system and its interaction with the neurological system; describe so-called “alternative therapies” with proven effects on

immune function; and introduce lucid dreaming as a real phenomenon that may influence the immune system and thus clearly merits further research.

Overview of the Immune System

The immune system is able to respond to antigens in two ways. Cellular immunity (also called T_H1), mediated by macrophages, natural killer (NK) cells, and cytotoxic (CD8) T cells, responds primarily to bacteria, fungi, viruses, and protozoa. Humoral immunity (also called T_H2), mediated by B cells, mast cells, and eosinophils, deals primarily with extracellular bacteria, allergens, viruses, and parasites. Often the immune response mounted to an infection is a combination of cellular and humoral immunity.

When an antigen such as an intracellular bacterium enters the body, it is recognized as foreign by specific surface components and phagocytosed by an antigen presenting cell (APC), such as a macrophage. The APC then presents the antigen on MHC class II surface protein. The MHC class II with antigen is recognized by a subclass of CD4 T helper cell, T_H1 cells. The potentiation of T_H1 cells from non-differentiated T_H0 cells is triggered by the release of the APC-produced cytokine interleukin-12 (IL-12), which additionally activates NK cells. Interferon- γ (IFN- γ) released by activated NK cells also stimulates the potentiation of T_H1 cells. The T_H1 response includes the release of cytokines IFN- γ , IL-2, and tumor necrosis factor- β (TNF- β), which enhance cellular immunity and inhibit humoral immunity in a variety of ways (see Table 1, below).

Large antigens such as parasites and other non-phagocytosable antigens are better dealt with by marking them for destruction with antibodies, “walling them off” with

granuloma formation, or surrounding them with granulated lymphocytes such as eosinophils and mast cells. When T_H2 cells recognize specific antigens displayed on B cell MHC class II, a complex interaction occurs that increases adhesion between them and causes the T_H2 cell to produce a cytokine (CD40 ligand) which drives replication of that B cell. T_H2 cells also produce IL-4 and IL-10, both of which stimulate humoral immunity and suppress cellular immunity (see Table 1, adapted from Parham, 2000).

Table 1. Cytokines Produced by T-Cells (adapted from Parham, P., The Immune System, fig. 6.20)

Cellular Immunity (pro-inflammatory cytokines)	<u>Cytokine</u>	<u>Principal Source</u>	<u>Main Actions (P: paracrine; A: autocrine)</u>
	IL-12	macrophages	P: Activates T_H1 cells, NK cells
	IL-2	T_H1 cells	A: stimulates T cell growth P: stimulates NK cell growth
	IFN- γ	T_H1 cells, NK cells, CD8 T cells	A: inhibits T_H2 cell growth P: activates macrophages, stimulates production of MHC class I and II
	TNF- α	T_H1 cells, some T_H2 cells, some CD8 cells	P: activates macrophages, induces production of nitrous oxide
	TNF- β	T_H1 cells, some CD8 T cells	P: activates macrophages, induces production of nitrous oxide
Humoral Immunity (anti-inflammatory cytokines)	IL-4	T_H2 cells	A: activation and differentiation of B cells, esp. IgE-switching; increased MHC class II induction P: inhibits macrophage activation; promotes mast cell growth
	IL-10	T_H2 cells	A: increases MHC class II production; inhibits T_H1 cells P: suppresses macrophage activation, co-stimulates mast-cell growth
	IL-5	T_H2 cells	P: stimulates eosinophil growth and differentiation

Because the cytokines associated with cellular immunity promote the synthesis of nitric oxide, increase epithelial permeability, and are involved with fever production, they are called “inflammatory” cytokines. Those associated with humoral immunity are often referred to as “anti-inflammatory” cytokines because of their role in inhibiting macrophage activation and the production of pro-inflammatory cytokines (Elenkov and Chrousos, 2002).

The Mind-Body Interface: Effects of Stress Hormones

The first step toward establishing a real mind/body relationship involved identifying actual physical connections between the immune system and the nervous system and a possible means of communication between the systems. In the 1970s, researchers identified adrenergic receptors on lymphocytes and showed that alpha adrenergic stimulation of these receptors potentiated lymphoproliferative response to a mitogen, and beta adrenergic stimulation inhibited this response (Hadden et al., 1970). Noradrenergic sympathetic nerve fibers were subsequently identified in primary and secondary lymphoid organs such as the spleen, bone marrow, thymus, and lymph nodes (for review see Felten and Felten, 1988).

The close association between nerve endings and immune cells, as well as evidence of adrenergic receptors on lymphocytes, bolstered the idea of “hard wired connections” (Ader, 2000) between the brain and immune system. Recent research has in fact established that sympathetic denervation results in modulation of T cell response to superantigen (del Rey et al., 2002), and other experiments have shown that sympathetic lesioning can lead to both enhancement and suppression of immune response (for review

see Smith and Blalock, 1988). Because these connections develop early in life, and degenerate in the final years of life, it has been hypothesized that they play a probable role in immunosenescence (Bellinger et al., 1992).

Hugo Besedovsky looked at the relationship between host defenses and neuroendocrine function from the opposite angle: working with other researchers, he found in animal studies that exposure to antigens via immunization resulted in increased firing of neurons in the ventromedial hypothalamus (Besedovsky et al., 1977), thus establishing a bi-directional relationship between the CNS and the immune system. Research in the 1980s identified the “common biochemical language” by which the brain and immune system communicate: lymphocytes were shown to produce neuroendocrine hormones such as adrenocorticotrophic hormone (ACTH) and endorphins (for review see Smith and Blalock 1988). It has also now been well established that lymphoid and myeloid cells possess receptors for many neuroendocrine hormones and neuropeptides (Blalock, 1989). Additionally, cytokines released from lymphocytes can stimulate the production of corticotrophin-releasing hormone from the hypothalamus, which subsequently causes the release of adrenocorticotrophic hormone from the pituitary gland and corticosteroids from the adrenal gland (for review see Yang and Glaser, 2000).

The neuroendocrine system is now thought to be the main regulator of inflammatory reactions in the body. The two peripheral arms of this system, as they have already been alluded to, are the Hypothalamic-Pituitary-Adrenal axis (HPA) and the Sympathetic-Adrenalmedullary axis (SAM). The HPA and SAM axes work together to affect changes to the inflammatory/anti-inflammatory balance (see Figure 1, below). Glucocorticoids reduce pro-inflammatory cytokine production (TNF- α , IFN γ , IL-2) and

suppress phagocytic activity of macrophages (Snyder and Unanue, 1982; Russo-Marie, 1992), thus favoring humoral (T_H2) immunity over cellular immunity. Epinephrine and norepinephrine, acting on β_2 -adrenergic receptors inhibit the production of IL-12 and enhance the production of IL-10, again favoring a T_H2 response over a T_H1 response. Catecholamines also influence NK cell activity via β_2 -adrenergic receptors and by inhibition of IL-12 and $INF\gamma$ (Elenkov et al., 1996).

