

NONVERBAL BEHAVIOR AND PSYCHOPATHOLOGY

ANN M. KRING AND BARBARA K. STUART

The study of nonverbal behavior has captured the imagination and interest of researchers across a number of disciplines, including psychology, sociology, anthropology, ethology, and linguistics to name but a few. At least since Darwin's 1872 publication of *The Expression of Emotion in Man and Animals* (see also Ekman 1998), the study of nonverbal behavior has been particularly central to researchers interested in emotion. Indeed, contemporary conceptualizations of emotion all include reference to nonverbal behaviors, particularly facial expressions, as integral to emotional responding, due not only to Darwin but also to the pioneering work of Tomkins, Izard, and Ekman in the 1960s and early 1970s.

However, it has only been in the last two decades that research on the nature of emotion and psychopathology has illuminated the important role that nonverbal behaviors play in a variety of disorders (for reviews see Berenbaum *et al.* 2003; Keltner & Kring 1998; Kring 2001). This is somewhat surprising given the ubiquity of emotion problems in different psychological disorders. Indeed, emotion disturbances figure prominently in many different forms of psychopathology, whether they are 'excesses' in emotion, 'deficits' in emotion, or the lack of coherence among emotional components. As illustrated in Table 8.1, many of the disorders found in the current *Diagnostic and Statistical Manual* (DSM-IV-TR; American Psychiatric Association 2000) include one or more symptoms reflecting an emotion disturbance.

Much of the progress towards understanding the nature of emotion disturbances in psychopathology has been aided by the use of methods pioneered by basic emotion researchers. Indeed, basic research on the components of emotional responding in nonclinical populations has proven useful and relevant for the study of emotional dysfunction in clinical populations. However, considerably less research has been conducted on understanding how nonverbal behaviors outside the context of emotion may be related to the symptoms, etiology, or course of different psychological disorders. In this chapter, we focus on the methods, complexities, and promises of studying emotional behavior in different forms of adult psychopathology. After first defining emotion, we next consider in some detail some of the special considerations associated with studying emotional behavior in psychological disorders.

Nonverbal behavior and emotion

Drawing from over a century of theory and research, there is fairly good consensus that emotions are adaptive and serve important functions. Broadly defined, emotions are

Table 8.1 Emotion-related symptoms in DSM-IV-TR

Disorder	Emotion-related symptom
Schizophrenia, schizoaffective, schizophreniform	Affective flattening, anhedonia
Major depressive episode	Depressed mood, anhedonia
Manic episode	Elevated, expansive, or irritable mood
Dysthymia	Depressed mood
Hypomanic episode	Elevated, expansive, or irritable mood
Panic disorder	Intense fear or discomfort
Agoraphobia	Anxiety
Specific phobia, social phobia	Marked and persistent fear
Obsessive-compulsive disorder	Marked anxiety or distress
PTSD	Irritability, anger, physiological reactivity, distress, anhedonia, restricted range of affect
Acute stress disorder	Symptoms of anxiety or increased arousal
Generalized anxiety disorder	Excessive anxiety and worry, irritability
Hypochondriasis	Preoccupation with fears of having disease
Anorexia nervosa	Fear of gaining weight
Sleep terror disorder	Intense fear and signs of autonomic arousal
Pathological gambling	Irritability, dysphoric mood
Adjustment disorder	Marked distress
Paranoid personality disorder	Quick to react angrily
Schizoid personality disorder	Emotional coldness, detachment, flattened affectivity
Schizotypal personality disorder	Inappropriate or constricted affect, excessive social anxiety
Antisocial personality disorder	Lack of remorse, irritability
Borderline personality disorder	Affective instability due to marked reactivity of mood, inappropriate intense anger or difficulty controlling anger
Histrionic personality disorder	Rapidly shifting and shallow expressions of emotion
Narcissistic personality disorder	Lacks empathy
Avoidant personality disorder	Fear of criticism, disapproval, or rejection
Dependent personality disorder	Fear of being unable to care for self or being left alone
Alcohol intoxication	Mood lability
Alcohol withdrawal	Anxiety
Amphetamine intoxication	Euphoria or affective blunting, anxiety, tension, anger
Amphetamine withdrawal	Dysphoric mood
Caffeine intoxication	Nervousness, excitement
Cannabis intoxication	Euphoria, anxiety
Cocaine intoxication	Euphoria or affective blunting, anxiety, tension, anger
Cocaine withdrawal	Dysphoric mood
Hallucinogen intoxication	Anxiety or depression
Inhalant intoxication	Belligerence, euphoria
Nicotine withdrawal	Dysphoric or depressed mood, irritability, frustration, anger, anxiety
Opioid intoxication	Euphoria followed by dysphoria
Opioid withdrawal	Dysphoric mood
Phencyclidine intoxication	Belligerence
Sedative etc. intoxication	Mood lability
Sedative etc. withdrawal	Anxiety

