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Has Behavioral Science Tumbled Through the Biological Looking Glass? Will Brief, Evidence-Based Training Return It From the Rabbit Hole?

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HAS BEHAVIORAL SCIENCE TUMBLED THROUGH THE BIOLOGICAL LOOKING GLASS? WILL BRIEF, EVIDENCE-BASED TRAINING RETURN IT FROM THE RABBIT HOLE?

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ABSTRACT: Time constraints and professional demands leave practicing professionals unlikely to enroll in extended training such as a semester-long graduate course. Thus, the three-hour continuing education format has become a standard for those in practice. One may ask what sorts of training strategies optimize that format. To explore that, a three-hour training program for seventy-six practicing mental health professionals, most of whom self-identified as psychologists, was devised. It made use of primarily antecedent techniques that have been shown to bring about changed perceptions on a number of topics. Content focused on two areas of importance to behavior analysts, the culture's increasing acceptance of the biological causation model of disorders such as attention-deficit hyperactivity disorder (ADHD), unipolar depression, anxiety disorders, and schizophrenia, and the field's increasing reliance on medications, often to the exclusion of behavioral methods. Pre-post assessment showed that participants had changed their thinking regarding the two content areas. The authors caution that participants' changed opinions may serve as setting events to changes in practice, but those changes are verbal. One must not assume changes in practice techniques will automatically occur.
KEYWORDS: brief training, continuing education, biological causation, biological psychiatry, pharmaceutical industry

The shaping of opinions is of interest to those in both the behavioral sciences and clinical practice. What factors are involved when a professional's opinion is changed regarding an important issue within the field? This study was an effort to explore that question by looking at professionals' opinions regarding the causes of disorders and the factors that may change their thinking, within the context of what is arguably the most common format for ongoing training, a three-hour continuing education program. A timely topic was selected as content—the

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mental health field's increasing turn to biological explanations, and the co-occurring rise of psychotropic medications as the treatment of choice. Some background on those issues is helpful.

A Changed Cultural Worldview

Clearly, a number of disorders such as dementias, Down's syndrome, and disorders attributable to brain tumors, intracranial infection, and toxins are biologically caused. In contrast, the causes of other disorders, such as the majority of cases of depression, anxiety, attention-deficit hyperactivity disorder (ADHD) and schizophrenia often are unknown and likely vary from patient to patient. Adding to the difficulty in teasing out causes of the latter disorders is that some of them may be said to be the result of learning histories that act upon biological predispositions.

It has been suggested that matters such as guild protectionism and economics have driven a preference for biological explanations of behavioral disorders in recent decades, and that both the professional and public communities are willing to endorse the biological model at levels of confidence that go well beyond the data (Terry & Kohlenberg, 2006; Valenstein, 1998; Winston, 2006; Wong, 2006a; Wong, 2006b; Wong, 2007; Wyatt, 2003; Wyatt, 2006; Wyatt & Midkiff, 2006a; Wyatt & Midkiff, 2006b; Wyatt & Midkiff, 2007). Many years ago, Skinner had observed the beginnings of this phenomenon when he coined the term "conceptual nervous system," to point out that human biology had become a convenient "dumping ground" where the cause of any unexplained abnormal behavior is hypothesized to lie (Skinner, 1974, pp. 48-49).

The biological worldview of common disorders such as depression and anxiety has strengthened in recent years, despite opinions that there exists relatively modest evidence to directly support it, at least for many cases of such disorders (Antonuccio, Danton, DeNelsky, Greenberg & Gordon, 1999; Wyatt, 2003; Wyatt & Midkiff, 2006). Additionally, behaviors perhaps best thought of as natural reactions are now, at times, erroneously conceptualized as biological disorders (Horowitz & Wakefield, 2007). Moreover, it is clear that learning theory provides a plausible basis for the etiology and maintenance of many problems in functioning such as anxiety disorders and most child conduct problems (Mineka & Zinbarg, 2006) as well as for many cases of depression (Seligman, 1975; Abramson, Metalsky & Alloy, 1989) and other disorders. A more complete discussion of the debate may be found in special issues of *Behavior and Social Issues* (Special Issue: Mental Illness, Mental Health, and Cultural Analytic Science, 2006; Special Section: Behavior Analysis, Biological Determinism, and Biological Psychiatry, 2007).

Increasing medicalization of behavioral disorders may impede implementation of non-drug treatment. A new patient may come to therapy already convinced by advertising or the family doctor that his problems are genetic or chemical in nature, regardless of whether there is evidence to support that notion. The culture's resulting preference for medications over other therapies is illustrated by recent studies. When parents were given a prescription for a drug and then told to also enroll their ADHD children in behavioral intervention programs, only twenty-five percent did so. In contrast, when parents were told by their doctors to first try behavioral interventions, ninety-five percent did so (Pelham, 2009). A 2001 to 2003 study of over 80,000 adults and 5,000 children by managed care tracker Medco Health Solutions found that in the three months following initial prescription of an antidepressant, more than three quarters of the adults and over half of the children had not had a mental health visit (Stettin, Yao, Verbrugge, & Aubert, 2006).

In this atmosphere it is probable that, for many mental health professionals, there exist gaps between their acceptance of biological causation and the state of the research. A brief, data-based training program might bring about changes in their thinking. Because active professionals typically receive training in half-day or full-day continuing education programs, it is helpful to work within such time frames. However, research-based training of well-functioning individuals has typically targeted university students, parents of children with behavioral problems and caregivers for those with disabilities, rather than mental health professionals. Evidently little or no research has been conducted regarding world-view change among practicing mental health professionals.

Such professionals should be knowledgeable regarding a number of thorny issues. These include psychiatry's shift to biological formulations of disorders, interpretation conundrums within family/genetic and brain function studies, disputed drug study methodology and questionable pharmaceutical industry marketing tactics. (See the special issues that are referenced above.)

Training approaches

A great deal has been written about educational practices that best bring about changes in beliefs, attitudes and opinions (e.g., Allen & Preiss, 1998; Cialdini, 2001; Dillard & Pfau, 2002; Perloff, 1993). The great majority of such studies have targeted individuals other than the mental health practitioners. For the most part, the literature has focused upon changing beliefs concerning political matters, consumer products and guilt or innocence of defendants in criminal and civil cases. There exists some behavioral literature on training well-functioning adults. However, it often involves parent training or training

caregivers for the disabled, or it has focused on changing the classroom performance of university students over the course of a full academic semester (e.g., Ryan & Hemmes, 2005; Saville, Zinn, Neef, Van Norman, & Ferreri, 2006). An EBSCO host search revealed no results for "attitude change" or "opinion change" when these terms were combined with any of the following: mental health, schizophrenia, depression, anxiety or ADHD. Additional search of the literature uncovered no other relevant sources.

