

Psychophysiological Aspects of Multiple Personality Disorder

A Review

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ABSTRACT

Multiple personality disorder has been associated with marked psychophysiological alterations ever since careful clinical observations have been made on this perplexing disorder. Physical symptoms known to be associated with multiple personality include headaches, conversion symptoms, changes in voice, seizure-like activity, unexplained pain or insensitivity to pain, alterations in handedness or handwriting style, palpitations, alterations in respiration, gastrointestinal disturbances including bulimia and anorexia, menstrual irregularities, sexual dysfunction, and dermatological conditions including unusual allergic responses and differential responses to medication. Early scientific studies on the galvanic skin response in multiple personality disorder were conducted by Prince in the early twentieth century. Since 1970 there has been a resurgence of interest in multiple personality disorder including sophisticated studies of physical symptoms, brain-wave activity, visual evoked potential, regional cerebral blood flow, visual refraction, muscle activity, cardiac and respiratory activity, galvanic skin response, and the switch process. In addition to describing these studies, the etiology of multiple personality disorder and future directions in research will be discussed.

Marked psychophysiological alterations are frequently described in patients with multiple personality disorder (MPD). The changes that occur across the alternate personalities are most notable. These changes have been reported almost from the beginning of the literature on MPD. For example, in 1811 Mary Reynolds, one of the earliest cases of multiple personality in the United States, suffered from blindness and deafness in her alter personality (Mitchell, 1888). In the French literature; Despine's patient, Estelle, appeared to suffer a paralysis (Despine, 1840).

Dr. Morton Prince, a neurologist, was the first scientist to study MPD beyond merely providing a good clinical description. He and a psychiatrist colleague, Dr. Frederick Peterson, were the first to study the galvanic skin response in MPD (Prince & Peterson, 1908). No further studies were undertaken until Morselli (1953) and Thigpen and Cleckley (1954) reported electroencephalographic differences between personalities in separate cases of MPD. Not until 1972 did Ludwig, Brandsma, Wilbur, Bendfeldt, and Jameson, perform a comprehensive scientific study of a patient with MPD. Their research included comprehensive electroencephalography, visual evoked responses, galvanic skin response, and numerous other psychophysiological tests.

In 1984 Putnam observed that the psychophysiological investigation of MPD was still in its infancy (1984a). Now, thanks to the efforts of Putnam and others, the scientific investigation of the various psychophysiological manifestations of MPD is enjoying a robust childhood. To date, studies have been conducted to investigate

changes across personalities in virtually every organ system of the body. A variety of sophisticated techniques, including electroencephalography, visual evoked responses, galvanic skin responses, electromyography, regional cerebral blood flow, voice spectral analysis, brain electrical activity mapping, and electrocardiography have been used in the quest to better characterize and further understand MPD. This paper will attempt to summarize the major findings from these studies, offer observations upon its etiology, and suggest directions for future research. Major findings will be grouped below according to organ system.

In an attempt to keep the reader abreast of the most current developments in this rapidly changing scientific field, the references cited include those which appear as abstracts in conference proceedings. Some of the studies cited here are admittedly anecdotal in nature and must await further rigorous replication before their findings may be regarded as established. In the interests of comprehensiveness, all scientific source material available to the author as of the time of this writing has been acknowledged.

NEUROMUSCULAR SYSTEM

Headaches

One of the most common physical symptoms in MPD is severe headache. In studies reporting 20 (Coons and Milstein, 1986), 70 (Bliss, 1984), and 100 (Putnam, Guroff, Silberman, Barban, & Post, 1986) MPD patients, headaches were reported to occur in 50-60 percent. Recently Packard and Brown (1986) described a 24-year-

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old woman whose seven personalities had a variety of headache types. Most headaches in MPD are tension, vascular, or a combination of both. These headaches usually are worse during personality changes.

Voice

Changes in voice quality in MPD patients have long been recognized (Rosse, 1892; Schreiber, 1973; Coons, 1980). Studies to characterize these voice changes further using voice spectral analysis are currently underway (Putnam, 1984a).

Conversion

Conversion symptoms also occur quite commonly, in about 40 percent of MPD patients in several large series (Bliss, 1980, 1984; Coons & Milstein, 1986; Putnam et al., 1986). These symptoms can be quite varied and include blindness, deafness, aphonia, anaesthesia, and paralysis (Taylor & Martin, 1944). Generally conversion symptoms occur briefly in the course of illness during a period of intense emotional distress. Personalities with particular conversion symptoms are well known.