complex systems that developed through the course of human evolutionary history to prepare an organism to act in response to environmental stimuli and challenges. Furthermore, emotions are comprised of a number of components, including (but not limited to) behavioral or expressive, feeling or experiential, and physiological, that are typically coordinated within the individual. Indeed, the coordination of these components, under most circumstances, serves a number of important intra- and interpersonal functions (e.g. Ekman 1994; Frijda 1986; Keltner & Kring 1998; Lang *et al.* 1990; Levenson 1992), although across different contexts, these components may only be loosely connected (Russell *et al.* 2003).

In our view, advances in the understanding of emotion disturbances in psychopathology will be best advanced by adopting the conceptualizations, definitions, and methods for assessing emotion posited by basic emotion researchers. As we have argued elsewhere (Kring & Bachorowski 1999), the functions of emotion in persons with various psychopathological disorders are comparable to those for nondisordered individuals. In many different disorders, however, one or more components of emotional processing are impaired in some respect, thus interfering with the achievement of emotion-related functions. For example, schizophrenia patients' absence of facial expressions may evoke negative responses from others (Krause *et al.* 1992) and have a number of other consequences for social relationships and interactions (Keltner & Kring 1998).

We submit, then, that the study of emotion in psychopathology does not require different methods than those used to study emotion in nonpathological populations. Indeed, the promise of translating basic emotion theory and methods into the study of emotion and psychopathology has been realized in many areas of research, as we review later in the chapter. Although similar methods for assessing emotion in psychological disorders can and should be used, researchers must nevertheless take into consideration issues and characteristics of particular patient populations that may render interpretations of emotional behavior difficult. For example, when studying patients with schizophrenia, researchers must be mindful of possible medication side-effects that may manifest themselves as emotional disturbances (Kring & Earnst 1999).

Special considerations in the study of emotion and psychopathology

Conducting research with psychopathological populations requires special consideration with respect to a number of issues, including sample issues, diagnosis, treatment or medication effects, illness course, and comorbidity. Full review of these issues is beyond the scope and topic of this chapter; for additional exposition on these important considerations we refer interested readers to the chapter by Sher and Trull (1996) in the *Annual Review of Psychology*. We nevertheless believe it is important to discuss these issues in brief as they have enormous bearing on study design and the interpretation of findings from studies assessing emotional behavior and psychopathology.

Sampling issues

In psychopathology research, true experiments cannot be conducted due to the fairly obvious fact that persons cannot be randomly assigned to have a psychological disorder

such as schizophrenia. Instead, most psychopathology researchers employ convenience or nonprobability samples by, for example, including patients from a particular hospital or outpatient clinic or recruiting nonpatient controls by accepting volunteers from the community (Sher & Trull 1996). Recruiting patients for a research study is difficult, fraught with special ethical considerations, and labor intensive, and thus convenience samples are often the most feasible. However, this approach is not without problems as selection biases can affect the generalizability and interpretability of the findings.

An additional sampling issue of relevance is the use of clinical versus subclinical samples. Clinical samples are typically defined as individuals who meet diagnostic criteria for a particular disorder. Subclinical samples may comprise individuals at risk for a particular disorder or individuals who exhibit a number of symptoms of a disorder but do not meet the diagnostic criteria for that disorder. Studies using subclinical populations are also referred to as analogue studies. In many studies using subclinical populations, college students scoring high on a symptom measure are compared to college students who do not score high on the measure. For example, many studies have examined college students selected on the basis of scores on the Beck Depression Inventory (BDI; Beck *et al.* 1961). However, this inventory was not designed to diagnose depression, only to assess its severity in a clinically diagnosed group. Some evidence indicates that selecting subjects solely on the basis of elevated BDI scores does not yield a group of people who can serve as a good analogue for those with clinical depression (Coyne 1994). High scorers may not be clinically depressed (Santor & Coyne 2001). Further, Hammen (1980) found that high scorers declined markedly when retested just two to three weeks later. On the other hand, other evidence suggests that individuals who score high on symptoms measures and yet do not meet diagnostic criteria do not differ markedly from individuals who meet diagnostic criteria (Gotlib *et al.* 1995). Kendall *et al.* (1987) provided a set of guidelines for investigators to follow when using the BDI in order to maximize comparability between studies using individuals scoring high on the BDI and studies using individuals who meet diagnostic criteria for depression.