Despite the lack of empirical evidence relative to the mental health field and attitude change, some fairly consistent findings have emerged regarding a number of variables that are thought to be influential in changing beliefs of listeners. For example, physical attractiveness of the speaker tends to exert a positive influence on message acceptance (e.g., Cialdini, 2001; Haughtvedt, 1997; Perloff, 1993). Similarly, perceived prestige of the speaker tends to enhance attitude change (Aronson & Golden, 1962; Berlo, Lemest, & Martin, 1969; Eagly, Wood, & Chaiken, 1978; Haughtvedt, 1997).

A speaker's verbal presentation style has impact upon the listener's adoption of the speaker's position. That is, a speaker's verbal speed, intensity, choice of words and the like will influence the resulting level of agreement with the speaker's position (Perloff, 1993). A review of the influence of verbal style revealed several factors that any speaker would do well to practice. An extensive vocabulary is beneficial; use of declaratives, as opposed to questions, results in greater attitude change; employment of empty adjectives ("cute," "sweet") degrades message acceptance as does being overly polite. The use of hedges ("I guess," "kinda," "you know") and intensives ("very" and other superlatives) tends to hamper message acceptance, while use of powerful language ("it is," and "no doubt") adds credibility (Burrell & Koper,1998).

Although historically audiences were thought to be passive, taking in whatever message was brought to them, that conceptualization has changed. In the past audiences were thought of as infused with information, much like a person is injected with medicine by means of a hypodermic syringe. In more recent years the theoretical position that audiences actively process information has taken root (Perloff, 1993). It is said that listeners may do this in either of two styles, systemic or heuristic, the latter also known as the elaboration likelihood model—ELM (e.g., Booth-Butterfield, 2005; Petty & Cacioppo, 1986). When a listener is responding systemically, he or she is actively involved, is alert, is attending to details and is weighing the content that is being presented. In contrast, when a listener is responding heuristically, he or she is more influenced by superficial variables such as physical attractiveness and verbal style. Although research continues along systemic/heuristic lines, it is clear from the host of

variables described above, that the interplay of listener style, speaker style and content is an area that has much to offer researchers in the field.

Where the biological causation model of mental disorders is concerned, any effort to realign the attitudes and beliefs of mental health professionals with the state of research would do well to give consideration to the antecedent variables described above. Additionally, when one considers the training and experience of front-line treating professionals, it is reasonable to assume that empirical data would have significant impact in any presentation that is designed to change their thinking. While heuristic factors should have some relevance for such an audience, one would hypothesize that systemic factors, such as research data, may well exert an even more powerful influence. That is because most mental health practitioners (psychologists, counselors, clinical social workers, etc.) have training histories in which research was emphasized, at least to some extent.

Heuristic factors and non-empirical cultural phenomena, such as ubiquitous advertisements for medications, reach everyone including professionals. Nevertheless, the role of empirical data in changing thinking ought to be particularly important to practitioners whose training has placed emphasis upon research. As well, the literature supports the notion that evidence enhances changes in thinking (Perloff, 1993; Reinard, 1988).

It is possible, however, that evidence may be misperceived, or may not be "evidence" at all. For example, when pseudo-scientific messages are employed, particularly those that contain a great deal of scientific jargon, message persuasiveness is enhanced (Haard, Slater, & Long, 2004). That may explain why drug industry advertising is sufficiently persuasive that industry profits have mushroomed. Nevertheless, it is clear that research evidence is an important variable in the influence process. That should be particularly the case when the audience is trained to appreciate and utilize research, although one would still expect a professional audience to be influenced to some extent by heuristic variables.

Audiences tend to pay greater attention when the speaker's message has high relevance for them. For example, when students listened to a presentation about potential changes in comprehensive exams, the message had greater impact if the proposed changes would affect their exams, as opposed to exams of some future generation of students (Kerr, 2002). Similarity (e.g., age, sex) of presenter and audience also affects change in attitude, and that factor is most powerful if a similarity (e.g., profession) is relevant to the message presented (e.g., Perloff, 1993). Ultimately, it would seem, an audience of mental health practitioners would be influenced by research evidence, as the credibility enhancing effects of evidence seem consistent (O'Keefe, 1998; Reynolds & Reynolds, 2002).

Several specific factors tend to cause a data-based message to be favorably received. One factor appears to be the citation of sources (Fleshler, Ilardo, & Demoretcky, 1974; O'Keefe, 1998). The failure to cite relevant sources may result in changes in the opposite direction of that predicted by the speaker, and the outcome may be even worse if no supporting citations are cited to counter an opposing message that *is* supported (Reynolds & Reynolds, 2002). Thus, it is not surprising that pharmaceutical industry advertising frequently cites "doctors" and "researchers."

Whether anecdotes help or harm a speaker's efforts to bring about changed thinking within the audience may depend on several factors. Some research suggests that anecdotes may be as persuasive as statistical data when the audience is only moderately involved (Baesler, 1997). Other data indicate the superiority of data over anecdote (Allen & Preiss, 1997). Some research has suggested that statistical evidence is better at producing desired knowledge in the listener, while anecdotes result in greater affective change (Kopfman, Smith, Ah Yun, and Hodges, 1998). In training professionals it probably is wise to employ both statistical evidence and anecdote, with the preponderance going to statistical evidence, in any effort to bring about attitude/belief change.

Whether the listener finds the evidence to be valid may also depend upon his or her prior knowledge of the subject. Evidence is unlikely to have impact upon an audience that lacks prior information about the topic (Reynolds & Reynolds, 2002). Perhaps that is because an audience must perceive the evidence as legitimate, and it may be difficult for that to occur with a naïve audience. An audience must be able to follow a link from evidence evaluation to overall message evaluation, to a change in acceptance (Reynolds, 1986/1987).

Another factor known to influence a listener is the perception of bias in the presentation. At least a few statements that are at odds with the speaker's evident bias tend to result in greater credibility of the speaker (e.g., McCroskey, 1969). However, a speaker walks a fine line in that regard. Once a source is seen as invalid on one bit if information, his or her credibility may be weakened on other information (Schul & Mayo, 1999). Some research has shown that audience members whose initial position is in agreement with the speaker prefer statistical evidence, while those who oppose the position advanced by the speaker find anecdotal stories to be more persuasive (Slater & Rouner, 1996).

A look at the audience reactions to U.S. presidential candidates engaged in debates revealed that it is possible to present too much information. However, the authors acknowledged that such candidates are probably already expected to have a great deal of knowledge and to be quick to bring forth that knowledge.

Candidates likely had more credibility to lose than to gain, a fact which may have accounted for the effect in their study (Lavasseur & Dean, 1996).