Vision

In addition to conversion symptoms, the eyes may experience other changes both between personalities and with integration. Shepard and Braun (1985) monitored refraction, visual acuity, ocular tension, keratometry, color vision, and visual fields in MPD patients and found changes in these measures among patient's personalities both before and after integration. Some of these findings were replicated by Morgan, Hales and Miller (1986) when they used a matched control group of MPD simulators. Finally, a single patient with MPD was reported to have microstrabismus which varied in its frequency of occurrence among her three personalities (Condon, Ogston, & Paoe, 1969).

Pain

A number of early reports described insensitivity to pain in alter personalities of MPD patients (Wilson, 1903; Taylor & Martin, 1944). More recently Bliss (1984) reported body anaesthesia in 32-38 percent of 70 MPD patients while Putnam et al. (1986) reported a 25 percent incidence of paresthesias and analgesias in a group of 100 MPD patients.

Seizure Disorders

Several studies have noted an association of MPD with epilepsy (Mesulam, 1981; Schenk & Bear, 1981; Drake, 1986; Bensen, Miller, & Signer, 1986). However, the first two studies were seriously flawed because most of the patients did not meet the DSM-III criteria for MPD (Coons, 1984). Bensen, Miller and Signer (1986) described two patients who exhibited personality changes after seizures with the preictal and postictal states experiencing amnesia for each other, but neither patient met the DSM-III criteria for MPD as non of the personalities were "complex and integrated" with their "own

unique behavior patterns and social relationships" (American Psychiatric Association, 1980). Drake (1986) described a series of 15 patients with MPD, five of whom had seizure disorders. Four of these patients, however, only had two "personalities," a preictal state and postictal state, and like the Bensen patients probably do not meet DSM-III criteria for MPD. It should be noted here that most of the cases cited above also do not meet the new DSM-III-R criteria for MPD (American Psychiatric Association, 1987).

Coons, Bowman, and Milstein (1987) found a 14 percent incidence of psychogenic seizures and a 10 percent incidence of organic seizures in a series of 50 consecutive MPD patients (three patients had grand mal epilepsy and two patients had temporal lobe epilepsy). They concluded that dissociation in MPD is unlikely to be a manifestation of chronic limbic epilepsy or an interictal phenomenon of temporal lobe epilepsy as has been suggested (Mesulam, 1981; Schenk & Bear, 1981). Putnam (personal communication, 1987) confirms that epilepsy does occur in a small percentage of MPD patients. It should be apparent from the foregoing discussion that some ictal and interictal phenomena can mimic dissociation and depersonalization seen in MPD.

Neurophysiologic Measures of Nerve and Muscle Activity

Electroencephalography. Until just recently electroencephalograms (EEGs) tracings of the brain's electrical activity, of MPD patients only have been reported on single cases. Instances of both normal (Lipton, 1943; Thigpen & Cleckley, 1954; Ludwig, et al., 1972; Larmore, Ludwig, & Cain, 1977; Bliss, 1980; Salama, 1980; Coryell, 1983) and abnormal (Horton & Miller, 1972; Cutler & Reed, 1975; Pohl, 1977; Brende & Rinsley, 1981; Coons, Milstein, & Marley, 1982; Braun, 1983b) EEGs have been reported.

A number of case reports and studies have compared EEGs across personalities and have noted that EEG differences occur predominately in alpha rhythm (Thompson, Forbes, & Bolles, 1933; Thigpen & Cleckley, 1954; Ludwig et al, 1972; Larmore 1977; Cocores, Bender, & McBride, 1984). Most of these investigators have concluded that these differences in alpha rhythm probably reflect the degree of arousal and tension across different personality states. Except for muscle and movement artefact, Coons, Milstein, and Marley (1982) found no EEG differences across personalities in two MPD patients and one simulating control. However, frequency analysis revealed significant changes in the relative EEG amplitudes at different frequencies for both the MPD patients and control, with the control subject showing more significant differences than the MPD patients. These investigators proposed that these differences probably reflected changes in intensity of concentration, mood, and degree of alertness.