Researchers interested in schizophrenia have studied individuals believed to be at risk for developing schizophrenia, sometimes referred to as 'psychosis prone'. In the 1970s, Loren and Jean Chapman developed self-report scales of characteristics believed to reflect the precursors for schizophrenia, including physical and social anhedonia, perceptual aberrations, and magical thinking (Chapman *et al.* 1976; Eckblad & Chapman 1983; Mishlove & Chapman 1985). These investigators conducted a longitudinal study of college students at the University of Wisconsin by following, for 10 years, over 500 students who scored high on these measures to ascertain how many students would go on to develop schizophrenia (Chapman *et al.* 1994). The results of the 10-year follow-up indicated that a number of the students exhibited psychiatric symptoms, though very few actually developed schizophrenia, leaving some to wonder whether this is a useful analogue for schizophrenia research. However, other follow-up studies have indicated that social anhedonia is a significant predictor of the later development of schizophrenia spectrum disorders (Kwapil 1998).

Trull and colleagues (e.g. Trull 1995; Trull *et al.* 1997) have studied emotional, cognitive, and interpersonal features of borderline personality disorder (BPD) among

nonclinical college students who were not seeking treatment for BPD but who nonetheless demonstrated a number of BPD features. Individuals with a high number of BPD features reported greater trait-negative affect, hostility, anxiety, and depression, and less trait-positive affect than control participants who had no BPD features. What is unclear is whether these individuals with BPD features differ in important ways from patients with the diagnosis of BPD.

Decisions about whether to use patients who meet diagnostic criteria for a particular disorder versus individuals with a number of symptoms should be made on both theoretical and empirical grounds. The current diagnostic systems are works in progress and, thus, considering as valid only those studies that use patients meeting diagnostic criteria would be a mistake. On the other hand, studies that define 'patient' groups by identifying college students with a very small number of symptoms (e.g. a score of 7 on the BDI) are not likely to advance our understanding of a particular disorder. What needs to be done is work that integrates both clinical and subclinical samples to broaden our understanding of emotional features and disturbances associated with the various psychological disorders.

Diagnostic issues

Choosing to study individuals who meet diagnostic criteria for a particular disorder still leaves a number of decisions for the researcher. First, decisions about which diagnostic system to adhere to must be considered. Most often, the American diagnostic system, currently DSM-IV-TR (APA 2000) is used. However, international researchers often follow the International Statistical Classification of Diseases and Related Health Problems (ICD-10; World Health Organization 1992). Although the two systems do not differ tremendously, there are subtle differences, which may render comparison across studies using the different diagnostic systems difficult. Furthermore, both of these diagnostic systems have undergone a number of revisions over the past 30 years. For example, depending upon the disorder of interest, it can be difficult to compare findings from studies conducted in the 1970s (DSM-II), early 1980s (DSM-III), and today (DSM-IV).

Beyond decisions about the diagnostic system, procedures for assigning diagnoses must be delineated. In some studies, diagnoses are obtained from reviewing patients' records. This is problematic in that clinical practices for assigning diagnoses vary quite a bit from hospital to hospital and clinic to clinic, with some diagnoses made following a 10-minute conversation with a patient, others made from prior patient records, and still others made from a systematic interview and treatment team case conference. Given this variability, the stability and reliability of diagnoses across such sites is likely quite low. Most research studies use structured clinical interviews, such as the Structured Clinical Interview for DSM-IV (SCID-IV; First *et al.* 1994). The advantages to using such structured interviews are many. First, the questions and scoring system in the interview are standardized so that differences between investigators are minimized. Second, training materials are available to increase the likelihood that different investigators use the interviews in a similar fashion. Third, these interviews have been used in a large number of studies of different psychological disorders and the reliability and validity of the instruments have been well established.