Thus, the literature suggests that members of a relatively sophisticated audience, such as professional mental health practitioners who are unlikely to enroll in a full semester's academic course, would be most amenable to a change in their thinking during a brief training program under several specific conditions. The speaker should present material in a relatively fluent manner, using a "socially powerful" verbal style. The presentation should be primarily supported by data, with citations, and should minimize use of anecdotes. The message must be seen as highly relevant by the audience and some mention should be made of information that goes against the presenter's evident perspective. Finally, the presenter is careful to avoid data overkill.

Selection of Training Program Content: Rise of the Biological Model

A brief training program could well employ the techniques described above as it addresses issues of social importance. One such issue is the increasing tendency toward biological conceptualizations of common disorders and medications as the preferred treatment modality. Such training should be important to all practitioners, but might resonate particularly well with non-medical personnel. Of special interest is the extent to which non-medical practitioners accept various facets of the biological model as valid, and whether brief training would alter their thinking. Although it is not the purpose of this article to thoroughly review the topic here, as that is a task that surely would consume a number of articles, several of the more salient issues are presented below.

The gap between what is known about biological causation of common disorders and what is sometimes claimed may be illustrated by findings involving the neurotransmitter serotonin. Although a connection between serotonin and depression is frequently seen in pharmaceutical industry advertisements, such claims are at odds with the opinions of experts in the study of serotonin and mood (Lacasse & Leo, 2005). The absence of evidence caused Wayne Goodman, Chair of the Psychopharmacologic Advisory Committee of the U.S. Food and Drug Administration, to say that the chemical imbalance theory of depression is a "useful metaphor" but one which should not be employed when doctors talk to patients (Ross, 2008).

In contrast to the drug industry's marketing claims of the era, in the late 1990s and early 2000s many academic sources continued to employ substantial caution when the causes of common disorders were discussed, as several representative examples make clear. Chapter two of an extensive report (U. S.

Department of Health and Human Services, 1999) by then Surgeon General David Satcher began, "The precise causes of mental disorders are not known" (p. 49). Similarly, the *Introductory Textbook of Psychiatry* (Andreason & Black, 2001) stated, "Much of the current investigative research in psychiatry is directed toward the goal of identifying the pathophysiology and etiology of major mental illnesses, but this goal has been achieved for only a few disorders…" (p. 23). The *Textbook of Clinical Psychiatry* (Hales & Yodofsky, 2003) cautiously noted, "Although reliable criteria have been constructed for many psychiatric disorders, validation of the diagnostic categories as specific entities has not been established" (p. 43). At odds with those careful statements, the medical director of the American Psychiatric Association claimed publicly that the same three sources had provided powerful evidence in support of biological causation for the majority of disorders (MindFreedom, 2003).

A phenomenon driving the debate about causality is that the current treatment of choice for many common disorders is medication. When treating professionals and/or clients are convinced that the client's difficulties in functioning are mostly, or completely, biologically caused, they may be poorly motivated to undertake non-drug interventions such as those based on a functional analysis of environmental variables (Pelham, 2009; Stettin, Yao, Verbrugge, & Aubert, 2006). Skinner (1956) noted the difficulties that arise when behavior is viewed as evidence of an underlying sickness: "It is rare to find behavior dealt with as a subject matter in its own right. Instead, it is regarded as evidence for a mental life, which is then taken as the primary object of inquiry" (p.84). Replace "mental life" with "biological illness" and the contemporary status is relatively well described, at least for many individuals.

The history of the U.S. culture's turn to biological explanations is intriguing, with several identified factors involved. Between 1970 and 1980 the percentage of medical school graduates choosing psychiatry as a specialty had dropped by more than half, from 11% to 5%. Organized psychiatry then undertook efforts to recruit more medical school graduates into the field, and it did so, in part, by advocacy of the precept that psychiatry would need to become more "biological," and thus more scientific, if it was to regain lost esteem and influence (Nelson, 1982).

Also around that time a turf war between psychiatry and what psychiatry saw as "intruder" professions intensified psychiatry's efforts to become more medical. Clinical psychologists had initiated efforts to expand their scope of practice to include hospital admission privileges (APA Practitioner Focus, 1990), the right to be reimbursed by Medicare without supervision by a physician (Buie, 1989), and prescription privileges (Seaman, 1997). The fields became embroiled in disputes that at times generated visible hostility, and that have continued into the present

century (Fox, 2002). A biological worldview tended to buttress psychiatry by emphasizing its status as a medical profession.

The American Psychiatric Association's response to a recent challenge is of interest. The psychiatrists' guild responded to a challenge by a group of professionals and former patients who pressed the doctors' group to provide research evidence in support of biological causation of depression, anxiety and other commonly diagnosed disorders. The psychiatric organization's medical director supplied references to various samples of academic literature that, ironically, contained relatively weak empirical support for the organization's position, and instead made clear that the causes of most major disorders are unknown. When that was pointed out, the psychiatric organization released a position statement reasserting its faith in biological causation, but provided no supportive evidence (MindFreedom, 2003).

It has become common to learn of research said to support biological causation. However, much of this research has received insufficient critical scrutiny. Family studies that seemed to validate genetic contributions, such as studies of identical twins who were reared apart, have been plagued by methodological and interpretation difficulties. For example, recent examination of a table (Gottesman, 1991) that is commonly reproduced in textbooks and articles, and which shows elevated risk for schizophrenia based on genetic relatedness, has revealed that the table's pooled results may be parsimoniously explained by environmental factors (Joseph & Leo, 2006). Similarly, studies of brain structure and functioning, as are done on autopsy or by employment of PET (Positron Emission Tomography) and fMRI (functional Magnetic Resonance Imaging) scans, have provided vivid images of brain functioning accompanied by unwarranted conclusions that biological causes of disorders were on view.

The twin studies consistently find concordance rates above population baselines for most disorders and, thus, have consistently been interpreted to provide convincing evidence of at least partial genetic causation. However, seldom have twin researchers accounted for the environmental variables that might have brought about concordance rates for various disorders. For example, even when identical twins are separated soon after birth and reared apart, their environments' responses to their identical levels of physical attractiveness and ages at which they reach puberty are routinely ignored or downplayed in the literature. Both attractiveness and rate of development, which are identical for identical twins regardless of where they are raised, are known to be related to emotional and behavioral status. Further, adoption agencies often require that adoptive parents match the birth parents with regard to religion, socioeconomic station and urban/rural status, variables that also are associated with emotional

and behavioral development. Moreover, many sets of identical twins that were said to have been reared apart were actually reared in the same extended family, according to the twin researchers themselves. Thus, it is likely that identical twins reared "apart" may well have been reared in environments that responded to them quite similarly, and in ways known to influence behavioral status. Twin researchers have usually failed to account for such factors (Joseph & Leo, 2006; Midkiff & Wyatt, 2006; Wyatt, 1993; Wyatt, Posey, Welker, & Seamonds, 1984).

