Starvation, Serotonin, and Symbolism

A Psychobiocultural Perspective on Stigmata

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Abstract

Stigmata, wounds resembling those of Christ, have been reported since the 13th century. The wounds typically appear in association with visions following prolonged fasting. This paper argues that self-starvation holds the key to understanding this unique event. Stigmata may result from self-mutilation occurring during dissociation, phenomena precipitated in part by dietary constriction. Psychophysiological mechanisms produced by natural selection adjust the salience of risk in light of current resource abundance. As a result, artificial dietary constriction results in indifference to harm. A variety of data links dramatic dietary constriction, reduced serotonergic functioning, altered states of consciousness, and self-injurious behavior. Catholic representations of Christ's crucifixion provide a cultural context that both motivates and lends meaning to the experiences of individuals whose predispositions and life histories increase the likelihood of dietary constriction, dissociation, and self-mutilation. Examining this case raises interesting questions about both the evolutionary and the cultural grounds for defining individual psychopathology.

Keywords: *stigmata, fasting, serotonin, impulsivity, self-mutilation, dissociation, trance*

Introduction

The term *stigmata* refers to lesions thought by sufferers to be of divine origin. The lesions appear on areas of the body, particularly the hands and feet, where Christians believe Christ to have been wounded during the crucifixion. Stigmatists, as sufferers are called, report that the wounds appear spontaneously, often bleeding profusely. I will argue that i) stigmatists belong to a class of individuals exhibiting a propensity towards extreme dietary constriction; ii) biomedical and evolutionary perspectives provide proximate and ultimate explanations of this propensity; iii) dissociation and self-mutilation, events that likely play key roles in stigmatism, are similarly explicable at both proximate and ultimate levels; and iv) culturally-constituted understandings concerning fasting, transcendent states, and wounds both shape stigmatists' actions and make meaningful behavior that, in other contexts, would be viewed as pathological.

The first recorded stigmatist was Francis of Assisi, a 13th century merchant's son who renounced a life of privilege in favor of ascetic monasticism. Francis shunned worldly pleasures, filling his days with prayer and fasting. Thin during the best of times, Francis' health declined, and he became extremely weak and emaciated. After fasting the forty days of Lent, Francis experienced a vision in which he was approached by a seraph that revealed itself to be Christ. When the vision ended, Francis discovered that he had acquired stigmata. Despite a continued decline in his health, he redoubled his ascetic efforts, living an additional two years before dying at approximately the age of 45 (Yarom, 1992). Although it is impossible to know exactly how many stigmatists have arisen since St. Francis, or what their experiences involved, of those that are documented, most follow a similar pattern of illness, fasting, visions, and the appearance of wounds;[1] the only recurrent deviation from St. Francis' example is that the vast majority of stigmatists have been women rather than men (Whitlock & Hynes, 1978; Harrison, 1994).

Fasting, interindividual differences, and subjective experience

Fasting is found in disparate societies the world over. The meaning of this behavior is highly culturally constructed (Banks, 1996); the act can become the nexus of baroque rituals and symbolic tapestries, systems which are themselves amenable to even more elaborate etic interpretations (cf. Farrell, 1985). However, in any given population, some individuals are likely to demonstrate a special inclination toward fasting (Banks, 1996; cf. Kaye, Gendall & Strober, 1998). It seems reasonable to suppose that these are the persons most likely to create, acquire, and perpetuate the symbolic systems that imbue fasting with meaning, justification, and additional motivational force.