So as not to unnecessarily reify the diagnostic criteria for particular disorders, some investigators choose to study a spectrum of disorders. For example, many studies of schizophrenia may include patients with schizophrenia, schizoaffective disorder, schizophreniform disorder, and delusional disorder. Those who study autism may include patients with Asperger's Syndrome and perhaps other pervasive developmental disorders. Those interested in studying depression may include persons who meet criteria for major depressive disorder and dysthymia. The reasoning behind such an approach is that any one set of diagnostic criteria is a fallible indicator of what is undoubtedly a broader range of pathology. On the other hand, hypotheses about emotion and a particular disorder (e.g. schizophrenia) cannot be as unequivocally tested with a broad-spectrum sample.

To be sure, the diagnostic criteria are a 'work in progress' and will likely continue to change. However, the specificity of a particular emotion disturbance cannot be tested with a sample that cuts across many (similar) disorders. At the least, researchers should be clear when describing the sample used in a study. Furthermore, inclusion of sufficient numbers of patients in each diagnostic group in order to systematically test for any differences in the dependent variables of interest is ideal.

Treatment issues

When studying patient groups, information about current and past treatment must be gathered and taken into consideration. Interpretation of findings about emotion disturbances in psychopathology may vary depending upon treatment status. For example, if an emotion disturbance exacerbates when patients are no longer receiving treatment, one might conclude that the treatment was effective in resolving the emotion disturbance. By contrast, an emotion disturbance that persists regardless of treatment status, as is the case with diminished expressiveness in schizophrenia (Kring & Earnst 1999), suggests that the disturbance is a stable aspect of the disorder that may be relatively resistant to treatment. Finally, if an emotion disturbance remits when patients are withdrawn from treatment, particularly medication, the emotion disturbance is likely a medication side-effect.

Indeed, in some disorders such as schizophrenia, side-effects from medication may present like the emotional phenomena of interest. For example, one of the most common and troubling side-effects of neuroleptic medication is akinesia (Blanchard & Neale 1992; Carpenter *et al.* 1985; Marder *et al.* 1991; Sommers 1985; Van Putten & Marder 1987; Van Putten *et al.* 1980). Although clinical descriptions of akinesia vary, it is typically defined by characteristics that are virtually identical to descriptions of the schizophrenia symptom of affective flattening, including diminished facial expression, nonspontaneous speech, and few gestures. Thus, it is often difficult to determine whether the diminished expressiveness seen in some schizophrenia patients is a symptom of the disorder or a side-effect of the medication.

A number of strategies have been employed to assess medication effects on various performance measures. Perhaps the most common method has been to examine the correlation between equated medication dosage levels and the dependent variables of interest. Although this approach provides useful descriptive information about medi-

cation dosage, it does not take into account the differential effect of different types of medications (Blanchard & Neale 1992). A second common approach is to assess medication side-effects with clinical rating scales and then to include these scores as a covariate in statistical analyses to partial out the effects of side-effects on performance. However, as discussed later, some rating scales for medication side-effects contain items that are virtually identical to items on scales designed to assess the emotion disturbance. Thus, relying solely on clinical rating scales will provide an incomplete assessment.

In order to assess the effects of medication on emotional behavior, one of the most powerful designs is a within-subjects design (Blanchard & Neale 1992) referred to by Spohn and Strauss (1989) as a counterbalanced crossover design. In this design, the same patients are tested both on and off medication, with roughly half of the sample being off medication at the first testing and then retested while on medication, and the other half of the sample being on medication at the first testing and then retested while off medication. The within-subjects aspect of the design allows patients to serve as their own controls, and the counterbalancing aspect of the design controls for order effects. Although this is a powerful design to detect medication effects on a dependent variable of interest, withdrawing medication from patients for research purposes is no longer possible in many hospitals and clinics. Thus, many investigators will be unable to clearly assess what, if any, effects medications may have on emotion behavior and instead note this as a possible alternative account for the findings reported.

Testing patients receiving treatment (medication or psychotherapy) is not without advantages. Indeed, in many respects this is a more ecologically valid assessment of patients with a particular disorder given that a large number of individuals do indeed receive treatment.

Course of illness

In their seminal review of cognitive theories of depression, Barnett and Gotlib (1988) distinguished between the concepts of antecedents, concomitants, and consequences. Briefly, for a variable such as nonverbal behavior to be considered an antecedent of a psychological disorder, it must be shown to precede the onset of the disorder. Features that are observed during an episode of a psychological disorder may be more accurately construed as concomitants, and those features that persist after the episode has abated might be considered consequences.