Similar to the issues that confound family and twin studies, research that looks at brain structure and functioning via fMRI, PET scans and autopsy may easily be misinterpreted. Often the findings are taken as evidence of causation when they serve only as evidence of correlation. Although researchers typically caution against making causal attributions, the vivid images of brain hot spots, oversized ventricles and the like are frequently seen in pharmaceutical industry advertising and are presented in ways that tend to reinforce the notion that brain events are causal. While at times that may be accurate, as with brain tumors, in most cases of depression, anxiety and other common disorders a causal connection between unusual brain structure/function and the disorder is cannot be shown.

Related to that, it would be quite surprising if, for example, an individual who is experiencing depression had no identifiable changes in brain activity or structure. A parsimonious explanation of depressive thoughts, feelings, overt behaviors and brain changes may be that the individual has recently experienced elevated stressful life circumstances. Alternatively, a person who has not undergone such experiences may be depressed because he or she has never learned adequate coping skills and is easily overwhelmed by routine levels of stress (Wyatt, 2003; Wyatt, 2006). In either event, the brain's structural and functional changes in response to environmental events, termed neuroplasticity, have long been documented yet typically de-emphasized in both drug advertisements and research reports (Valenstein, 1998).

Non-empirical events have reinforced the biological model. Quite visible among these are the financial interests and advertising practices of the pharmaceutical industry. Although recent years have witnessed increasing sales of psychotropic medications, a number of meta-analytic reviews have revealed that evidence for effectiveness of some medications is relatively weak, a surprising finding given the frequency with which medications are prescribed (Khan, Leventhal, Khan, & Brown, 2002; Sommers-Flanagan & Sommers-Flanagan, 1996). A meta-analysis of 19 double-blind studies of top-selling antidepressants showed that placebo effects accounted for approximately 75% of the patients' improvement. Moreover, the authors asserted that the remaining 25%

improvement could have been the result of an enhanced placebo response due to the side effects that patients experience when taking an active drug, or other factors (Kirsch & Saperstein, 1998; Kirsch & Weixel, 1988). Similarly, a review of 29 published and 11 unpublished studies found that the anti-depressant Paxil was better than placebo at improving symptoms of acute, moderate-to-severe major depression, but that Paxil's uncomfortable side effects caused such high discontinuation rates that the drug overall is "…not better than placebo…" (Lundberg, 2008).

Busy physicians who prescribe psychotropic medications may be unable to keep current on such research. One study revealed that forty percent of primary care physicians followed neither long-term medication follow-up guidelines nor guidelines for patients who were non-responsive to the medications (Hepner, Rowe, Rost, Hickey, Sherbourne, Ford, Meredith, & Rubenstein, 2007). Physicians are routinely targeted by drug makers' representatives. Sales pitches and perks to physicians have become so prevalent that a number of medical schools have begun to train students in ways to resist them (Caruso, 2006). Many doctors may routinely be misled and may then convey misinformation about causes of disorders to their patients.

Related to the above, drug study methodology has come under greater scrutiny in recent years. For example, methodological concerns regarding the placebo run-in or "washout" phase have received increasing attention (Leutcher, Cook, Witte, Morgan, & Abrams, 2002; Lydiard, Steiner, Burnham, & Gergel, 1998; Nierenberg et al., 1995; Londborg, Wolkow, Smith, DuBoff, England, Ferguson, Rosenthal, & Weise, 1998; Pohl, Wolkow, & Clary, 1998; Sommers-Flanagan & Sommers-Flanagan, 1996). A placebo washout phase takes place prior to the actual study. All potential subjects are given a one-to-three week clinical trial of a placebo. Potential subjects who respond favorably to the placebo are then *excluded* from further participation in the study. Then the remaining individuals become the study's subjects. They are divided into two groups (drug v. placebo). Results that suggest a drug effect tend, thus, to be inflated due to the intentional exclusion of many placebo responders from the subject pool. When studies using the washout methodology, as most studies do, are presented to professionals or the public, there is typically little attention to implications of the washout phase (Wyatt, 2003).

Potential over-generalization of drug treatment effects from research participants to the general population represents an additional thorny issue. Research subjects usually must meet stringent exclusion and inclusion criteria and, thus, are less than representative of the population of individuals with specific disorders (Khan, Leventhal, Khan, & Brown, 2002). For example,

patients are frequently excluded from studies of antidepressants if they: failed to respond to any previously prescribed antidepressant during the current episode; had another Axis I disorder; experienced any serious medical illness; presented with significant lab tests (CBC, urea nitrogen, creatinine, electrolytes, plasma glucose, liver function, thyroid, etc); were receiving anticoagulants; had a positive drug screen; reported suicidal ideation; ever received CBT or ECT; were pregnant or lactating; were women of childbearing potential who were not using contraceptives or if they had responded to placebo during the 2-3 week washout period (Nierenberg, McLean, Alpert, Worthington, Rosenbaum, & Fava, 1995; Zimmerman, Chelminski, & Posternak, 2004). Such exclusions are important and protective. However, they tend to limit generalization of the results.

At times, administrators of managed care programs have argued that psychotherapy is "enhancement, not treatment" (Valenstein, 1998). That view may be reflected in the fact that, until recent legislation, many health insurance plans paid 80 percent of the physician fee, but only 50 percent of the non-physician psychotherapist's usual fee. Several meta-analyses of studies involving thousands of patients have compared medication to non-medical therapies and have found that therapy is as effective as medication for treatment of depression in the short term, and more effective than medicine in the long term (Jacobson & Hollon, 1996; Hollon, 1996; Antonuccio, Danton, & DeNelsky, 1995). While such findings enlighten non-medical therapists, the results have yet to generate widespread enthusiasm among insurance providers who continue to push for biological treatment of presumed biological disorders.

Financial incentives for the drug industry have contributed to the upswing in use of psychotropic medicines over the past thirty years. Prescription of psychotropics increased 20% from 1985 to 1994 in the United States. During essentially the same period, prescriptions for stimulants tripled and those for mood elevators doubled to 20 million (Pincus, Tamielian, Marcus, Olfson, Zarin, & Thompson, 1998). In the widely read journal *Pediatrics* the number of full-page advertisements for stimulants doubled from 1990 to 2000 (Wyatt, 2003). In 1996, the year that direct-to-consumer advertising of prescription medications was legalized, U. S. patients spent $3.8 billion on anti-depressants. That had nearly tripled to $9.9 billion by 2001 (Millenson & Shalowitz, 2005). Many drug advertisements suggest, or specifically state, that mental and behavioral disorders are “medical illnesses” similar to diabetes or other illnesses, and heavily imply that drugs are the treatment of choice. Thus, the pharmaceutical industry’s contributions to unwarranted perceptions of biological causation are well known (Lacasse & Leo, 2005).