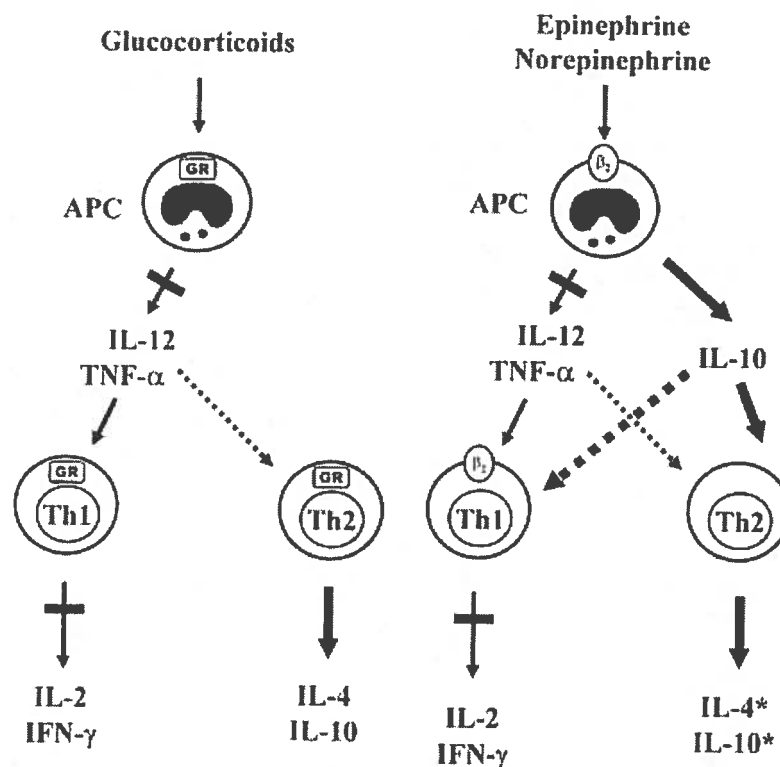


Figure 1. Effect of stress hormones on inflammatory response (from Elenkov and Chrousos, 2002).

Some neuropeptides, such as substance P, provoke a strong pro-inflammatory response, while others, such as beta-endorphin, provoke an anti-inflammatory response (for review see Berczi et al., 1996). The elucidation of these mechanisms led to the

hypothesis that a “stress” response (resulting from infection, disease, pregnancy, psychological stress, or other factors), with its concomitant activation of the HPA and SAM axes and release of “stress” hormones (e.g. glucocorticoids and epinephrine/norepinephrine), might affect overall immunity, wound healing time, propensity to experience autoimmune disorders, and immune response in immunocompromised patients.

Slowed cutaneous wound healing—with decreased inflammation, delayed healing, and increased serum corticosteroid levels—was observed in mice that had been subject to a restraint stress (Padgett et al., 1998). Subsequent experiments revealed that restraint stress in mice also increased susceptibility to streptococcal and staphylococcal bacterial infection during cutaneous wound healing (Rojas et al., 2002). Additionally, certain inflammatory autoimmune conditions, such as rheumatoid arthritis (RA), have been correlated with decreased production of cortisol.

Pregnancy—in particular the third trimester—has been associated with a decreased incidence of new onset RA and an increased incidence of remission. The inflammatory cytokines IL-2 and IFN γ are present in lower than normal concentrations during the third trimester, and anti-inflammatory cytokines IL-4 and IL-10 are present in higher than normal concentration. These observations might explain why inflammatory autoimmune disorders “improve” during pregnancy, especially the third trimester. Anti-inflammatory autoimmune disorders, such as Systemic Lupus Erythematosus (SLE), often flare-up during this period and improve in the postpartum period, when levels of inflammatory cytokines increase and anti-inflammatory cytokine levels drop off (for review see Elenkov and Chrousos, 2002).

The relationship between the stress response, whatever its origin, and immunomodulation now seems impossible to deny. Although very few studies have attempted to address the possibilities of immune enhancement (see part II, below), the existing literature does suggest that such an effect is possible. As many researchers have stated, the major clinical consequences of these interactions will most likely be in immunocompromised patients (cf. Ader, 2000), where even small imbalances in proinflammatory/anti-inflammatory homeostasis can have profound consequences.

Meditation and Other Relaxation Techniques

Meditation has been practiced for hundreds of years as a way to “reduce stress” and improve health naturally. Although the Western biomedical community has been scientifically analyzing the physical and psychological effects for more than 30 years, the validity of meditation as a unique state of consciousness, separate from sleep or eyes-closed relaxation, is still the subject of much controversy. Many rigorously designed studies, however, have shown a real physiologic difference between Transcendental Meditation (TM) and relaxed state. It is not the purpose of this report to undertake a literature review of the large body of work surrounding TM, but it may be helpful at this point to consider a representative study highlighting the physiologic effects of TM as compared to relaxation.

In 1999, Travis and Wallace conducted an order-balanced, single-blind within-subject study of TM vs. eyes-closed rest, during which participants (all TM practitioners with an average of 9.9 years of experience with meditation) were asked to first rest with eyes closed (10 minutes), and then meditate (10 minutes). They were not told that

physiologic measures would be taken. The parameters of respiratory rate, skin conductance, respiratory sinus arrhythmia levels (a measure of vagal responsiveness), and EEG coherence (a measure of cortical processing) were examined—parameters that were chosen following a review of the literature. Data from subjects who were found to be sleeping, based on EEG recordings* and eye movement measurements, were discarded. The experimenters found significant differences between the two states; specifically, during the TM period, subjects experienced lower respiratory rates, lower skin conductance levels, increased respiratory sinus arrhythmia (correlated with decreased susceptibility to stress), and higher anterior-posterior and frontal alpha coherence (indicative of information exchange or coordination between brain regions—for review see Travis and Wallace, 1999). The investigators suggested that such wide-spread physiologic changes might be due to prefrontal cortex inhibition affecting the thalamus and the basal ganglia, along with the midbrain reticular activating system (Travis and Wallace, 1999).