To interpret findings regarding emotional behavior and different psychological disorders, it is necessary to review the evidence in the context of the temporal course of the disorder. Specifically, evidence showing that emotion disturbances precede the onset of a given disorder would support the role of an observed emotion disturbance as antecedent to the disorder and allows for a clearer claim about the causal status of that disturbance. A prospective, longitudinal study is the best design to determine whether or not emotional disturbances precede the onset of a disorder; however, few such studies have been conducted. Evidence that emotional disturbances are present only during an active symptomatic state suggests that the disturbances are better construed as concomitants. Indeed, most of the research on emotional disturbances in

psychopathology has employed cross-sectional designs that are ideally suited to evaluate whether particular emotional features can be construed as concomitants.

Finally, if the evidence indicates that emotion disturbances persist after symptomatic recovery or predate a relapse, the disturbances may be construed as consequences of the disorder. Prospective, longitudinal designs again are the best method for ascertaining whether emotional features can be considered to be a consequence of the disorder. Understanding where, in the course of a disorder, certain emotional features or disturbances appear has important implications for treatment development as well as for theories of etiology (for a review see Kring 2001).

Comorbidity

Comorbidity refers to co-occurrence of more than one disorder. This is very common across all disorders. For example, 50% or more of patients with schizophrenia also have a substance-related disorder (Blanchard *et al.* 2000); anxiety and mood disorders exhibit a tremendous amount of comorbidity (Mineka *et al.* 1998). Given that comorbidity is so common, findings from studies that examine a particular disorder (e.g. depression) that is not comorbid with another disorder (e.g. generalized anxiety disorder) may not generalize well to the larger population of individuals with depression. For example, there is some evidence to indicate that nonverbal behaviors observed in comorbid anxiety and depression (e.g. distressed facial expressions, hostility, agitation) differ from observations of depression (Katz *et al.* 1993). On the other hand, if researchers are interested in isolating a specific emotion disturbance for depression, then the place to begin is with a sample of patients with depression only. Later studies could include patients with depression and anxiety to test the generalizability of the particular emotion disturbance.

Why study emotion in psychopathology?

Although it may seem obvious that the study of emotion in psychopathology is of critical importance, since emotion is so central to many different disorders (see Table 8.1), we submit that it is important to be clear about the goals of such research. For example, in our view, research on emotional behavior or other nonverbal behavior in psychopathology will not supplant current diagnostic assessments. In other words, we doubt that different psychological disorders can be diagnosed by nonverbal or emotional behavior 'signatures' independent of other measures.

Furthermore, it is unlikely that emotion clearly distinguishes different psychological disorders (see also Pansa-Henderson *et al.* 1982). For example, findings by Watson *et al.* (1988), indicating that heightened levels of negative affect (NA) could characterize both anxiety and depression, while lowered levels of positive affect (PA) uniquely characterized depression, suggest that emotion might serve as a means for distinguishing among psychological disorders. However, subsequent research has shown that other disorders, including schizophrenia and social phobia show the same pattern of heightened NA and lowered PA (e.g. Berenbaum & Fujita 1994; Blanchard *et al.* 1998; Wallace & Alden 1997), casting doubt on the specificity of this pattern to depression.

Nonetheless, we do believe that findings on emotion and psychopathology will be a useful augmentation to diagnostic assessments, and we concur with Berenbaum and colleagues (2003) that the development of a taxonomy of emotion disturbances in psychopathology may have much clinical utility. While we are less optimistic that such a taxonomy may provide greater predictive power than current diagnostic systems (as nonverbal behavior is not necessarily indicative of gross psychopathology), it can nevertheless highlight subtle dysfunctional processes.

Numerous descriptive studies on nonverbal behavior and psychopathology have been conducted over the last 40 years; however, there has been little cumulative benefit from these studies. As highlighted above, changes in diagnostic systems and practices makes comparison across studies from different diagnostic 'eras' difficult, if not impossible. However, descriptive studies have also failed to advance our knowledge of emotion disturbances in psychopathology due to the overly descriptive nature of the research. A typical study may begin with a small sample of patients (e.g. 7-10) and then try to identify variables (e.g. facial expression, vocal expression, gestures, eye contact) that distinguish these patients from a nonpatient control group. Many of these studies are conducted without advancing hypotheses about how or why groups may differ and without sufficient conceptual or theoretical underpinnings to constrain such hypotheses. Thus, the literature is replete with several mini-findings that neither advance our understanding of a particular disorder (with respect to symptoms, course, etiology, or treatment) nor advance our understanding of the ways in which emotion disturbances are manifest within a particular disorder or constellation of symptoms.