The unequal distribution of fasting behavior in most populations raises the question as to why some individuals are more likely than others to be attracted to fasting. While motivated at the conscious level by complex cultural schemas, in a broader comparative context extreme religious fasting can be seen as an instance of radical dietary constriction. An evolutionary perspective sheds light on the persistent presence of the propensity toward radical dietary constriction in a small percentage of any population. Like other mammals, humans develop conditioned aversions to foods following a single experience of toxicosis, the so-called Garcia effect (Bernstein, 1999). The psychophysiological mechanism producing such one-trial learning exhibits the hallmarks of an adaptation, a specialized trait produced by natural selection. However, avoiding toxins is not the only adaptive challenge confronting organisms in the dietary domain, as biological fitness is also a function of foraging efficiency, the nutritional benefits reaped for a given unit of time or energy expended in the search for food. Importantly, there is an intrinsic trade-off between optimal toxin avoidance and optimal foraging efficiency -- the safest diet will generally be the least efficient, and vice versa. Because selection pressures fluctuate as a consequence of stochastic changes in a) pathogen prevalence, b) the concentration of toxic plant secondary compounds, and c) resource availability, there is no longstanding optimal level of toxin avoidance, hence natural selection is likely to maintain a range of heritable variation in the propensity to develop conditioned aversions in particular, and the propensity toward dietary constriction in general. This variation will generally be distributed in a normal fashion, and hence, in any given population, some individuals are likely to be predisposed to relatively greater dietary constriction. Additionally, episodic immunosuppression stemming from normal endocrine functioning increases the risk of food-borne pathogens for females relative to males (Fessler, 2001). Consistent with this sex difference, women typically exhibit lower thresholds for nausea (and disgust) than men, and are more likely to possess conditioned food aversions (see ibid.). Accordingly, it is expectable that females will predominate in the tail of any population distribution of the propensity toward dietary constriction.[2]

Extreme voluntary dietary constriction independent of conscious goals or social coercion (i.e., excluding hunger strikes, etc.), currently termed anorexia nervosa,[3] occurs in diverse cultures (Davis & Yager, 1992) and has been known since ancient times (Bemporad, 1996; also cf. Bell, 1985). While details are still unclear, there are strong indications of a genetic component to anorexia nervosa (Kaye *et al.*, 2000). Compared to normal-weight subjects, individuals having a low body mass index are more likely to possess food aversions acquired after nausea or vomiting (Mattes, 1991). This suggests that chronic restrained eating may reflect a heightened susceptibility to nausea conditioning (or, relatedly, disgust -- Troop *et al.*, 2000; cf. Banks, 1996), i.e., in the terms used earlier, these individuals constitute one tail of the distribution of sensitivity to ingestible toxins.[4] Consistent with the postulated heritability of anorexia nervosa, genetic factors are known to contribute to the propensity to develop conditioned food aversions (reviewed in Mattes, 1991). Similarly, consistent with both episodic immunosuppression and greater nausea susceptibility in women, across markedly differing cultural contexts women predominate among sufferers of extreme dietary constriction (Davis & Yager, 1992; cf. Tait, 1993; Banks, 1996), and this is equally true of Medieval Catholic ascetics (Bell, 1985; Lester, 1995).

It is important to note that, even holding questions of meaning aside, severe dietary constriction is a psychobiologically complex phenomenon, and is unlikely to be reducible solely to interindividual differences in sensitivity to the risk of toxicosis. While initial predispositions may influence the initiation of dietary constriction, via both endogenous physiological processes (see Huebner, 1993; Støving *et al.*, 1999; Kaye *et al.*, 2000) and subjective experiences, fasting and dietary constriction may become self-reinforcing behaviors. In particular, fasting may be associated with sensations of transcending time and space and accessing mystical knowledge (Laxenaire & Marchand, 1982; Barrett & Fine, 1990; Garrett, 1996).

Clinical studies reveal high rates of dissociative experience in sufferers of anorexia nervosa

(Demitrack *et al.*, 1990; Schumaker *et al.*, 1995). In many instances, the propensity towards dissociation likely precedes anorexia, stemming directly from a history of childhood trauma (Grave *et al.*, 1996). However, anorexia may also perpetuate dissociative experience (Katz, 1996). Moreover, anorexia may directly cause such experience, since food deprivation induces depersonalization and dissociation (Paul, 1955; Robinson & Winnik, 1973). Although not the only component, in many cultures dissociation is an element in trance (Bourguignon, 1965). Likewise, in diverse cultures, fasting is employed as part of systematic measures intended to induce trance states (Winkelman, 1986). These effects may in part stem from disruptions in sleep patterns (cf. Bliss, Clark & West, 1959; Devillieres *et al.*, 1996). Sleep disruption, which is associated with weight loss (Nobili *et al.*, 1999), may result from a) dietary constriction of the precursors of melatonin, a hormone important in circadian regulation (Kumar, 1996) and/or b) a reduction in levels of the neurotransmitter serotonin (cf. Zajicek *et al.*, 1997), effects which may be further augmented by intentional sleep deprivation as an ascetic practice (*cf.* Bynum, 1987; Lester, 1995). In addition to possible effects via sleep disruption and deprivation, alterations in consciousness may be a direct result of diminished serotonergic activity caused by fasting (see Demitrack *et al.*, 1990 for discussion; cf. Hollander *et al.*, 1990).