The Travis and Wallace study did not specifically address the issue of immunomodulation achieved through TM, but a subsequent study did find the reduction of one patient's inflammatory symptoms of sarcoidosis (normally treated with corticosteroids) following a combined program of TM, diet modification, and herbal therapies (Nader et al., 2000). Other forms of “deep relaxation”—not necessarily comparable with the meditative state, yet sharing certain physiologic characteristics—

* The EEG of awake subjects is characterized by low voltage, higher frequency waves. As relaxation progresses, EEG recordings show higher amplitude, lower frequency waves. Alpha rhythm (8-10 Hz) reflects an awake but relaxed, eyes-closed state. In deep sleep, delta waves (.5 to 4 Hz) appear. Spindle waves are oscillations between 6 and 15 Hz that occur in stage 2 sleep. Delta waves and spindle waves reflect synchronized oscillations in thalamocortical systems. In contrast, REM sleep (the period during which most dreams occur) is characterized by low voltage, high frequency waves similar to the awake, eyes-closed relaxed state, but 1-2 cps slower on average. (Purves et al., 2001).

have also been shown to provoke changes in the neuroimmune system. For example, a recent study showed decreases in salivary cortisol level in subjects performing Abbreviated Progressive Relaxation Training exercises, a form of muscle relaxation, vs. controls who “sat quietly” for equal amounts of time (Pawlow and Jones, 2001). Using salivary sIgA as an immune marker, another researcher found alterations in immune function with active vs. passive participation, and with passive vs. no participation, in musical activity (Kuhn, 2002). While there clearly needs to be further research performed in the area of immunomodulation via relaxation/meditation, these and similar studies further support the mind-body relationship, and suggest that immunomodulation through “stress” control is a real possibility.

Hypnotherapy and Visualization

Hypnotic trance has been the subject of research for many years, and there is still much controversy surrounding the validity of the trance state. Hypnotic trance was at one time considered to be a sleeping state (and still is by some), but EEG observations in human and animal subjects have shown that hypnotized subjects are actually awake, but deeply relaxed, in alpha rhythm with theta and delta waves in the right hemisphere (Williams and Gruzelier, 2001). Earlier studies also investigated the differences in heart rate, respiratory rate, EEG activity, and other variables in sleep as compared with hypnosis. The relaxed state of hypnosis has been shown to correlate with various physical changes, including modulation of gastric acid secretion, pain control, dermatologic responses, and immune modulation. A representative study on the effects of hypnotherapy on warts (Ewin, 1992) reported 33 cures in 44 consecutive cases of warts

with hypnosis. Interestingly, subjects who were asked to cure their warts simply by imagining them being cured experienced average or longer than average healing times as compared to control subjects. In terms of physiologic effects, hypnosis seems to go beyond other relaxation techniques (not including meditation, which has not been sufficiently investigated in comparison to hypnosis).

A 1995 study showed alterations in levels of B cells and T helper cells in highly hypnotizable subjects under the effects of hypnosis, as compared to relaxation alone (Ruzyla-Smith et al., 1995). A more recent study combined hypnotherapy with guided imagery of the immune system, and found not only alterations in immune markers, but decreased incidence of illness surrounding midterm examinations in subjects; a subsequent study by the same group of researchers found the combined techniques halved the recurrence rate of herpes simplex in subjects (for review of both experiments, see Gruzelier, 2002).

Although imagery techniques have been used on their own in the treatment of cancer patients (patients were asked to visualize their immune systems fighting off the cancer) with some reported success (Simonton et al., 1980), most of the existing literature does not support the hypothesis that guided imagery alone can significantly alter immune function. It is plausible, however, that hypnosis in combination with guided imagery could potentially be a profound inducer of immunomodulation, especially in immunocompromised patients. These theories need further investigation.

It is natural to question why hypnosis might be more effective at altering immune function than relaxation or guided imagery. The hypnotized subject is in a deeply relaxed yet fully conscious state, capable of intense focus on one idea or suggestion. Perhaps in

this state the line between reality and imagination becomes blurred, and it is possible to “convince” the subject of something that he or she knows, both logically and from empirical evidence, is not true. Hypnotized subjects, when shown black-and-white photos and told that they are in color, experience activity in their visual cortex consistent with color vision (Kosslyn et al., 2000).

This exact event is a daily, yet little recognized, event in every person’s life. Dreaming presents each and every one of us with an imagined reality that we take to be real, at least as long as the dream lasts. What if it were possible to “awake” in our dreams to the realization that we are dreaming, with the ability to control what we do and who we are in our dreamed reality? Such an event might be comparable to a hypnotized subject engaging in guided imagery, but the subject would be her own guide, and the imagery would be more vivid than anything that can be experienced in a waking state.

An Introduction to Lucid Dreaming

Very little research has been done in the area of lucid dreaming, which is defined as the awareness of one’s dreaming state while asleep. Lucid dreaming as it is being practiced today has its roots in the centuries-old practice of Tibetan dream yoga, a specific type of yoga that involved retaining awareness while dreaming, and thus preparing for the ultimate challenge to awareness presented by death.

Because dreaming in general and lucid dreaming in particular are almost entirely subjective experiences, it is natural to question how we know that lucid dreaming is in fact a “real” phenomenon. In a study published in 1981, LaBerge et al. tested five subjects in the following way: subjects were instructed in lucid dreaming induction

techniques, and then recorded (polygraph for eye and fist movements, EEG to establish REM sleep patterns) over a course of 2-20 nights. Subjects were asked to “signal” that they were lucid in their dreams by moving their eyes from side to side in a pre-established time interval. Subjects were also awakened randomly during various REM and non-REM sleep stages and asked to report whether or not they had been having lucid dreams. In the course of the study, 35 lucid dreams were reported, and subjects reported signaling during 30 of these periods of lucidity. The polygraphs from these 30 cases were submitted to a judge who, uninformed of the times of report of signaling, was able to correctly identify the lucid dreaming period in 90% of the cases (LaBerge et al., 1981a).

Common criticisms of the validity of the lucid dreaming phenomenon include the assertion that subjects are not actually asleep (i.e., they are merely in a state of deep relaxation, although they believe themselves to be asleep); or that they are influenced by the researcher’s “demand” that they signal and report lucid dreams. However, the above-mentioned study and subsequent studies (LaBerge et al., 1981b) help to allay these doubts. It is clear that the participants involved in the study a) believed themselves to be asleep; b) did not experience the real world via sensory input; and c) were shown to be asleep using physiological measures.

Contrary to popular belief, lucid dreaming is a skill almost anyone can learn, given practice and determination (cf. LaBerge, 1990). Generally, subjects must begin by overcoming fears and concerns they may have about controlling their dreams. For example, many people fear that they will never be able to stop lucid dreaming once they start. Others believe that important psychological, spiritual, or emotional information is communicated in dreams, and fear to disrupt this process. Thus, a detailed understanding

of what dreaming is and how lucidity may affect dreams and the dreamer are necessary before training in lucid dreaming techniques may begin. Certain techniques facilitate lucid dreaming, including varying one's sleep schedule; "reality checks" in which the subject asks herself constantly and randomly throughout the day whether she is dreaming or awake; and perhaps one or more lucid dream induction devices (e.g., sleep visors that flash lights when the dreamer enters REM sleep). The ultimate goal of all of these exercises is to achieve lucidity while dreaming (LaBerge, 1985).