As noted above, it is important to discover where emotion disturbances are situated in the temporal course of a given disorder, and this is a laudable goal for research on emotion and psychological disorders. For example, finding particular emotion behaviors prior to the onset of an illness would suggest that these behaviors have the potential to be construed as a marker for the illness or a vulnerability indicator (Nuechterlein & Dawson 1984). Finding a constellation of emotion disturbances concomitant with an episode of a disorder points to the possibility that changes in this disturbance can be used as an indicator of treatment effectiveness. Addressing these questions requires prospective, longitudinal designs.

An additional goal for researchers interested in emotion and psychopathology might be to develop newer, more effective interventions. The theorizing of Marsha Linehan about the role of emotion regulation deficits in borderline personality disorder (BPD) led to the development of dialectical behavior therapy (DBT; Linehan, 1993) for this disorder. Theories posited by Linehan and others (Linehan 1987; Snyder & Pitt 1985; but see Farchaus-Stein 1996) have suggested that individuals with BPD have difficulty returning to an 'emotional baseline' following an emotional event. Furthermore, empirical evidence suggests that BPD patients report chronic and intense feelings of a number of negative emotions, including anger, hostility, depression, loneliness, and anxiety (e.g. Coid 1993; Farchaus-Stein 1996; Gunderson *et al.* 1975; Gunderson & Phillips 1991; Kruegelbach *et al.* 1993; Soloff 1981; Soloff & Ulrich 1981; Snyder & Pitt 1985).

Portions of DBT involve training patients in a number of emotion regulation skills, including reorientating of attention, changing facial and body language, perspective

taking, inhibition of mood-dependent actions, and experiencing emotion without escalating or blunting the feelings (Linehan 1993; Linehan & Schmidt 1995; Robins *et al.* 2001). Although there are several studies showing the effectiveness of this intervention, little work has yet been conducted to confirm the emotion mechanisms believed to be central to the disorder. The development of DBT followed from theory, and the attendant empirical work to support the hypothesized emotion regulation deficits is now being conducted (e.g. Lynch *et al.* 2001).

An alternative approach would be to build an intervention based on accumulated findings about a particular emotional behavior disturbance in a disorder. For example, accumulated evidence shows that schizophrenia patients are less emotionally expressive than nonpatients (see Kring 1999 for a review). Certainly, expressive behavior is an important part of socially skilled behavior. However, recent evidence suggests that the emotional deficits in schizophrenia are distinct from social skills deficits (Salem & Kring 1999), and thus interventions aimed at improving social skills may not necessarily change expressive behavior. These interventions could be strengthened by including components that specifically target emotional disturbances (e.g. expressing emotion at the right time in the appropriate contexts; interpreting emotions in others) as well as the performance of socially skilled behavior.

Approaches to studying emotion and nonverbal behavior in psychopathology

A number of different approaches to studying emotion and nonverbal behavior in psychopathology have been used. Some of these methods are more specific to psychopathology (e.g. symptom rating scales), whereas others are commonly used in other areas of research (e.g. facial expression coding systems such as FACS). This diversity of methods is both a blessing and a curse. Some of the methods are designed with the complexities associated with different disorders in mind. However, the sheer number of different methods throughout the literature makes comparisons across studies quite difficult. In this section, we present a cross-section of these methods, highlighting the strength and weaknesses of each along the way.

Symptom rating scales

Symptom rating scales are not typically derived to assess nonverbal behavior or emotion. However, to the extent that a particular disorder involves emotional or nonverbal behavior symptoms, they will be included in these rating scales. Most generally, symptom rating scales are completed following an interview with a patient. These interviews typically focus on the signs and symptoms of a particular illness. Table 8.2 includes a description of some commonly used clinical rating scales for adult psychopathology. These interviews were designed to assess specific symptoms and their severity and as an aid to diagnosis. Individual subscales may contain items relevant to emotion or nonverbal behavior, and other research suggests that these measures are related to other indices of emotion. For example, Kring *et al.* (1994a) found that the affective flattening subscale of the Schedule for the Assessment of Negative Symptoms