Serotonin, diet, and risk-taking

The environment presents organisms with a range of opportunities that vary with regard to both the extent of potentially obtainable benefit or potentially sufferable cost and the likelihood of obtaining benefits or suffering costs. In general, organisms should adjust their behavior in light of both their current status and their future prospects. Individuals whose current status and future prospects are both favorable should avoid opportunities that entail considerable risk, as they can afford to limit themselves to safer, if potentially less rewarding, alternatives. In contrast, individuals whose current status and future prospects are both highly unfavorable should be relatively indifferent to risk, as benefit maximization should be the principal goal -- these individuals have little to lose by failure, and much to gain. We can therefore expect natural selection to have fashioned mechanisms which calibrate risk-taking behavior in light of current status and future prospects.

Individuals who follow a risk-indifferent strategy of benefit maximization are commonly termed 'impulsive.' Food availability constitutes perhaps the most elementary index of current status and future prospects (Kacelnik & Bateson, 1996). A large corpus of evidence supports a connection between impulsivity and low fluid levels and/or low activity levels of serotonin (reviewed in Hollander & Rosen, 2000). In animal models, serotonin, the production of which is dependent on dietary precursors, is a critical mediating factor in increases in impulsivity that result from long-term food deprivation (Fachinelli, Ison & Rodriguez Echandia, 1996). Food deprivation causes a decrease in both available serotonin levels and serotonin synthesis in the hypothalamus (Haleem & Haider, 1996; see also Fernstrom & Wurtman, 1971), as well as a drop in the density of serotonin transporter binding sites in the frontal cortex (Huether *et al.*, 1997), the region principally responsible for cost-benefit assessments. In human subjects, manipulation of the availability of dietary serotonin precursors may produce changes in impulsivity within a short time (Young, Pihl & Ervin, 1988), and can influence the response to stressful conditions (Markus *et al.*, 1998).

Sufferers of anorexia nervosa exhibit marked reductions in cerebrospinal fluid levels of the principal serotonin metabolite, indicating reduced serotonergic activity (Kaye *et al.*, 1984), and these reductions correspond with degree of deviance from normal body weight (Demitrack *et al.*, 1990); weight restoration is accompanied by increases in serotonin levels (Kaye *et al.*, 1991). Although there is debate as to whether serotonergic deficits are the cause or the consequence of the disorder, a number of lines of evidence suggest the latter as the best explanation. First, the above noted animal models reveal a link between long-term food deprivation and reduced serotonergic functioning. Second, unlike a variety of other eating disorders, anorexia nervosa is not amenable to treatment through enhancement of serotonergic activity with selective serotonin reuptake inhibitors (Ferguson *et al.*, 1999). Third, striking parallels exist between features attending human starvation and conditions co-morbid with anorexia nervosa.

<u>Behavioral and psychological concomitants of severe dietary constriction</u>

During World War II, 36 physically and mentally healthy Minnesotan (U.S.) male conscientious objectors, seeking to serve their country without going to war, voluntarily followed a severely restricted but nutritionally balanced diet for six months, losing approximately 25% of their body weight (Keys *et al.*, 1950). Psychological monitoring throughout the experiment led investigators to propose that the experience caused subjects to suffer "semi-starvation neurosis" (cf. Fichter, Pirke & Holsboer, 1986). The severity of the affliction increased as starvation progressed, then decreased as subjects were rehabilitated using a progressively improving diet (Keys *et al.*, 1950:868). During this latter phase of the experiment, subjects were divided into groups, with some groups undergoing accelerated rehabilitation. Rapidity of recovery from psychological dysfunction correlated with the rapidity with which the diet improved (ibid.:872-3).