Lucid dreaming can be thought of as a strong form of visual imagery; indeed, perhaps "lucid dreaming is the *most vivid* form of imagery likely to be experienced by normal individuals" (LaBerge, 1985, p.155). However, the limited experiments that have been conducted up to this point indicate that lucid dreaming goes far beyond ordinary visualization techniques, and may actually have more in common with a hypnotic trance state than with visualization. Lucid dreamers who are trying to hold their breath will actually change their respiratory rate and increase their heart rate.

Similarly, EEG studies have shown a change in brain activity when the lucid dreamer is trying to sing (right brain) or count (left brain), as would be expected if the subject were awake and performing the same tasks (LaBerge and Dement, 1982a,b). A control subject engaged in imagined singing and counting showed no such lateralization (LaBerge, 1990). In both hypnosis and lucid dreaming, it seems possible to "fool" our brains into believing that a fantasized reality is actually real. When we dream of performing some action, it is essentially equivalent to actually doing that action because our central nervous system is active in sending signals to the body during dreams.

A recent unpublished experiment by LaBerge and Zimbardo further illustrates this point. Six subjects, all expert lucid dreamers, were asked to first trace a circle with their eyes open (“perception”), and eye movements were measured. Then, subjects were asked to trace a circle with their eyes closed (“imagination”), and again the eye movements were measured. Finally, subjects were asked to perform the same task of tracing a circle with eyes open during lucid dreaming. Tracing a circle with the eyes in lucid dreaming yielded far fewer lateral eye movements than performing the same activity in the awake state with the eyes closed—i.e. using imagination/visualization only (see Figure 1, below) (LaBerge and Zimbardo, 2000).

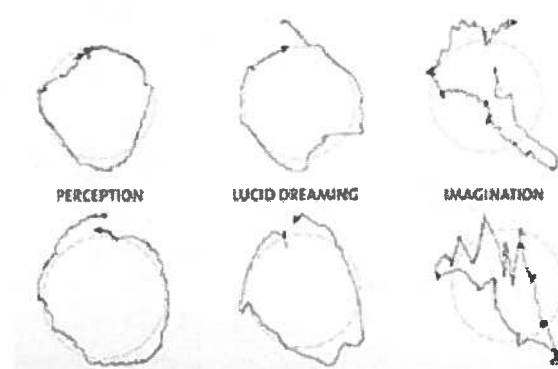


Figure 2. Circle tracking compared in three states (from LaBerge and Zimbardo, 2000).

It seems entirely possible that we might observe, with lucid dreaming, physical effects (including alterations in immune function) such as those that have already been described in a limited way with hypnotized subjects. The further exploration of lucid dreaming as a potentially healing phenomenon is the subject of Part II of this paper.

Part II

Lucid Dreaming in a Sample of College Students:

Incidence, Correlates, and Potential for Healing

People wake up in the middle of the night.
No, not in the middle. Deep in their brains.
They know the present, the little braveries.
We lock our doors from the inside.
We want to be delivered.
We want the patience of mirrors.
We want not to be torn in two by a brown river.
We want the courage to dive
Off the high board into human eyes.
Behold the door.
The lock's alive.

—"Behold" by Stan Rice, 1942-2002 (Knopf, 2002)

Background

Although lucid dreaming was first described in 1867, it did not attract widespread public interest until Stephen LaBerge's best-selling book of the same name was published in 1985. Awareness during dreaming seemed to offer an alternate reality unlimited by the restrictions inherent in the ordinary waking state. It was thought that lucid dreaming might lead not only to a tremendous expansion of consciousness into previously unimagined areas but also, more prosaically, to intensified joy in simply being alive.

Lucid dreaming still fascinates prominent scholars. For example, at a conference on Complementary and Alternative Medicine held at the University of California, Irvine, on November 21, 2002, two leading psychiatrists who are professors at the university—Dr. Roger Walsh and Dr. Justin Call—were asked to comment on lucid dreaming. Dr. Walsh, who gave a keynote speech on meditation at the conference, is on the editorial board of

the *Journal of Consciousness Studies* and has published in more than a hundred peer-reviewed journals. He said that he was convinced of the importance of lucid dreaming and that he followed the published research on the subject with great interest and enthusiasm (personal communication).

While a person's professional status does not make his or her subjective report of an experience inherently valid, it is reasonable to conclude that a person with a scientific background might be able to provide more insight into the meaning or genesis of that experience than the average person. Dr. Call, a world-renowned child psychiatrist, said that he himself was a lucid dreamer and could recall many lucid dreams. When asked for details, he described a period when he was going through psychoanalysis as part of his professional training. He said that he had had a series of lucid dreams in which the same events unfolded before his eyes that he was describing to the analyst in the waking state, but with the difference that in the dreams he himself was able to do the analysis. He speculated that he was unconsciously in competition with the analyst and that lucid dreaming gave him a cathartic release of this competitiveness that was beneficial to his mental health (personal communication).

Lucid dreaming techniques have reportedly been successful in treating chronic nightmares (Brylowski, 1990; Abramovitch, 1995; Zadra and Pihl, 1997). In Part I of this paper, I speculated that lucid dreaming may also be able to effect changes in immune response similar to those postulated with other "alternative" therapies such as meditation and hypnosis, with resultant enhancement of physical as well as psychological healing. For example, hypnosis has been shown to be associated with immune-related skin

changes such as the disappearance of warts (Ewin, 1992) and reduced swelling and induration around the site of tuberculin skin tests (Zachariae et al., 1989).

While clinical measurement of changes in cortisol or immunoglobulin levels is beyond the scope of the present study (and indeed has not been extensively carried out in studies of hypnosis and meditation either), more experiential evidence of the potential healing power of lucid dreaming is clearly needed. The research described in this paper was carried out both to elicit such evidence from lucid dreamers and, more basically, to establish the incidence (prevalence and frequency) of lucid dreaming in a previously untested sample of college students. A third goal was to investigate possible relationships between incidence figures and factors such as sex, handedness, presence of family or friends who had experienced lucid dreaming, exposure to media treatments of lucid dreaming, belief in a higher being, and experience with meditation and/or mind-altering nonprescription drugs.

Lucid dreaming has been variously defined, but the usual definition is simply that of a person becoming aware that he or she is dreaming while dreaming is still taking place. This was the definition initially used for the present study (see survey questionnaire in the Appendix). Some scholars have gone beyond this minimal definition in an attempt to avoid overestimating the prevalence of lucid dreaming. They have asked participants to write a description of one or more of their lucid dreams to make sure that the description contains language such as "I suddenly became aware that I was dreaming," or (more rarely) they have set as a criterion that the dreamer must report having been able to control the content of his or her lucid dream.