Table 8.2 Selected clinical rating scales

Scale	Relevant disorders	Items relevant to emotion and nonverbal behavior
BPRS	Schizophrenia, mood disorders	Anxiety, emotional withdrawal, guilt feelings, tension, mannerisms and posturing, depressive mood, hostility, motor retardation, blunted affect, excitement
HAM-D	Major depressive disorder	Depressed mood, feelings of guilt, slowed speech or decreased motor activity, agitation, anxiety
HAM-A	Anxiety disorders	Anxious mood, tension, fears, depressed mood, twitching, stiffness, fidgeting, restlessness, tremor of hands, furrowed brow, strained face, sighing
PANSS	Schizophrenia	Blunted affect, emotional withdrawal, anxiety, guilt, tension, mannerisms and posturing, depression, motor retardation, hostility, excitement
SANS	Schizophrenia	<i>Affective flattening</i> : unchanging facial expression, decreased spontaneous movements, poor eye contact, affective nonresponsivity, paucity of expressive gestures, lack of vocal inflections; <i>avolition-apathy</i> : physical anergia; <i>anhedonia-asociality</i>
SAPS	Schizophrenia	<i>Bizarre behavior</i> : aggressive and agitated behavior, repetitive or stereotyped behavior
ADI	Autism	Anticipatory gestures, vocal expression, range of facial expression, appropriate facial expression, pleasure/excitement

Note: BPRS = Brief Psychiatric Rating Scale (Ventura *et al.* 1993); HAM-D = Hamilton Rating Scale for Depression (Hamilton 1960); HAM-A = Hamilton Rating Scale for Anxiety (Hamilton 1959); PANSS = Positive and Negative Syndrome Scale (Kay *et al.* 1986); SANS = Scale for the Assessment of Negative Symptoms (Andreasen 1984); SAPS = Scale for the Assessment of Positive Symptoms (Andreasen 1984); ADI = Autism Diagnostic Interview (Le Couter *et al.* 1989).

(SANS; Andreasen 1984) was related to coded facial expressions of positive and negative emotion and an acoustic assessment of vocal prosody.

Although these interviews and rating scales are quite effective in assessing specific symptoms of a disorder, they are not a particularly effective means for assessing emotion and nonverbal behavior. First, the behavioral sample upon which they are based may not be representative because the ratings are typically made at one particular time, usually while the patient is in the hospital. Second, the format of these interviews also relies on a certain degree of clinical skill that may systematically fail to elicit emotional material, and thus may not provide an opportunity for patients to express a wide range of emotions. Third, the items on most rating scales do not differentiate between reduced expression of positive versus negative emotions but, rather, assess overall reduced expressiveness, therefore resulting in data that are uninformative with respect to particular emotions. Finally, most uses of the rating scales require a tabulation of a total score rather than specific subscale scores. Thus, knowing the overall total on the BPRS is informative with respect to overall symptomatology, but it does not provide any specific information about emotional symptoms.

A special type of clinical rating scale often of interest to researchers studying the emotional features of schizophrenia is one that assesses medication side-effects. As noted above, akinesia can appear virtually identical to flat affect. Unfortunately, the items on clinical rating scales used to rate akinesia are often the same items used to

assess flat affect. This suggests the need for a more comprehensive and fine-grained behavioral assessment of expressive behavior and emotional responding that goes beyond rating scales for symptoms and medication side-effects.

Self-report measures of symptoms or diagnosis

Many symptom self-report measures have been developed. Review of these measures far exceeds the scope of this chapter. In almost all cases, these measures were not developed to assess emotion or nonverbal behavior associated with a particular disorder. Rather, they were developed to assess symptoms of disorders. Like the clinical interviews discussed above, these measures include items related to emotion only if emotion-related symptoms are part of the disorder. Taken alone, then, these measures are not a good measure of emotion in psychopathology. Taking out emotion-relevant items to form a new 'subscale' may violate the integrity of the measure and is therefore not recommended. These measures may be used to augment other measures of emotion and psychopathology but, like clinical interviews, the primary purpose of these measures is to provide information about diagnosis, symptom severity, or both.

Observational ratings

Other methods for assessing emotion and nonverbal behavior include direct observational ratings. Most often, these studies have been conducted with patients who are inpatients. For example, Brown *et al.* (1979) observed and rated overt changes in facial expression associated with pleasurable activities that were exhibited by six schizophrenia and five depressed inpatients; schizophrenia patients exhibited significantly more such changes than did depressed patients.