Keys et al. describe semi-starvation neurosis as involving depression, hysteria, and hypochondriasis. The association between depression and reduced serotonergic functioning is well known, and anorexia nervosa is often co-morbid with depression (Schumaker *et al.*, 1995). Although the term 'hysteria' is somewhat imprecise, it can be considered a form of dissociation (cf. Demitrack *et al.*, 1990:2). Some investigators link the condition with anorexia nervosa (Scherrer *et al.*, 1972; Flavigny, 1991), and serotonin is likely a key mediator of hysteria-like phenomena (Moller, 1991; Hollander & Rosen, 2000). Likewise, hypochondriasis, associated with reduced serotonergic functioning (Perkins, 1999), belongs to a class of disorders involving distorted perceptions of one's own body, a class which includes anorexia nervosa (Phillips, Kim & Hudson, 1995).

Subjects in the Minnesota experiment evinced hyperirritability, with some individuals experiencing barely-containable violent impulses. Hyperirritability was also observed in two smaller semi-starvation experiments (Benedict *et al.*, 1919; Fichter, Pirke & Holsboer, 1986), and is a recurrent theme in numerous accounts of starvation due to disaster or war (reviewed by *Keys et al.*, 1950:784-818). An extensive literature documents a link between irritability, impulsive aggression, and reduced serotonergic activity (Hollander & Rosen, 2000; Davidson, Putnam & Larson, 2000), and both aggressivity and anger attacks have recently been documented in association with anorexia nervosa (Fava *et al.*, 1995; Thompson *et al.*, 1999). Many of the Minnesota subjects engaged in impulsive buying sprees, often purchasing useless items which they could ill afford. Impulsive buying is associated with decreased serotonergic activity (Black, 1996) and binge eating (McElroy, Keck & Phillips, 1995). Four subjects (most of whom were thereafter dropped from the experiment) engaged in compulsive binge eating, a behavior which occurs in a significant proportion of subjects suffering anorexia nervosa (Kaye *et al.,* 2000), and which involves reduced serotonergic functioning (McElroy *et al.,* 2000). One subject suffered kleptomania and suicidal ideation, requiring hospitalization. Both kleptomania (Vandereycken & Van Houdenhove, 1996) and suicidality (Herzog *et al.*, 2000) are co-morbid with anorexia nervosa, and both are associated with reduced serotonergic activity (Hollander & Rosen, 2000). Niremberski (1946) reports that impulsive food theft persisted in liberated survivors of the Belsen Nazi concentration camp even after it was obvious that food supplies were abundant.

Although hallucinations are not reported for the Minnesota subjects, Mikkelsen (1913:303) describes repeated examples accompanying starvation during a disastrous arctic expedition. Robinson and Winnik (1973) studied obese patients undergoing drastic ‘crash’ dieting, and found that patients with no previous history of psychiatric disorders manifested megalomaniac and persecutory delusions, auditory hallucinations, insomnia, and confusion. Paranoia and megalomania in obese patients on zero-calorie starvation diets were also noted by Swanson and Dinello (1970) and Glucksman and Hirsch (1968), with the later also recording somatisation. Rowland (1968:543) reports a case of dramatic dissociation under the same conditions, the symptoms being relieved by refeeding, as well as a case of apparent somatisation (ibid:545). Lastly, as in the Minnesota experiments, in the above studies hyperirritability characterized most of the obese patients under drastic dietary constriction.

Many of the symptoms exhibited under conditions of severe dietary constriction can be understood in terms of the functioning of an evolved system that adjusts risk-taking behavior in light of current status and future prospects. Despite consciously knowing that they could end the dietary constriction without incurring material costs, as they starved, subjects in the experiments and therapies nevertheless began to discount their futures, exhibiting a generalized indifference to risk. Subjects struggled to control impulses to attack those whom they saw as transgressing against them, actors who, under conditions of naturally occurring starvation, would have constituted competitors for scarce resources. Likewise, they wrestled with impulses to grab immediate benefit despite later costs through purchases or theft (cf. Curtin, 1946). Above all, they constantly battled intense impulses to eat immediately, impulses that forced them to continually renew their commitment to enterprises that stemmed from, respectively, fundamental ethical principles or a profound desire to alter their body forms.