The reported prevalence of lucid dreaming varies widely depending not only on the definition used but also on the nature of the sample studied. In groups of highly motivated adults with an unusually high interest in dreaming, prevalence has run between 70% (Kohr, 1980) and 100% (Gackenbach et al., 1983), whereas in two studies in which participants were randomly chosen from the phone book (Palmer, 1979) or from voter registration lists (Blackmore, 1984), prevalence was much lower—about 50% of respondents reported having had at least one lucid dream in their lives. Leading researchers in the field estimate that about 58% of the general population has experienced at least one lucid dream (Gackenbach, 1991a).

With regard to frequency, or how often a person has lucid dreams, there is less variation reported in the literature. Among adults, the percentage of the total population studied (not just lucid dreamers) reporting at least one lucid dream per month has ranged from 14% in a group of people randomly chosen from the phone book (Palmer, 1979) to 21% in a group with unusually high interest in dreaming (Kohr, 1980). Among students in a course on dreams, Gackenbach et al. (1985) similarly found that 21% reported having a lucid dream at least once a month.

If we compare people who experience lucid dreaming with those who do not, we may be able to understand more about the phenomenon itself. Thus many investigators have attempted to identify individual differences associated with lucid dreaming ability. Blackmore (1991) found that among students, there were no statistically significant differences in handedness or in sex between lucid dreamers and others. Gackenbach (1991b) reported no sex difference with regard to the frequency of lucid dreams. On the other hand, many researchers have found that people who consciously practice meditation

while awake have more lucid dreams than non-meditators (Sparrow, 1976; Reed, 1978; Hunt and McLeod, 1984). Further, a study of long-term meditators showed that the longer people had been meditating, the more likely they were to report lucid dreams that they could control (Hunt, 1987).

Other studies have found that as compared with non-lucid dreamers, lucid dreamers tend to have higher dream recall (Snyder and Gackenbach, 1988), and they have also been found to demonstrate more creativity and lower anxiety (Gackenbach et al., 1983) as well as greater field independence (Gackenbach et al., 1985) and enhanced absorption or focusing of attention—the latter characteristics being connected with meditation skills (Gackenbach et al., 1986).

Since lucid dreamers can reportedly learn to control the characters in their dreams (Tholey, 1989), one potential use for the technique is successful treatment of nightmares as described above. Some also suggest that lucid dreams can provide dreamers with personal insight, help them resolve internal conflict, and allow them to experiment with new behaviors in a risk-free context (LaBerge and Rheingold, 1990). One lucid dreamer even reported that she controlled her overeating by eating a lot in her lucid dreams and not in the waking state (Gray, 1991).

Uncertainty about the division between the dream state and the waking state has led to worry that if people harm themselves during a lucid dream, they could actually wake up with physical impairment (LaBerge et al., 1991). More frequently, however, it has been suggested that lucid dreaming has a potential for **enhancing** physical well-being. For example, Kellogg (1991) describes how he himself noted rapid healing of an infected tonsil immediately after he awoke from a lucid dream about his throat being healed. More

such reports of psychological and physical healing need to be collected, and this was one of the goals of the present study.

Method

The first step was to carry out an extensive literature review of writings about lucid dreaming, the results of which are presented in the previous section. I also attended classes on lucid dreaming taught at Stanford University by the person who first publicized the phenomenon, Dr. Stephen LaBerge, and I met with him many times to discuss my project. I then collected remarks on lucid dreaming from two other experts, both psychiatrists, neither of whom has any commercial involvement in the field (see Background section above). Permission to carry out the research was obtained from the U.C. Berkeley Center for the Protection of Human Subjects (Project #2002-12-50).

I then developed a 12-item one-page questionnaire designed to elicit both basic demographic information and respondents' experience, if any, with lucid dreaming (see Appendix). Some of the questions were open-ended, i.e. participants could write in responses. After pilot testing, I revised the questionnaire slightly and distributed it to volunteers from two groups of college students at a major West Coast university. Of the 140 students who made up this convenience sample, 86 were enrolled in a course on the psychology of dreams and the other 54 in a course dealing with drugs and behavior. Fourteen students who reported having had lucid dreams and who volunteered to be interviewed further were then contacted by telephone for details.

Dreams described by participants were independently analyzed first by me and then by a research associate to verify that they were in fact lucid dreams. Those that were

judged not to be so (“false positives”) because students’ descriptions did not include the key element of awareness were excluded, and those that remained were coded for major themes using a coding system agreed on in advance. Inter-rater reliability was virtually complete, and areas of initial disagreement were resolved by discussion between the research associate and myself.

Possible associations between dream incidence and demographic and other factors were analyzed for statistical significance with the Fisher exact probability test (one-tail), which most experts feel is the best test to use with a sample of this size. In a few cases where the numbers were too large because of aggregated data, the chi-square test (χ^2 , $df = 1$) was used instead.

Results

In this summary, the data are aggregated and presented in tables describing the sample as a whole ($N = 140$), since the sample was found to be relatively homogeneous in most respects. Data for students in each course ($N = 54$, $N = 86$) are presented separately in the text. Variables studied were selected heuristically for their hypothetically likely connection to lucid dreaming.

Demographic and other characteristics of the sample. Table 2 shows the aggregated demographic and other characteristics of the entire sample of 140 students.

Table 2. Demographic and other characteristics of 140 college students participating in a study of lucid dreaming, U.C. Berkeley, 2002.

Mean age (years)	21.2
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Female	95/140 (68%)
Left-handed	13/140 (9%)
Had a family member or friend who had experienced lucid dreaming and told about it	51/140 (36%)
Had exposure to media treatments of lucid dreaming (print media or movies)	77/140 (55%)
Believed in the existence of a higher being	77/140 (55%)
Meditated on a regular basis	20/140 (14%)
Smoked at least one cigarette a day	17/140 (12%)
Used at least one mind-altering drug other than alcohol during the past 12 months	81/140 (58%)

Analysis of each group separately showed that participants enrolled in the course dealing with drugs and behavior had a mean age of 20.2 years and 32/54 (59%) were female. Those in the dreams course had a mean age of 21.9 years and 63/86 (73%) were female. Five of the 54 students in the drugs and behavior course (9%) and 8/86 in the dreams course (also 9%) were left-handed, consistent with normative percentages reported in the literature.