Electromyography. Thus far, only one study (Larmore et al., 1977) has been conducted using the

electromyogram (EMG), an instrument used to measure the electrical activity of the muscle. Although the investigators noted changes in EMG recordings among personalities, they used no control subjects and were unable to draw any definite conclusions.

Visual Evoked Potentials. Ludwig et al. (1972) were the first to study visual evoked potentials (VERs), a complex electrical measurement of the brain's response to light stimulation. In their MPD patient two personalities had prominent and similar VERs, a third personality had none, and a fourth personality had only a small potential. In similar studies Larmore, et al. (1977) and Pitblado and Densen-Gerber (1986) reported differences in VERs in their single MPD patients. Braun (1983a) found differences in VERs in the personalities of two MPD patients. After unification, the patients' post-integration VERs were different from any of their pre-integration VERs.

In the most comprehensive study of VERs in MPD to date Putnam (1984a) found that the VER differences among the personalities of 10 MPD patients were significantly greater than the differences among the simulated personalities of 10 normal matched controls. Putnam holds that definitive interpretation of these VER findings must await further research. The possibility exists, however, that if these findings can be replicated and understood, the VER might be used to distinguish between MPD patients and non-MPD patients. This might be especially useful in ruling out malingering or factitious disorder.

Regional Cerebral Blood Flow. Several studies have been conducted in MPD patients using regional cerebral blood flow (rCBF) techniques (Lefkoff et al., 1984; DeVito, Braun, Karesh, Henkin, & Caniga, 1985; Mathew, Jack, & West, 1985). The rCBF is a research technique involving the inhalation of Xenon-133 gas followed by the measurement of its arrival and elimination through the use of computerized radiation detectors. The change in amount of radiation detected is proportional to rCBF (Rosse, Owen, & Morihisa, 1987). Preliminary results from the DeVito et al. (1985) study indicate that rCBF patterns among presenting personalities are abnormal and that these patterns may vary among personalities in the same individual. In the Mathew et al. (1985) study rCBF was measured in two personalities of an MPD patient and in three control subjects. Personality change in the subject was accompanied by right temporal hyperperfusion. Although it is tempting to make the interpretation that the activity in the Mathew et al. study may be related to the resurgence of affect-laden memories, this would be premature. These results are based on only a single measurement; any inferences drawn must be regarded as speculative. These initial small studies must be repeated with the use of more patients, multiple trials, and the use of appropriate control subjects.

Brain Electrical Activity Mapping. Studies using

brain electrical activity mapping (BEAM), a research technique in which computerized topographic maps are made of brain electrical activity (Duffy, F.H., Burchfiel, J.L., & Lombrosco, C.T., 1979) are in progress (Lefkoff et al., 1984; Putnam, 1984) but none have been published.

Switch Process

The switching from one personality to another in MPD usually occurs rapidly in about five seconds (Putnam, 1985; Coons et al., 1987), and may be accompanied by eyelid fluttering, and/or twitching of facial muscles or other body parts such as the extremities. In one patient observed by the author, the presenting personality perspired heavily in a rather warm room, but an alter personality was insensitive to heat and did not. A small number of multiples switch almost instantaneously and an equally small number take an inordinately long period of time (minutes to hours) to switch. Sometimes the patient is immobile, as if in a trance-like state, during the switch process. Putnam (1985) has recently monitored the switch process using slow-motion video tape technique while recording GSR, pulse, respiration, and skin temperature. Quite recently Putnam (1988) has offered a scholarly review of the switch process, with particular emphasis upon its importance in MPD.

Changes in Handedness and Handwriting

Changes in handwriting between personalities have been noted for decades (Taylor & Martin, 1944; Thigpen & Cleckley, 1954). Coons (1980) reported one patient who had at least 10 different handwriting scripts among her 24 personalities. Change in handedness has likewise been reported (Taylor & Martin, 1944; Smith & Sager, 1971). Putnam et al. (1986) reported this change to occur in at least 37 percent of 100 MPD patients.

CARDIOVASCULAR SYSTEM

Palpitations and Heart rate

Heart palpitations related to anxiety were found in 30 percent (Putnam et al., 1986) of 100 MPD patients. Bahnson and Smith (1985) reported that their patient showed both bradycardia and tachycardia during the switching process.

Blood Pressure

Larmore et al. (1977) reported slight and probably insignificant changes in blood pressure among personalities in an MPD patient.