Drug researchers' conflicts of interest (that may have fueled reliance on medications and, thus, acceptance of the biological model) gave rise to the question, "Is academic medicine for sale?" It was asked by Marcia Angell, then Editor-in-Chief of *The New England Journal of Medicine*. Her question was prompted by the fact that many drug researchers have financial links to drug companies, links numerous enough among the journal's authors that Angell reported she had insufficient space to list them all in the journal. Moreover, Angell postulated that drug companies increasingly promote the creation of "diseases" to fit their drugs, and that some among the populace are coming to believe they suffer from serious ailments that, perhaps, do not exist (Angell, 2000). More recently the editor of the *Journal of the American Medical Association*, Catherine DeAngelis, wrote that pharmaceutical companies have so much influence that one would have to be "deaf, blind and dumb not to see it…." She added that the medical community has "…allowed them to take over, and it's our fault…" (reported in Johnson, 2008). Given this state of affairs, it is difficult to rule out the possibility that researchers' conflicts of interest have played into drug makers' advocacy of the biological model.

At a glance, the randomized double-blind, placebo controlled studies such as those published in the *Journal of American Medical Association* can appear quite convincing, especially when it comes to data on drug efficacy. As one journal editor put it, the quality of the journal will bless the quality of the drug (Smith, 2005). Most professionals trust the peer-reviewed journal as a reliable source of information. Those such as Angell and DeAngelis have bluntly raised a concern that medical journals are evolving into extensions of the marketing arms of pharmaceutical companies (Smith, 2005). A review of eighty-five studies of twelve anti-depressants found that 37 of 38 that produced positive results were published, while only 3 of 36 with negative results were published and 11 with negative or questionable results were written as if the drug had been effective (Turner, Matthews, Linardatos, Tell, & Rosenthal, (2008).

Editors are required to meet budgeting demands, as well as provide scholarly articles for professional consumption. Drug companies, except perhaps in rare instances, do not attempt crude efforts to "fudge" data. Rather, the pharmaceutical industry exerts subtle influence because it underwrites 75% of the studies published in many of the major journals such as *Annals of Internal Medicine, Journal of the American Medical Association, Lancet*, and *New England Journal of Medicine* (Smith, 2005). It is reasonable to conclude that such practices can create conflicts of interest (Brennan et al., 2006). There have been suggestions that drug makers have promoted the over-diagnosis (and possible creation) of disorders that their drugs will then treat. For example, in 1994 approximately

20,000 U.S. children were diagnosed with bi-polar disorder. That had risen to 800,000 by 2003, and children's prescriptions of anti-psychotic medications had shown a corresponding increase (Olfson, Blanco, Liu, Moreno, & Laje, 2006).

The tendency for high-profile physicians to receive income from drug companies and then promote those companies' drugs had reached surprising levels by the mid-to-late 2000s. A case in point is that of Dr. Frederick K. Goodwin, who was host of PBS's now-defunct "The Infinite Mind." On his September 20, 2005, radio show Goodwin promoted "…modern treatments—mood stabilizers in particular—(that) have been proven both safe and effective in bipolar children." The same day, Goodwin was paid $2,500 by Glaxo-Smith-Kline for his promotional presentation for its mood stabilizer Lamictal. Confronted with his evident conflict of interest, Goodwin responded, in part, "…it didn't occur to me that my doing what every other expert in the field does might be considered a conflict of interest." He added, "These (pharmaceutical) companies compete with each other and cancel each other out." Goodwin received $329,000 that year from GSK for promoting Lamictal (Harris, 2008).

One additional variable that tends to reinforce, and is reinforced by, medicalization of disorders is the layperson's preference for the biological model. Among the populace, many believe that a psychological explanation implies that a person is weak or has not tried to overcome his problem (Link, Struening, Rahav, Phelan, & Nuttbrock, 1997; Wahl, 1999). The preference among patients and families for a non-stigmatizing, responsibility-shifting view of behavioral disorders has been magnified by direct-to-consumer advertising. The downside is that the causes of patients' maladaptive behaviors may be overlooked, at least to the extent that the causes are located within patients' environmental and learning histories.

The Present Study

The above discussion of the rise of the biological causation model served as background for development of a three-hour training program for professionals. The present study was an effort to make use of empirically derived training strategies in a three-hour program for front-line mental health professionals regarding two socially important, treatment-relevant phenomena—the surge of the biological causation worldview of mental and behavioral disorders and efficacy of drug treatment. This research was designed to explore whether such training would change professionals' views of these two phenomena as they relate to common disorders such as depression, anxiety disorders and others. This is important because it is likely that, for many professionals, such education is a pre-

requisite to, although certainly not a guarantee of, corresponding changes in clinical practice behaviors.

Method

Participants. Participants were 76 mental health professionals and paraprofessionals ranging in age from 18 to 63 (see Table 1) who attended a three-hour training program.

Ninety percent of the participants were identified as non-medical mental health employees and all were recruited through announcements sent to agencies to be posted, and a state psychological association membership flyer about the training opportunity, including that continuing education credit was available. Credit was not contingent upon pre-post completion of the assessment form.

The control group consisted of 26 graduate students in a doctoral training program in clinical psychology who were enrolled in an advanced statistics class. They ranged in age from their twenties to their fifties. Many possessed master's degrees and several had more than ten years of full-time clinical experience at the master's level. Participation was voluntary. The content of the class included no components of the training program.

All subjects in both groups completed an informed consent in accordance with the Ethical Principles of Psychologists and Code of Conduct - Principle 6.11.

Materials. The Strength of Belief Scale (SOBS) is a 38-item survey containing six domains of interest to this research: A general biological causation domain indicated overall acceptance of the biological causation model for a range of mental health problems (anxiety, addiction, depression, ADHD, & Schizophrenia). A layperson domain assessed professionals' perceptions of laypersons' preference for biological explanations. An empirical domain examined importance of research findings to professionals regarding causation of mental disorders. The pharmaceutical domain looked at the professionals' perceptions of pharmaceutical industry influence upon the rise of the biological causation model. A guild domain measured attendees' views of organized psychiatry's promulgation of biological causation. A health maintenance organization (HMO) domain assessed attendees' views of the insurance industry's preference for the biological model (See Table 2).

Each of the 38 items was rated on a Likert-type scale of one to six, with 1 indicating "strongly agree" and 6 indicating "strongly disagree". The intervening points on the Likert scale were agree (2); somewhat agree (3); somewhat disagree (4) and disagree (5).