In the drugs and behavior course, 23 students (43%) said that a family member (9/23), friend (14/23), or both (1/23) had had at least one lucid dream and had told them about it; and 13/54 (24%) had read articles and books or seen movies about lucid dreaming. The movies *Vanilla Sky* and *The Waking Life* were specifically mentioned. In the dreams course, 28 students (33%) said that a family member (9/53), friend (17/33), or both (1/28) had had at least one lucid dream; one student did not specify who the person was. The fraction of students in the dreams course (64/86, or 74%) who said they had

read or seen movies about lucid dreaming was three times that in the drugs and behavior course (24%), reflecting the fact that they had such material as part of their assigned reading. This difference was statistically significant at $p = < .0001$, χ^2 .

Also, in the drugs and behavior course, 30/54 students (56%) said they believed in a higher being or power, while 16 (30%) said they were not sure, and 8 (15%) said they did not. In the dreams course, 47/86 students (55%) said they believed in a higher being, 25 (29%) said they were not sure, and 14 (16%) said they did not. Finally, in the drugs and behavior course, 7/54 students (13%) practiced meditation on a regular basis, and in the dreams course, 13/86 (15%) did so. The questionnaire also asked whether students had ever been successfully hypnotized, and how often, but the positive responses were too few (5/140) to permit analysis.

As Table 2 shows, 17/140 students (12%) reported smoking at least one cigarette per day during the past 12 months. This number included 6 of the 54 students in the drugs and behavior course (11%), and 11 of the 86 students in the dreams course (13%). Finally, 81 of the 140 students (58%) said they had used at least one mind-altering non-prescription drug other than alcohol during the 12 months preceding the study.

In the drugs and behavior course, two-thirds of the students (36/54, or 67%) said they had done so. The drugs most commonly used were marijuana (25 students), psilocybin (psychedelic) mushrooms (18), MDMA ["ecstasy"] (10), cocaine (9), LSD (6), the hallucinogenic herb *salvia divinorum* (6), nitrous oxide (6), and opium or other opiates (4). One student each had used methamphetamine ["speed"], mescaline, and absinthe.

In the dreams course, a little more than half of the students (45/86, or 52%) said they had used at least one mind-altering drug other than alcohol during the previous 12 months. The drugs most commonly used were marijuana (37 students), psilocybin mushrooms (12), MDMA (10), LSD (5), methamphetamine (2), cocaine (2), and GHB (2). One student each had used ketamine, *salvia*, ayahuasca (a hallucinogenic drink), and 2C-B (a psychedelic).

Table 3 presents aggregated data on use of mind-altering drugs in the entire sample of 140 students. Note that the three most commonly used drugs—marijuana, psilocybin mushrooms, and MDMA—were identical in the two groups and occurred in the same order of frequency. While there was a trend toward more drug users in the drugs and behavior course than in the dreams course, the difference was not statistically significant ($p = 0.1345$, χ^2). However, students using **two or more** drugs (as opposed to **one or no** drugs) were significantly more likely to be in the drugs and behavior course (20/54, 37%) than in the dreams course (15/86, 17%); $p = 0.0161$, χ^2 .

Participants were given the option of skipping the question about drug use, but very few did so, perhaps because the questionnaire was filled out anonymously. Most students who used drugs (46/81, or 57%) said that they used only one kind, typically marijuana, but a minority of students (10/81, or 12%) reported using four or more kinds. These heavy users of drugs were no more or less likely to report having lucid dreams than those who used only one kind ($p = 0.4360$).

Table 3. Mind-altering non-prescription drugs used by 140 college students during the 12 months preceding the study, U.C. Berkeley, 2002.

Drug	Number (percent) of students reporting use
Marijuana	62/140 (44.3%)
Psilocybin mushrooms	30/140 (21.4%)
MDMA ("ecstasy")	20/140 (14.3%)
LSD	11/140 (7.9%)
Cocaine	11/140 (7.9%)
<i>Salvia divinorum</i>	7/140 (5.0%)
Nitrous oxide	6/140 (4.3%)
Opium or other opiates	4/140 (2.9%)
Methamphetamine	3/140 (2.1%)
GHB	2/140 (1.4%)
Mescaline	1/140 (0.7%)
Absinthe	1/140 (0.7%)
Ayahuasca	1/140 (0.7%)
2C-B	1/140 (0.7%)
Ketamine	1/140 (0.7%)

Incidence of lucid dreaming. Table 4 presents aggregated data on incidence (prevalence and frequency) of lucid dreaming for the entire sample of 140 students. Overall, 78/140 students (56%) reported having had a lucid dream at least once in their lives, and 12/140 (9%) reported having had at least one lucid dream a month during the past 12 months. These results represent the data after they were corrected for false positives—dreams that were judged not to be lucid because the students' descriptions did

not contain statements such as, “I knew I was dreaming.” The 56% prevalence figure is consistent with the estimate, cited above, that about 58% of the population has had at least one lucid dream (Gackenbach, 1991a). The 9% “at least one lucid dream a month” frequency figure is somewhat lower than the 14% to 21% figures reported in previous studies, possibly because the students were younger than other populations sampled.

Table 4. Prevalence (incidence and frequency) of lucid dreaming among 140 college students, U.C. Berkeley, 2002.

Experience	Number (percent)
<i>Incidence:</i> Had a lucid dream at least once in their lives	78/140 (56%)
<i>Frequency:</i> Had at least 1 lucid dream per month during the past 12 months	12/140 (9%)

The prevalence of lucid dreaming was greater among students in the dreams course (53/86, 62%) than among students in the drugs and behavior course (25/54, 46%), but the difference did not reach statistical significance ($p = 0.1089, \chi^2$). (The students who said they were “not sure” whether they had had lucid dreams—18 in the drugs and behavior course and 23 in the dreams course—were counted as not having had them, since the dreams they described did not meet the criteria for lucid dreams referred to above.)

In contrast to the drugs and behavior course, where 8/54 students (15%) said they had had lucid dreams but were judged not to have had them (“false positives”), no students from the dreams course fell into this category. This is probably attributable to the fact that extensive discussion of lucid dreaming had taken place in the dreams

course prior to administration of the questionnaire, so that students in that course were better able to identify true lucid dreams.

With regard to frequency, in the drugs and behavior course 5/54 students (9%), or one-fifth of the 25 lucid dreamers, said that they had had at least one lucid dream a month during the past 12 months. This group might be regarded as “expert dreamers” who had extensive experience with the phenomenon. In the dreams course, 7/86 students (8%) fell into this category.

Association with other variables. Table 5 presents aggregated data on the association between lucid dreaming and other variables in the entire sample of 140 students.

Consistent with the literature on lucid dreaming, few statistically significant associations between incidence and other variables were found. The strongest relationship was that, in both groups studied, students who reported having a friend or family member who had had a lucid dream were far more likely to have had one themselves ($p = < .0001$, χ^2). The association was also significant in the two groups considered separately, though less strong than in the whole sample ($p = 0.0005$ in the drugs and behavior course, $p = 0.0011$ in the dreams course).