RESPIRATORY SYSTEM

Thus far, Bahnson and Smith (1975) have been the only investigators to monitor respiration in MPD. They found that dramatic respiratory pauses of up to two minutes duration accompanied switching of personali-

ties in an MPD patient. The author has never witnessed this phenomenon, but he has observed a quickening of respiratory rate in certain alters when those alters are talking about affect-laden material.

GASTROINTESTINAL SYSTEM

Bliss (1980) reported the occurrence of a number of gastrointestinal symptoms in 14 MPD patients. These included stomach upsets (91%), severe nausea without pregnancy (73%), abdominal pain (91%), and severe constipation (73%). Putnam et al (1986), reported a somewhat lower incidence of gastrointestinal symptoms in a series of 100 MPD patients, including gastrointestinal disturbances (35 percent) and nausea and vomiting (30%). Recently Torem (1986) found several patients with eating disorders whose binging/purging/starving behavior was carried out by other dissociated ego states. Putnam et al. (1986) found anorexic symptoms (25%) and bulimic symptoms (15%) in their group of 100 MPD patients.

GENITOURINARY SYSTEM

Bliss (1980) found a wide variety of genitourinary symptoms in his series of 14 MPD patients, including burning genital pain (55%), urinary retention (27%), painful (36%) or irregular (64%) menses, sexual displeasure (55%), and dyspareunia (18%). Of these symptoms the burning genital pain, irregular menses, and sexual displeasure were the only symptoms which were found significantly more commonly among MPD patients than within the control group. Coons and Milstein (1986) found symptoms of psychosexual dysfunction in 55 percent of 20 patients with MPD. These included inhibited sexual desire (N=6), promiscuity (N=5), functional dyspareunia (N=2), and inhibited female orgasm (N=2). Symptoms of psychosexual dysfunction were found more commonly among patients with MPD than among a matched control group. In addition, a positive association was found between prior sexual abuse and subsequent psychosexual disturbance, but fell short of achieving statistical significance. Labott, Leavitt, and Braun (1986) have studied sexual experiences in MPD using a sexual experiences inventory.

SKIN

Dermatological Conditions and Stigmata

Shelly (1981) was the first to report on dermatological manifestations of MPD. In his 28-year-old female patient an alter personality induced a factitial dermatitis on her arm with poison ivy. In one of his patients Braun (1983b) noted a factitial dermatitis which was induced by the scratching of an alter personality. Another of his patients developed a puritic rash on her face and hands which was associated with discussing sexual abuse by

her mother. A third patient developed an outbreak of red dots on her skin when discussing being tortured with burning cigarettes.

Densen-Gerber (1986) reported on two patients who exhibited dermatological stigmata similar to Braun's third patient. The first patient would develop symbolic needle track marks when she would switch to a drug-addicted personality. The second would develop welts and marks on his back and legs when undergoing flashbacks of physical beatings.

Self-mutilation

Although self-mutilation is not a psychophysiological symptom, it will be discussed here because it may be confused with the aforementioned dermatological conditions. Bliss (1980) was among the first to report on self-mutilation in MPD. Of 14 female patients, three had alters who engaged in self-mutilation without experiencing pain. The first patient had cut herself and broken bones in acting out her angry impulses towards her stepfather and another personality. The second patient had an alter who hit herself with her fist producing bruises which were mistakenly thought to be due to autoerythrocyte sensitization. The third patient tried to self-induce an abortion with a sharp stick, resulting in profuse bleeding.

Coons, Bowman and Milstein (1987) reported that 34 percent of 50 MPD patients engaged in self-mutilation. In a somewhat larger study of 65 patients with MPD and other dissociative disorders Coons and Jani (1987) reported that 39 percent of MPD patients engaged in self-mutilation. Examples of self-mutilation included the cutting of extremities or genitals with sharp instruments, bruising with fists or other objects, and burning with cigarettes or lighters. In most of these patients the self-mutilation was accompanied by an absence of pain.