Table 1. *Participants*

	Frequency	Percent
Age:		
18-26	2	2.6
27-35	14	18.4
36-44	8	10.5
45-53	25	32.9
54-62	20	26.3
63+	7	9.2
Total	76	100.0
Education:		
High school	2	2.6
Associate degree	2	2.6
Bachelor's degree	13	17.1
Master's degree	31	40.8
Doctoral degree	28	36.8
Discipline:		
Psychologist	45	59.2
Social Worker	11	14.5
Counselor	12	15.8
Other	8	10.5
Employment:		
Community mental health	7	9.2
State hospital	2	2.6
Private practice	28	36.8
General hospital	2	2.6
For profit psychiatric hospital	11	14.5
University	6	7.9
Other	20	26.3

Table 2. *Strength of Belief Scale (SOBS) items. Participants responded to each item on a scale from (1) strongly agree to (6) strongly disagree*.

1. Attending pharmaceutical company sponsored workshops is helpful for me to understand the benefits of psychotropic medication. (P)
2. Anxiety is a biological disorder. (B)
3. In studies of effectiveness of psychotropic drugs, the people who take the experimental drugs are representative of the general population. (E)
4. Medication is less costly than psychotherapy in the eyes of Health Maintenance Organizations (HMO) and other health insurance agencies. (H)
5. Doctors are experts. (L)
6. Most people in America think that a diagnosis of a mental disorder implies that a person is weak. (L)
7. Family physicians acquire their practical knowledge about psychotropic medication from the pharmaceutical company representatives. (P)
8. A mental illness believed to be biologically caused offers greater hope for recovery than non-biologically caused mental illness. (L)
9. Health Maintenance organizations (HMO) and other health insurance agencies limit coverage of the number of psychotherapy sessions much more so than the number of office visits for medication refills. (H)
10. Social workers are well suited to diagnose and treat mental disorders. (G)
11. Financial interests of pharmaceutical companies have brought about unverified claims of causation of mental disorders. (P)
12. Medical doctors are figures of authority. (G)
13. Unipolar depression is a biological disorder. (B)
14. Studies of identical twins who were separated soon after birth and reared apart show fairly high levels of concordance for various mental and behavioral disorders. (Concordance means if one twin develops a disorder such as depression or schizophrenia later in life, then the other develops it too.) (E)
15. Studies have shown that people with psychological problems have more or less of certain brain chemicals called neurotransmitters. (E)
16. Most people in America think that a diagnosis of a mental illness implies a person has not tried to overcome his or her problem. (L)
17. Pharmaceutical company television advertisements for psychotropic medications are believable. (P)
18. Health Maintenance Organizations (HMO) and other health insurance agencies put the patient first. (H)
19. Medical doctors should be believed. (G)
20. Psychiatrists are well suited to diagnose and treat mental disorders. (G)
21. ADHD is a biological disorder. (B)
22. The majority of mental disorders are biological illnesses rather than the result of poorly learned coping skills. (B)
23. Schizophrenia is a biological disorder. (B)

24. Psychologists are well suited to diagnose and treat mental disorders. (G)
25. Most of my knowledge about psychotropic medication comes from pharmaceutical company representatives. (P)
26. Studies of identical twins who were separated soon after birth and reared apart that show fairly higher levels of concordance for various mental and behavioral disorders provide strong evidence for biological causation of mental disorders. (E)
27. Counselors are well suited to diagnose and treat mental disorders. (G)
28. Psychiatrists acquire a significant amount of their practical knowledge about psychotropic medication from the pharmaceutical company representatives. (P)
29. Addiction is a biological disorder. (B)
30. It is important to listen to those of authority. (G)
31. There is evidence that biological abnormalities such as chemical imbalances, brain lesions or genetic abnormalities cause most mental disorders. (E)
32. When depressed patients are given an antidepressant a large percentage of the patients' improvement is due to the placebo effect. (E)
33. Asking my doctor about medications advertised on television can be helpful in finding the right medication that will meet my needs. (P)
34. If in the future scientists identify a specific gene that predisposes people to become mentally ill, this would prove that mental illness is a disease. (E)
35. Studies that show people with psychological problems have more or less of certain brain chemicals provide strong evidence for biological causation of mental disorders. (E)
36. I trust that the medication prescribed to me by my doctor is what I need. (G)
37. If an expert said so, it must be true. (L)
38. The majority of mental disorders are biological illnesses rather than habit disorders. (B)

Letters in parentheses indicate the domain to which the item belongs: (B)=Biological; (L)=Layperson preference; (E)=Empirical; (P)=Pharmaceutical influence; (G)=Guild influence; (H)=HMO.

The SOBS was developed in three steps. First, an initial set of items was formulated based on intuitive judgment. They were submitted to members of a university department of psychology faculty for feedback, which consisted mainly of suggestions for editing along with intuitive perceptions of item relevance to the study's goals. After those adjustments were made, the revised surveys were completed by a sample of advanced doctoral students. Items that correlated weakly with other items within their specified domains were eliminated. A final reliability analysis was conducted with the remaining thirty-eight items from the treatment group data. Coefficient alphas ranged from .57 - .87 for the six domains. (See Table 3.)

Table 3. *Reliability Analysis of Each Domain*

Domain	***α***
Biological Domain	.73
Layperson Domain	.76
Empirical Domain	.77
Pharmaceutical Domain	.82
Guild Domain	.87
HMO Domain	.57

α *= coefficient alpha*

Design and procedure.

Educational Program. A 3-hr training program was developed. Following much of the background information described above, it presented the historical roots of the rise of the biological causation model and reviewed research often cited in support of biological causation. Drug trial methodology and drug effectiveness issues were presented, as well. The training was conducted in didactic style by the second author who employed 90 power point slides (See Table 4.)

It is of concern that the study's second author also served as trainer. Several procedures were installed to buffer possible presentation bias. At the outset the presenter articulated a number of disorders that research has shown to have entire, or very heavy, bases in biology. They included Down's syndrome and disorders due to tumor, endocrine dysfunction, known toxins, neurological damage resulting from substance abuse and others. Additionally, the presenter stated that an unknown percentage of cases of common disorders such as depression and anxiety likely have biological roots. Further, the American Psychiatric Association's pro-biological point of view, as put forth in its response to the MindFreedom (2003) challenge, was presented. Perhaps most important, the program focused on research and encouraged attendee participation in discussion of it. Finally, the presenter invited audience responses at any time during the presentation. It is thought that possibility of biased presentation was minimized by these procedures.

Table 4. *Outline, goals and objectives of the three-hour training program for mental health professionals*

Outline

- Introduction and cautions: Some disorders are heavily biologically influenced.
- Dilemmas in treatment.
- When the patient's conceptualization is biological, and wrong.
- Non-empirical influences on patients' and professionals' thinking.
  - Medical Guilds.
  - HMO/Insurance Industry.
  - Pharmaceutical companies.
  - The patient's worldview.
- Critical thinking for the professional. What the research tells us.
  - Genetic studies.
  - Studies of brain structure and functioning.
  - The disease model of addiction.
  - ADHD: The food additive and sugar connections.
- Putting our knowledge to use with patients.