Other associations were non-significant. In the sample as a whole, there was a nonsignificant trend toward students who had read about (or seen a movie about) lucid dreams being more likely to have had one ($p = 0.2176$, χ^2). This association reached borderline statistical significance in the drugs and behavior course ($p = 0.0563$) but not in the dreams course ($p = 0.3192$), where such readings were required.

Table 5. Association between certain variables and lucid dreaming among 140 college students, U.C. Berkeley, 2002. (Because of the larger size of the numbers analyzed, all probabilities in this table were computed using the chi-square test.)

Variable	Probability of an association with lucid dreaming being due to chance
Having a family member or friend who experienced lucid dreaming	$p = < 0.01$ (<i>power</i> = .99)
Having been exposed to media treatment of lucid dreaming via print media or movies	$p = 0.21$, N.S. (<i>power</i> = .29)
Meditating on a regular basis	$p = 0.10$, N.S. (<i>power</i> = .50)
Using at least 1 mind-altering drug other than alcohol	$p = 0.25$, N.S. (<i>power</i> = .27)
Smoking at least 1 cigarette a day	$p = 0.61$, N.S. (<i>power</i> = .09)
Being female vs. male	$p = 0.89$, N.S. (<i>power</i> = .04)
Being left-handed vs. right-handed	$p = 0.46$, N.S. (<i>power</i> = .16)
Believing in a higher being	$p = 0.84$, N.S. (<i>power</i> = .05)

In addition, there was a nonsignificant trend in the whole group toward students who meditated on a regular basis being more likely to have lucid dreams than those who did not ($p = 0.1029 [x^2]$ in the group as a whole, $p = 0.1535$ in the drugs and behavior course, and $p = 0.1796$ in the dreams course). As noted above, previous studies have found that people who practice meditation have more lucid dreams than non-meditators (Sparrow,

1976; Reed, 1978; Hunt and McLeod, 1984), and that the longer people have been meditating, the more likely they are to have lucid dreams (Hunt, 1987).

There was also a slight nonsignificant trend toward students who used at least one mind-altering drug other than alcohol being more likely to have lucid dreams than those who used no drugs ($p = 0.2453 [x^2]$ in the group as a whole, $p = 0.1442$ in the drugs and behavior course, and $p = 0.2164 [x^2]$ in the dreams course). However, smokers were no more likely than nonsmokers to have lucid dreams ($p = 0.6101 [x^2]$ in the group as a whole, $p = 0.4092$ in the drugs and behavior course, and $p = 0.4194$ in the dreams course).

Consistent with results reported previously in the literature, neither females nor males were more likely to have lucid dreams ($p = 0.8875 [x^2]$ in the group as a whole, $p = 0.2327$ in the drugs and behavior course, $p = 0.8625 [x^2]$ in the dreams course), and neither left-handed people nor right-handed people were more likely to have lucid dreams ($p = 0.4624 [x^2]$ in the group as a whole, $p = 0.4281$ in the drugs and behavior course, $p = 0.3410$ in the dreams course). Further, students who believed in a higher being were no more likely to have lucid dreams than those who did not believe in such a being or were not sure whether they believed or not ($p = 0.8415 [x^2]$ in the group as a whole, $p = 0.1883$ in the drugs and behavior course, and $p = 0.4187$ in the dreams course).

Healing potential of lucid dreams. Of those students in the drugs and behavior course who had had lucid dreams (25/54), seven felt that the dreams were beneficial to their mental and/or physical health, ten were not sure, and eight felt that they were not. The corresponding figures for the 53/86 students in the dreams course who had had lucid

dreams were that 11 felt they were beneficial, 23 were not sure, and 16 felt that they were not (3/53 did not answer the question).

Analysis of the responses suggested that the students who felt that their lucid dreams were not beneficial to health felt that way because their lucid dreams began as frightening nightmares and even though they became lucid and “escaped” from the threat posed by the nightmare, the initial fright outweighed the feeling of relief as they remembered the dream.

On the other hand, the students who felt that their lucid dreams were beneficial made statements such as the following:

- Lucid dreaming made me more aware of the importance of the brain and the subjectivity of experience.
- It allowed me to do things that are impossible in real life, such as flying (it felt more like soaring!), breathing under water, and having sex with normally unattainable people.
- You can analyze or consider your dream, and then continue—it feels like watching a movie and then being able to pause before continuing on with it.
- It was nice to feel that I had absolute control of what happened in the dream. I could choose to wake up or continue sleeping. I could make people appear when I wanted them to. I could even control the weather.
- You can explore areas in your dream that you’re curious about, as if they’re in hypertext.
- Lucid dreaming is a real stress reliever and confidence booster.

- It's really fun—you're conscious that it's a dream yet still able to feel strong emotions.
- At first the dream was out of my control and then I gained control. It's enjoyable. It definitely added more excitement to my life.
- Some of my lucid dreams included "out of body" experiences where I seemed to have two bodies or see myself from a place outside myself.
- I seemed to have conscious control and an enhanced awareness and understanding of various situations with the people in the dream—family and friends.
- I was able to consciously start and stop the dream and I felt enlightened afterwards.
- I could manipulate the environment according to what I wanted, which was a lot of fun.
- I was falling off a cliff, but then realized I was dreaming and just let myself fall. So then I wasn't afraid to fall any more.
- I was going to be stabbed, but I told myself I was dreaming and not to be afraid.
- I felt bodiless; I was floating in what I can only describe as "limbo."
- Sometimes, I just stop and remember when I was flying and I feel both excited and relaxed at the same time.
- I'm positive that lucid dreaming would help people's mental and physical health if further explored.
- It's very empowering and liberating—you wake up in good spirits.

Themes that were identified through qualitative analysis included being in control of the events in the dream and able to change the course of the action in positive ways,

being aware of being in a dream state and so not worrying about ill consequences from any action (such as falling off a cliff), being able to do things that are impossible in the waking state (e.g. flying), and finally, simply having fun exploring various activities.

Within the group of 14 students who agreed to be interviewed in depth, several described ways in which their lucid dreams had brought them pleasure and/or a sense of mastery and stated a belief that this had benefited their psychological health. Themes that emerged were practicing for difficult social situations, gaining insight into problems, and doing things one is not able to do in “real” life.

One respondent stated that he was able to “play professional sports, have lots of sex, and role play a situation” which “helped [me] to understand the situation better.” Another respondent said, “Whenever I have difficulty confronting someone, and I’m scared of them in real life, in my dream I will confront them and feel better about them in real life.” The same subject also stated that lucid dreams helped her have more confidence, allowing her to change her physical appearance (“I want to be taller, I want to have longer hair . . . and all this can happen in my dream”) and “be more of a controller” than a “passive bystander.” A third subject said, “I wake up [from my lucid dreams] happier and more in control. I am able to mold reality . . . talk with people of the opposite sex that [I] wouldn’t have otherwise.”