Starvation, serotonin, and self-mutilation

Of the 36 Minnesota subjects, the behavior of one individual stands out as particularly bizarre; just after the nadir in the 6-month starvation regimen, an otherwise healthy 28 year old man engaged in repeated acts of self-mutilation, ultimately chopping off three of his fingers (Keys *et al.*, 1950:892-897). Numerous cases of self-mutilation likewise occurred among Allied prisoners of war in Japanese POW camps (Curtin, 1946); relatedly, accident rates went up dramatically in the Netherlands during the World War II famine (reviewed in Keys *et al.*, 1950:898). Self-mutilation exhibits significant co-morbidity with anorexia nervosa (Schulze *et al.*, 1999; Glorio *et al.*, 2000), and self-flagellation and other active, painful forms of mortification were present to a remarkable degree among Medieval female ascetics who engaged in dramatic dietary constriction (Lester, 1995). It is likely that the association between starvation and self-mutilation stems in part from the role of decreased serotonergic functioning in the etiology of the latter (cf. Demitrack *et al.*, 1990; New *et al.*, 1997).

The prospect of bodily harm, normally a fundamental deterrent to a wide variety of potentially injurious actions, loses its motivational salience as part of a general shift to risk indifference. Self-mutilation is thus partially explicable as a maladaptive byproduct of the normal risk-discounting system. Natural selection has not favored a ceiling on the indifference to harm because, under severe conditions, individuals who calculated potential harm were less likely to survive than those who became oblivious to harm, saw only potential benefits, and took advantage of risky opportunities accordingly. As a consequence, when both current status and future prospects are dire, people may become unconcerned with the injurious consequences of their actions. Severe dietary constriction leads to a (normally adaptive) reduction in serotonergic activity, prompting risk-taking in order improve present circumstances and future prospects. However, if serotonergic activity is sufficiently reduced, risk-taking may sometimes be misdirected into behaviors which hold no prospect of objective benefit. Moreover, as part of a normally adaptive response to injury, opiate-like beta-endorphins are released (Porro *et al.*, 1999). The removal of normal motivational barriers to harm thus facilitates injurious behavior which may result in rewarding endorphin release (cf. Holden, Pakula & Mooney, 1997).

Like fasting, self-mutilation is a dramatic behavior that lends itself to the application of symbolic systems. Self-mutilation is often institutionalized as a ritualized activity associated with supernaturalism, and frequently practiced while in trance (cf. Ward, 1984). Clinical self-mutilators display marked dissociative symptoms (Zlotnick *et al.*, 1996). As is true of present-day Western anorexics in general (Banks, 1992; Garrett, 1996), contemporary Western self-mutilators often do not have readily available cultural schemas that explain, justify, and further motivate their actions; instead, they seek to construct personal meanings around the behavior (cf. Scharbach, 1984).

Anorexia nervosa and self-mutilation may often be components of an obsessive-compulsive disorder (Yaryura-Tobias, Neziroglu & Kaplan, 1995), with the behaviors exhibiting a ritualized, repetitive pattern (cf. Barrett & Fine, 1990; Langbehn & Pfohl, 1993). Causal factors underlying obsessive-compulsive disorders, while complex, importantly include serotonergic functioning (McDougle *et al.*, 1999). In underweight anorexics, pharmacologic interference with serotonergic activity exacerbates obsessive-compulsive reactivity, while this effect diminishes as patients regain lost weight (Hadigan *et al.*, 1995). It thus appears that many cases of anorexia nervosa and self-mutilation may involve a downward spiral in which obsessive-compulsive tendencies contribute to dietary constriction, dietary constriction reduces serotonergic activity further, and reduced serotonergic activity exacerbates obsessive-compulsive tendencies (cf. Leibowitz, 1990; Kaye *et al.*, 2000). Obsessive-compulsive disorders exhibit many similarities with ritualized religious behavior (Dulaney & Fiske, 1994), and there is substantial correlation between Catholic religiosity and obsessive-compulsive cognitions and symptoms (Sica *et al.,* 2002). The repetitive practice of fasting, dissociative experience, and self-mutilation thus intrinsically lends itself to interpretation within a symbolic ritual framework.