Galvanic Skin Resoonse

Although the galvanic skin response (GSR) is under the control of the autonomic nervous system, it is being reported here because it is a measurement of skin electrical conductivity. As previously mentioned, Prince and Peterson (1908) were the first to measure GSR in MPD. They measured GSR in response to emotion-laden words across three personalities in their patients, obtained different reactions among the personalities and concluded that the reactions of their patient confirmed that their patient's amnesia was not only genuinely based on unconscious processes, but was directional in nature. In a similar study 64 years later Ludwig et al. (1972) found personality-specific GSR responses for emotion-laden words in an MPD patient. Bahnson and Smith (1975) demonstrated a drop in skin potential during the transition between personalities in their patient. Larmore et al. (1977) reported GSR changes in their patient, which they attributed to habituation to a change in room temperature. Finally Brende (1984) noted changes in skin conductance during transitions between personality states in his patient. These changes

in skin conductance were sometimes unilateral, and sometimes accompanied affect-laden material. In other words, alterations in skin conductances occurred both with personality switches and sometimes even with presentation of affect-laden material when no personality switching had occurred.

OTHER PSYCHOPHYSIOLOGIC REACTIONS

Allergies

Braun (1983b) reported two patients who experienced allergic responses to citrus juice and cats respectively in some personalities but not others. A third patient's sensitivity to smoke resolved after she had worked through the issues surrounding abuse by her father, a heavy smoker. Putnam et al. (1986) found that 26 percent of 100 MPD patients exhibited a differential allergic response across personality states.

Differential response to medication

Numerous clinicians have made anecdotal reports of differential response to medication across different personalities (Putnam, 1984a; Kluft, 1984; Barkin, Braun, and Kluft, 1986; Kluft, 1987). These medications include anxiolytics, sedative-hypnotics, antidepressants, antipsychotics, and narcotic pain medication. This same phenomenon has been seen with alcohol and other substances of abuse. Putnam et al. (1986) found that 46 percent of 100 MPD patients responded differentially to medication and 35 percent responded differentially to food. Thus far, no studies have investigated this phenomenon across personalities in a cohort of MPD patients in a rigorous and controlled matter.

DISCUSSION

This review of the psychophysiologic aspects of MPD provides further confirmation of the polysymptomatic nature of MPD (Bliss, 1980; Putnam et al., 1986; Kluft, 1987). The existence of a polysymptomatic picture or the occurrence of changing psychophysiologic symptoms and measures over time in a undiagnosed patient should suggest to the clinician the possibility of MPD as a diagnosis.

This review also suggests some possible mechanisms underlying the occurrence of a wide variety of functions underlying learning and memory.

markedly differing psychophysiologic responses in MD. Bliss (1980), Kluft (1982), and Braun (1983b) have commented about the similarities of many aspects of MPD to the phenomena of hypnosis. Braun suggests that the psychophysiologic phenomena seen in MPD have also been observed in patients without MPD, both with and without hypnosis. Many of these psychophysiologic phenomena such as anaesthesia, paralysis, pain, seizure-like activity, and alterations in vision, hearing and voice have been observed in patients with conversion disorder. Bliss (1980) feels that MPD is actually a form of self-hypnosis. Other phenomena such as palpitations, respiratory changes, gastrointestinal upsets, menstrual irregularities, etc. are manifestations of anxiety. Thus, it appears that MPD is not only a polysymptomatic disorder, but that a wide variety of defense mechanisms may underlie the production of these symptoms. These include conversion, somatization, hypochondriasis, and acting-out as well as denial, repression, regression, dissociation, identification, and fantasy (Bliss, 1980; Coons, 1980; Berman, 1981). It has already been well-established that these defensive reactions occur in response to overwhelming childhood trauma, particularly child abuse (Putnam et al., 1986; Kluft, 1987; Coons et al., 1987).

Putnam (1984a, b) has already made numerous suggestions about future directions for research. There is a need for more studies with matched control groups to distinguish differences across personalities from differences due to changes in arousal, tension, or artefact. These control groups could include normals, patients with other mental disorders, simulators, and those under hypnotic trance. Furthermore it would be advisable to include control groups with different degrees of hypnotizability, to enable distinctions to be drawn between the phenomena of high hypnotizability per se and those of MPD (Kluft, personal communication, December 27, 1987). In addition, study designs are necessary that can make use of multiple psychophysiological measurements in multiple trials. Furthermore, the use of polycenter approaches will enable investigators to study enough MPD patients to generate sufficient data to permit the application of sophisticated statistical methodologies. Research into the phenomena of MPD may illuminate far more than the mechanisms underlying dissociation. They may offer insights that clarify the mechanisms underlying functional somatic illnesses, and provide new understandings of the processes and

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