Another benefit of lucid dreaming experienced by the subjects was the ability to do impossible things in the lucid dream, such as flying or meeting with far away friends. For example, one subject stated, “right after my dream, I got up and I felt so good [after flying in a lucid dream . . . I also met my good friend—he’s far away—in a dream; I wanted to see him, and he just appeared and started talking to me.” Only one subject said

that she did not enjoy her lucid dreaming experience: "I didn't like the feeling of having control . . . I had been told that your dreams should follow their own course."

Discussion

This study documented the incidence of lucid dreaming in a convenience sample of 140 college students enrolled in psychology courses at a major West Coast university. It investigated the relationship between incidence and such factors as sex, handedness, presence of family or friends who had experienced lucid dreaming, exposure to media treatments of lucid dreaming, and experience with meditation and/or mind-altering drugs. Finally, through the use of in-depth telephone interviews, it explored the nature of their lucid dreams—including possible healing potential—with a subset of 14 participants.

The incidence of lucid dreaming, where 56% of the students reported having at least one such dream during the previous 12 months, closely paralleled figures previously reported in the literature by Gackenbach (1991a) and others. The percentage of students who said they had had at least one lucid dream per month (9%) was somewhat lower than the 14% to 21% previously reported (Palmer, 1979; Kohr, 1980; Gackenbach et al., 1985), possibly because the students were younger and/or less experienced with lucid dreaming than participants in prior studies.

There was a very strong association between incidence and having a family member or friend who had also had lucid dreams ($p = < 0.0001$). Similar findings have been reported in a study of women who ate nonfood items such as clay during pregnancy (Simpson et al., 2000). Women who engaged in this practice, known as pica, were much more likely to have a family member who ate such nonfood items than those who did not

($p = < 0.001$), indicating that there may be an element of suggestion and modeling involved in both pica and lucid dreaming. As mentioned in Part I of this paper, and as demonstrated by the demographic data gathered in this study, lucid dreaming is not a practice limited to one small subset of the population. It is a learnable phenomenon, which makes it all the more worthy of continued investigation into its possible healing potential.

In the present study, there was also a nonsignificant trend toward more lucid dreaming among students with exposure to media treatment of lucid dreaming and more experience with meditation and/or mind-altering drugs. Participants in the phone interviews (10% of the total sample of 140 students) described ways in which their lucid dreams had brought them pleasure and/or a sense of mastery and stated a belief that this had benefited their psychological health.

Why is lucid dreaming desirable? Most people wish to learn lucid dreaming as a means to explore things that are impossible during waking life, such as flying, breathing under water, or fantasy sexual encounters. Additionally, many find that lucid dreaming offers a unique opportunity to overcome social fears, such as speaking in public, by “practicing” for these situations while dreaming; and some people problem-solve while lucid dreaming. All of these uses of lucid dreaming are valuable. But for some people, lucid dreaming offers the special possibility of psychological healing.

The use of lucid dreaming techniques in the treatment of chronic nightmares was mentioned above. It is easy to imagine how lucid dreaming might also be used to help paralysis victims experience the sensations of walking, running, and sexual intercourse. It is not too soon to begin asking whether lucid dreaming might be able to effect changes in

immune response similar to those observed with other “alternative” therapies, as described in Part I of this paper. The possibility of both physical and psychological healing through lucid dreaming should not be left unexplored by the scientific community.

Limitations. Various limitations to the study performed should be mentioned in order to help guide future research. Limitations include the following:

- Incidence of lucid dreaming was judged subjectively, rather than by sleep lab verification.
- All benefit from lucid dreaming was self-reported.
- The power to identify an association between most of the variables and lucid dreaming, if such an association did in fact exist, was less than the standard power of 0.80. Hundreds, if not thousands, of subjects would be required to accurately assess the presence or absence of the associations.

Directions for future research. Definitive studies of physical benefits from lucid dreaming must await better methods to measure physiological changes, e.g. in cortisol or immunoglobulin levels and in brain activity. Until that time, however, researchers should continue to collect experiential data from lucid dreamers that suggest beneficial physical as well as psychological effects, because the nature of those reported effects may suggest ways in which physical benefits can eventually be measured. More training in lucid dreaming techniques should also be made available to the general public.

Finally, the public needs to understand that this is not a fringe activity limited to drug users or latter-day hippies but is an entity of interest to many highly respected professionals such as the two psychiatrists described at the beginning of this paper. Lucid

dreaming is a phenomenon that offers the intriguing possibility of self-healing not as a replacement for conventional biomedical therapies but as a valuable adjunct to them.

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APPENDIX

Questionnaire used to collect survey data from 140 college students in December 2002

Survey on Lucid Dreaming

For the purposes of this study, we are defining "lucid dreaming" as being aware that you are dreaming for more than a few seconds. Please feel free to continue your responses on the reverse.

Age _____ Sex _____ Left-handed (Y/N) _____ Major field of study _____

1. Have you ever had a lucid dream? Yes _____ No _____ Not sure _____
2. Has anyone in your family or among your friends had lucid dreams and then told you about them? _____ If yes, who? _____ Did that person or those persons have a good experience with lucid dreams? Yes _____ No _____ Not sure _____ If applicable, explain how the experience was good or bad

3. Have you ever read books or articles about lucid dreaming? Yes _____ No _____ If yes, what?

4. Have you ever been successfully hypnotized? Yes _____ No _____ If yes, how many times in your life have you been successfully hypnotized? _____
5. [OPTIONAL] Have you used mind-altering nonprescription drugs during the past year? Yes _____ No _____ [If yes] Which drugs? _____
6. Do you smoke cigarettes? Yes _____ No _____ [If yes] How many cigarettes per day (or per week) do you smoke? _____
7. Do you believe in a higher being? Yes _____ No _____ Not sure _____
8. Do you practice meditation on a regular basis? Yes _____ No _____
9. [If you have ever had a lucid dream]
 - a. About how many lucid dreams have you had in your life? _____ In the past month? _____ In the past year? _____
 - b. How did you know that you were lucid dreaming?

 - c. Was there any special theme or content in your lucid dream(s) that you have never or rarely experienced in non-lucid dreams? Yes _____ No _____ If yes, what was that content?

 - d. Do you feel that being able to lucid dream has helped your mental or physical health in any way? Yes _____ No _____ Not sure _____ If yes, how has it helped you? _____
 - e. If you are willing to be interviewed further by phone about your lucid dreaming, please write your phone number here _____. (You may also give your first name if you wish.)