Asceticism and wounds

Modern biomedical attempts to explain stigmata have largely focused on *psychogenic purpura* (Early & Lifschutz, 1974; Ratnoff, 1989; Panconesi & Hautmann, 1995). This unusual syndrome, manifesting as spontaneous painful bruising, generally occurs in individuals having underlying emotional disorders, and, consistent with the distribution of stigmatism, is more common in women. Psychogenic purpura may occur in conjunction with dissociation, hallucinations, fainting, double vision, and anxiety (Ratnoff, 1989; Yuecel, Kiziltan & Aktan, 2000).[5]

The bruises of psychogenic purpura may occur in nonrandom locations on the body, and the psychological concomitants of the disorder are congruent with many of the attributes of stigmatists. However, consistent with the prominence of bleeding in popular depictions of Christ's wounds, stigmatists have often exhibited not only bruising, but also open wounds that bleed profusely. Hence, while psychogenic purpura may contribute to the formation of stigmata, they are unlikely to be the sole cause -- active self-mutilation is probably involved as well. However, unlike secular self-mutilators who generally recognize themselves as the cause of their wounds, true stigmatists likely engage in self-mutilation during altered states of consciousness involving an experience of the divine, retaining no overt awareness of their actions.[6] The secondary gains to be reaped from both the presence of the wounds and the suppression of awareness of their source are substantial (Lord, 1957), and this probably reinforces the pattern of self-mutilation during profound dissociation. Once open wounds exist, the (as yet poorly understood) processes underlying psychogenic purpura may also contribute to the highly punctuated episodic bleeding reported in some cases (cf. Wilson, 1988).

Although accounts of the time course of stigmatic wounds vary, the prolonged existence of lesions, whether constantly open or easily reopened (directly or psychogenically), is a hallmark of the condition. Wound healing is importantly contingent on nutritional status; even relatively minor deficits of protein, iron, and zinc can directly impact wound repair (Mora, 1999). Meat and other animal products are important contributors to adequate levels of protein, iron, and zinc (Ortega *et al.*, 1998). Consistent with their unique salience as targets of conditioned food aversions (reviewed in Fessler, 2001), these foods are primary targets of avoidance by sufferers of anorexia nervosa (Vaz, Alcaina & Guisado, 1998), and, correspondingly, anorexics often suffer deficiencies of protein (Haluzík *et al.*, 1999), iron (Thibault & Roberge, 1987), and zinc (Varela, Marcos & Navarro, 1992; but see also Marcos, 1997). Corresponding to the behavior of anorexics, in disparate cultures, meat is singled out for avoidance by individuals fasting for religious purposes (cf. Eggan, 1950; Lodge, 1942; Schaden, 1962; Warren, 1973; Glick, 1980), and the centrality of meat in pious abstinence has a long history in Christianity (Toussaint-Samat, 1993).

Culture, atypical subjective experience, and mental health

Not all individuals who possess many conditioned food aversions become extreme dietary constrictors, not all extreme dietary constrictors self-mutilate, and not all self-mutilating dietary constrictors develop stigmata. At each branch in this event tree particulars of genotype, individual life history, and cultural context come into play. There is a strong association between traumatic life events, notably including physical abuse, and self-mutilation and dissociation (Nijman *et al.*, 1999). In keeping with the notion that serotonergic functioning serves to modulate impulsivity in light of current status and future prospects, psychosocial trauma during childhood, which can be seen as indexing difficult life circumstances, is associated with reduced serotonergic activity and enhanced impulsivity (Pine *et al.*, 1996; Lewis, 1985; Allgulander & Nilsson, 2000; Harano, Peck & McBride, 1975; Virkkunen *et al.*, 1996). A number of stigmatists are reported to have experienced early trauma, and a significant proportion of all stigmatists demonstrated propensities towards dissociation, self-mutilation, and severe dietary constriction (including vomiting) independent of fasting *in advance of* manifesting stigmata (Whitlock & Hynes, 1978; Wilson, 1988; Harrison, 1994). Hence, it appears that the path to developing the full-blown suite of traits found in stigmatists is likely one that begins with a genetic predisposition that is then augmented by life events. However, the total number of stigmatists is almost certainly tiny compared to the number of individuals who share their symptoms but not their symbolism. Reported cases of stigmatism are overwhelmingly concentrated in the Catholic countries of western Europe, with the majority located in Italy (Harrison, 1994). Moreover, the details of the stigmata reflect the artistic renderings of Christ popular at the time (Whitlock & Hynes, 1978). Clearly, becoming a stigmatist is importantly contingent on the presence of preexisting cultural schemas regarding the meanings of fasting, visions, and wounds.