Goals and Objectives

- Attendees will explore the research on biological causation of abnormal behavior.
- Attendees will understand, and be able to articulate, the influences that lead patients and professionals to adopt a biological causation worldview.
- Attendees will be able to critically evaluate the research on genetic studies, twin studies and studies of brain structure and function.

The treatment group participated in the training program. Prior to the beginning of the training the participants were asked to complete the 38-item SOBS. Upon completion of the training, participants were asked to again complete the SOBS, which contained the same items as the pre-training form, with the items randomly reordered.

A quasi-experimental non-equivalent groups design was utilized. Paired t-tests (two-tailed) were used to test for pre-post changes within each group separately. A linear regression analysis was conducted to evaluate whether a change in perceptions regarding the domains (guild; pharmaceutical; layperson; HMO/insurance; empirical) was associated with changes in belief in the

biological causation domain, after controlling for the effect of several demographic variables.

Results

Paired sample t-tests were conducted to evaluate whether participants showed general change in reported strength of belief in biological causation of several mental health disorders (ADHD, anxiety, depression, substance abuse, and schizophrenia). The results indicated that, prior to the training, participants tended toward agreement with the biological causation model of those disorders, and that a post-training a shift toward disagreement had occurred (M_{pre} = 3.02, SD = .77) (M_{post} = 3.86, SD = .88), t (75) = 9.48, p = <.001. The standardized effect size index, d, was 1.09, (See Table 5).

A paired sample t-test was also conducted to evaluate whether the training changed the professionals' opinions regarding the remaining four domains (pharmaceutical, empirical, layperson, and guild). Mean ratings on the eight items in the Empirical Domain were significantly changed from pre-training (M_{pre} = 3.29, SD = .74) to post-training (M_{post} = 4.0, SD = .76), t (75) = 9.79, p = <.001. Essentially, prior to training, participants felt that there was sufficient empirical evidence to support a biological causation model for most common abnormal behaviors but, post-training, there had been a shift toward disagreement.

There was also significant decline noted in the attendees' faith in the claims made by the pharmaceutical industry pre- (M_{pre} = 4.0, SD = .69) to post-intervention (M_{post} = 4.4, SD = .69), t (75) = 6.92, p = <.001. A modest increase in skepticism regarding the psychiatric/medical guild's claims of biological causation resulted as well (M_{pre} = 3.1, SD = .69) (M_{post} = 3.2, SD = .71), t (75) = 3.06, p = <.01.

A final set of paired sample t-tests was conducted to evaluate whether participants in the control group showed any pre-post change. Results indicated that no change occurred on any domain.

A standard multiple regression was performed between the pre-post difference in strength of belief in the biological domain, as the dependent variable, and the pre-post difference in strength of the pharmaceutical domain, empirical domain, and guild domain as the independent variables. The HMO and Layperson Domain were excluded from further evaluation, given that Pearson correlations were found to be insignificant. Additional analysis included a hierarchical regression in which the demographic variables of sex, age, and education were controlled for prior to assessing the relationship between the pre-post difference in strength of belief with the biological domain as the dependent

Table 5. *Pre and Post Training Means of Treatment Group*

Domain	$\underline{M}_{pre}$	$\underline{M}_{post}$	$\underline{M}_{diff}$	$\underline{SD}_{diff}$
Biological Domain	3.02	3.86	-.83**	.8
Layperson Domain	3.4	3.5	-.1	.6
Empirical Domain	3.3	4.0	-.7**	.7
Pharmaceutical Domain	4.0	4.4	-.44**	.55
Guild Domain	3.1	3.2	-.2*	.5
HMO Domain	3.2	3.1	.2	.7

$\underline{M}_{pre}$ = pretest mean
$\underline{M}_{post}$ = posttest mean
$\underline{M}_{diff}$ = $\underline{M}_{pre}$ - $\underline{M}_{post}$
$\underline{SD}_{diff}$ = standard deviation of $\underline{M}_{diff}$
$\underline{d}$ = Cohen's measure of effect size
**p < .01*
***p < .001*

variable and the pre-post differences in strength of belief with the pharmaceutical domain, empirical domain, and guild domain as the independent variables.

Table 6 displays the results for the regression analyses. R for regression was significantly different from zero: $R^2 = .340$, $F(3, 72) = 12.377$, $p < .001$. The combination of the three independent variables contributed significantly to prediction of strength of belief in biological causation. Upon closer review of the regression coefficients it seems that of the three variables, empirical domain had the greatest influence. Age, sex, and education as predictors for strength of belief in the biological domain were not significant, $R^2 = .053$, $F(3, 72) = 1.348$, $p = .266$. After controlling for these demographic variables, the three domains still accounted for a significant proportion of variability $\Delta R^2 = .350$, $F(3, 69) = 13.49$, $p < .001$.

Table 6. *Standard Multiple Regression of Guild, Empirical & Pharmaceutical Influences on the Strength of Belief (SOB) in Biological Causation*

Variables	SOB BDMN DV	G-INF	E-INF	P-INF	*B*	β
G-INF	.355				.216	.137
E-INF	.530	.409			.464**	.396
P-INF	.395	.271	.380		.288	.207
MEANS	.8302	.1702	.7319	.4359		
STANDARD DEVIATIONS	.76367	.48437	.65137	.54921		R^2 =.340
					Adjusted	R^2 =.313
						R =.583**

*$p < .01$
**$p < .001$
SOB = Strength of Belief Scale
BDMN = Biological Domain
G-INF = Guild Influence
E-INF = Empirical Influence
P-INF = Pharmaceutical Influence
Numbers = Pearson Correlations

Discussion

This study examined whether a three-hour, data-based continuing education training program that employed established antecedent methodology would altar practicing mental health professionals' perceptions of causation and drug treatment. A three-hour time frame was chosen because practicing professionals typically obtain continuing education by attending half-day training sessions and are unlikely to enroll in full-semester graduate courses. The study looked at the extent to which attendees, pre- and post-training, accepted a biological causation worldview both generally and for several common disorders including ADHD, unipolar depression, anxiety disorders, and schizophrenia.

The presentation employed several variables that the literature suggests are most effective with a relatively sophisticated audience. The speaker was reasonably well-known to the audience (university professor in a relatively small state), well organized and presented the training fluently. He used data and cited

sources. He was alert to the notion that data overkill can drain a presentation of its impact. He avoided anecdote, although attendees occasionally described anecdotes about their clients.