In a Muslim village in Bengkulu, Southwestern Sumatra, studied ethnographically, most adults fasted from sunrise to sunset for one month each year (Fessler, 1995). Fasters were motivated, in an experience-distant fashion, by religious concepts of obligation and the accumulation of merit. More immediately, fasters acquired the experience-near rewards of obtaining social approval, avoiding social disapproval, and enjoying a sense of communitas during fast-breaking. Nevertheless, for most people, fasting did not come easily. As Ramadan approached, much discussion revolved around the pain and fatigue which was to ensue, and the difficulty of controlling the urge to eat. In a cultural environment such as this, those rare individuals who exhibit a strong propensity to fast are praised rather than (to use the common form of the term) stigmatized. Similarly, culturally-constituted notions of the meaning of self-denial in historical Catholicism presented a meaningful and rewarding context for individuals who possessed a propensity for dietary constriction (Bell, 1985). More generally, many cultures provide recognizable statuses for individuals whose psychological propensities place them at the extreme end of a population distribution (James, 1902; cf. Banks, 1992; Tait, 1993; Huline-Dickens, 2000).

The salience of open wounds in depictions of Christ beginning in the 13th century (Yarom, 1992) provided a ready meaning system that likely shaped the experiences, actions, and accounts of devout Catholics having a psychological predisposition to dietary constriction and attendant dissociation and self-mutilation. However, the secular societies of modern nation-states have largely abandoned past belief systems that sanctioned such atypical subjective experience (Banks, 1996). Today, a dissociative self-mutilating anorexic is pitied rather than held in awe, hospitalized rather than beatified. This raises the question of the universality, or lack thereof, of criteria for determining mental health (cf. Mezzich *et al.*, 1999; Spiro, 2001).

An evolutionary approach suggests that mental health might usefully be defined in terms of propensities that, if expressed in the types of socio-ecological environments in which humans existed for most of our species' history, would have enhanced biological fitness (Daly and Wilson, 1988:80; Wakefield, 1992). From this perspective, self-starvation, dissociation, and self-mutilation, having always constituted maladaptive extreme versions and/or misfirings of evolved mechanisms, would be classed as pathological. It is important to note, however, that, rather than cleanly dichotomizing wellness and pathology, such an evolutionary approach to mental health generates a spectrum between two poles. For example, by this definition, lavishing care and affection on a pet would also be considered pathological (cf. Archer, 1997), albeit to a far milder degree. Conversely, heritable sociopathy, which may have resulted from frequency-dependent selection over the course of human evolution (Mealey, 1995), would have to be defined as healthy. As these examples suggest, while evolutionary perspectives may usefully inform our conception of mental health, it is likely that any satisfactory criteria will necessarily also take account of cultural factors, including cultural constructions of meaning and morality, however parochial and transient these may be (cf. Wakefield, 1992).

Notes

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1. The centrality of altered states of consciousness in cases of stigmatism is so pervasive as to lead the Catholic Encyclopedia to ask “Why should God never grant the stigmata to persons who contemplate the Passion of Christ with all the intensity of mystical life but without ecstasy?” (quoted in Copelan, 1975:86).

2. For an earlier attempt to relate the gender distribution of altered states of consciousness to dietary factors (but *not* gross dietary constriction -- Kehoe, 1983), see Kehoe and Giletti (1981); see Bourguignon, Bellisari and McCabe, (1983) for criticisms.

3. As Lester (1995:214-216) makes clear, because issues of self-perceived body form are a component in the diagnostic criteria for anorexia nervosa, this category is necessarily restricted to a particular cultural context; in contrast, extreme voluntary dietary constriction and food rejection are behavioral patterns that may be associated with a wide range of meaning systems.

4. Given the many parallels between food and sex (cf. Emanatian, 1996), additional evidence for this perspective is provided by the finding that restrictive anorexics are often disgusted by the prospect of sexual relations (King, 1963; Buvat-Herbaut *et al.*, 1983), a pattern that was also evident among Medieval ascetic women (Lester, 1995).

5. Intriguingly, three subjects in the Minnesota experiment suffered paresthesias (localized burning or tingling sensations; Schiele and Brozek, 1948), and the same symptoms occur in psychogenic purpura (Ratnoff, 1989).

6. Uncontrollable binge eating occurs in approximately 30% of restricting anorexics (Strober, Freeman & Morrell, 1999). It is therefore of related interest that a number of female ‘miraculous fasters’ of the Middle Ages, including at least one stigmatist, apparently engaged in binge eating during dissociated states (see Bynum, 1984).

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