The literature suggests that such an audience will respond favorably to some evidence that goes against the general thrust of a presentation. Several facets of the training were included to insure both that this was accomplished and, as important, that the presentation was indeed balanced. For example, the presenter stated that some disorders are caused biologically, and listed a number of them. The training included the American Psychiatric Association's defense of biological causation, and other elements that were thought to serve as buffers against bias. Representative research usually cited in support of biological causation was examined. The historical roots of the ascendance of the model and the dovetailing of interests of organized psychiatry and the pharmaceutical industry and related topics, were presented.

The program's critique of studies that are often cited as evidence of biological causation, such as studies of identical twins reared apart and studies of brain structure, function and chemistry, resonated particularly well with the attendees, given the significant pre-to-post change in the empirical domain. That finding is consistent with the systemic view (the listener is alert, responding to facts) described above. This becomes particularly important when one considers that the change occurred in experienced professionals, individuals whom one might suppose had become somewhat inured against substantial world-view changes. That the training was relatively brief adds to the importance of the results because, unlike a full-semester graduate course which most practitioners would be unlikely to pursue, professionals most often obtain continuing education in half-day segments.

Exploration of the connection between the financial interests of the pharmaceutical industry and the growth of the biological causation model, although factually presented, may have reached attendees somewhat more heuristically or emotionally. Participants came to the training with some degree of conviction that the financial interests of drug companies have brought about unverified claims of both causation and drug effectiveness. However, the brief review of that topic strengthened attendees' pre-existing skepticism.

It took minimal time to present methodological issues (the washout phase, representativeness of study participants, power of the placebo) and interpretative difficulties in studies of drug effectiveness. Nevertheless, that portion of the training produced change in attendees' thinking as well.

Thus, the study's findings are consistent with the hypothesis that a brief, research-based training program could alter the perceptions of active

professionals regarding topics of importance in treatment settings—the causes and treatment of common abnormal behaviors.

An issue in interpretation of the results is that our conceptualization of causation as either "biological" or "not biological" leaves open the question of contributions of both biology and environment, a perspective that no doubt accounts for an unknown percentage of various disorders. However, it was the intent of this research to discover whether the training would alter mental health professionals' worldviews. Thus, participants were required to choose something other than a convenient mid-point.

Another concern arises when considering the presentation of data and inferred change as a result of such presentation. It is difficult to extract the influence of expert power (factual information provided by a skilled presenter) from prestige or referent power (well known professor and likeable figure) when inferring subjects' responses to items (French & Raven, 1959, Aronson & Golden, 1962; Berlo, Lemest, & Martin, 1969; Haughtvedt, 1997). Therefore, left open to some speculation is the question: Was it the message or the messenger that brought about change? The answer is well beyond the scope of the present study. However, it is important that it was the "package" of expert presenter, data, source citations, historic review and the like that was effective. The conundrum is that, with an esoteric topic and a professional audience, it is difficult to imagine a credible presentation by an unknown individual with minimal, or no, credentials.

Another consideration lies in the measuring of change and what it means to the individual professional. It is unknown how a unit of change in a psychometric measure such as the SOBS might relate to a change, if any, in practice (Blanton & Jaccard, 2006). We made no assumptions that changed attitudes would be stable or that they would necessarily result in changes in clinicians' practices. Those are topics of future research. Rather, our assumption is that the present study has established a platform on which changed practice habits may be built. Without an enhanced, data-based change in thinking about causation, it probably would be quite difficult to bring about changed techniques in clinical practice.

A number of attendees informally remarked that the training had opened their eyes to research issues that they had not considered and which had not been addressed in their graduate training. Others pointed out that they had already felt skepticism about claims of drug companies, but that the training helped them gain focus on the specifics. Still others commented that the guild interests of organized psychiatry were not new to them, but that they had been unaware of the extent to which those interests had become symbiotic with drug industry interests.

The informal comments were reflected in several items whose mean ratings changed a full point, or nearly so, on the six-point SOBS scale. These included items dealing with causes of several disorders (items 13, 21 and 23, Table 2) and items dealing with the methodological and interpretive puzzles in research looking at identical twins reared apart (items 14 and 26) and of brain chemistry and structure (item 35). Critical examination of pharmaceutical industry influence also was reflected in substantial change in the skeptical direction (item 1).

Aside from providing a training model, the program's content suggests a likely need for more public funding of trials, particularly of large head-to-head trials of all treatments available for a given disorder. A federally regulated website could house the studies. Journal editors might then concentrate on critically describing the studies, instead of suffering the financial slings of staying in publication (Smith, 2005).

The professional cultures would also do well to re-orient both themselves and the populace as to what is, and is not, known about the causes of abnormal behavior. Authors of textbooks, such as those that likely were read by the professional participants in this study during their training, should revise their books' sections that deal with causation so that they offer in-depth, critical analyses of data such as those presented in the present training program. Our informal reviews of a number of frequently adopted textbooks revealed few that approach that goal and none that, in our view, achieve it.

There are other content-related suggestions that arise from the three-hour program's results. Textbook authors and university professors would do well to address cultural influences, such as direct-to-consumer advertising and advertising to physicians. When a consumer responds to an ask-your-doctor commercial, probability of prescription of that medication rises dramatically, even when the patient presents with minor symptoms (Kravitz, Epstein, Feldman, Franz, Rahman, Wilkes, Ladson, & Franks, 2005). The Food and Drug Administration (FDA) would do well to move more forcefully to replace drug company "education" with scientifically based information that will stimulate better conversations between doctors and patients.

Physician education on several issues should be enhanced. For example, physicians often cannot distinguish true statements from false ones when they listen to sales pitches (Hopper, Speece, & Musial, 1990). Many physicians would benefit from enhanced awareness of the impact of gifts, as the majority of them feel that gifts given by pharmaceutical representatives do not influence their own prescribing practices, but that such gifts do influence their colleagues (Steinman, 2000; Steinman, Shlipak, & McPhee, 2000).

It is possible that improved government regulation of the claims made by the drug industry, mass media organizations, and physicians' groups may be of help, although that task may well be very difficult. The Food and Drug administration's 2007 Science Board report detailed difficulties with inadequate staffing, poor retention of staff, out-of-date technology and a general lack of resources at the FDA (FDA Science and Mission at Risk, 2007).

Undertaking a paradigm shift is a daunting task, given the financial resources available to the pharmaceutical industry and to organized medicine. However, given that a three-hour continuing education program, carefully employing established antecedent teaching techniques, was able to bring about significant change, large funding sources such as the National Institute of Mental Health may yet be convinced to more vigorously support enhancement of empirically derived understanding of mental health syndromes and treatment.

Although it was not this study's purpose to resolve the debate about etiological bases of behavior and treatment practices, this research provides a basis for extension of the debate. This was an effort to determine whether the thinking of professionals would be changed significantly as regards practice related topics, within the confines of a brief continuing education program. That goal was achieved. Such enhanced understanding would seem to be a prerequisite if non-drug interventions such as applied behavior analysis are to flourish.

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