The Autism Diagnostic Observation Schedule—Generic (ADOS-G; Lord *et al.* 2000) is a combination of clinical interview/rating scale and observational method. The generic version of this measure was developed for use with a broader age range of individuals, including adults, following the success of the ADOS (Lord *et al.* 1989; Lord *et al.* 1999) in diagnosing autism in children ranging from 5–12 years old. The ADOS-G involves a number of activities and interactions that allow an examiner to assess social-emotional and other disrupted behaviors, as well as language capabilities. Activities include conversational interactions/interviews, examining cartoons, creating a story, describing a picture, and telling a story from a book. Some of the emotional behaviors assessed by the ADOS-G include unusual eye contact, whether or not facial expressions are directed towards others, empathetic or emotional gestures, empathy/comments on others' emotions, shared enjoyment, mannerisms, negative behaviors, and anxiety. Like most clinical interviews, a good bit of training is necessary in order to administer the measure accurately and competently.

Other descriptive, observational approaches come from the ethological psychiatry tradition (Troisi 1999). From this perspective, nonverbal behaviors are observed, catalogued, and conceptualized from an evolutionary standpoint (e.g. Pederson *et al.* 1988). Nonverbal behaviors are not necessarily presumed to reflect emotion, consistent with other ethological approaches to nonverbal behavior (e.g. Birdwhistell 1970;

Mitchell & Thompson 1986; Smith 1985). These studies typically include very small numbers of patients and describe a very large number of behaviors, most usually during an inpatient hospital stay.

One goal of the ethological psychiatry approach is to describe the behavior of the 'typical patient'. This implies that a psychological disorder can be identified by a particular nonverbal behavior 'signature'. However, this assumption does not leave much room for individual variation—yet individual differences are widespread in both patient and nonpatient populations. Additionally, since most of these studies include such a small sample of patients (due largely to the labor-intensive work associated with observing hundreds of behaviors), generalizations to larger groups of patients cannot be clearly made.

Findings from this approach have suggested that certain nonverbal behaviors may change over the course of a hospital stay for patients with depression and schizophrenia. For example, Pederson *et al.* (1988) observed and recorded the presence or absence of 142 different behaviors exhibited by five hospitalized depressed patients. Observations were conducted for four hours each day during the entire hospital stay (ranging from 4 to 11 weeks). Analyses were concerned with identifying behaviors that changed from the first to last week of hospitalization and how these behaviors correlated with symptom ratings of depression. Patients who improved the most during their hospital stay tended to display greater activity towards the end of the stay (e.g. more communication, getting out of bed, greater eye contact). Yet, there were widespread individual differences even among just five patients.

Similar findings were reported by Fossi *et al.* (1984) who observed 110 different behaviors among 29 hospitalized depressed patients. After treatment, patients exhibited greater eye contact, more exploration in the environment, and more frequent facial expressions of emotion. Towards the end of the hospital stay, patients spent less time in their rooms and more time in common areas compared with the early part of the hospital stay. Schelde (1998) also found behavior changes in 11 patients with depression following an inpatient stay of between 3 and 15 weeks. Specifically, patients showed less withdrawal, nonspecific gaze, more mouth movements, more social interest, more smiles, and more verbal social behavior. Other findings show that depressed individuals exhibited more excitement, gestures, and head movement following recovery (Bos *et al.* 2002; Geerts & Bouhys 1998; Geerts *et al.* 1996).

Although findings such as these may be informative with respect to generating hypotheses for future studies about nonverbal behavior and depression, they are limited by numerous methodological issues, including:

- small sample sizes;
- variations in treatment;
- insufficient information about patients' symptoms;
- lack of a control group.

More recent ethological studies have attempted to predict prognosis and treatment response (Troisi 1999). The Ethological Coding System for Interviews (ECSI) was developed to rate behaviors occurring in the context of a clinical interview. Thirty-seven different behaviors are rated using this system, and seven subscales are then

created: affiliation (e.g. smile, eye raise); submission (e.g. nod, lips in and pressed together); prosocial (affiliation and submission combined); flight (e.g. look away, look down, shut eyes); assertion (e.g. lean forward, head shake, thrust, frown); displacement (e.g. scratch, fumble, yawn, hands on face); and relaxation (e.g. relax, settle, laugh, arms across chest). In a sample of 18 male schizophreniform patients, Troisi *et al.* (1991) found that patients with a poor prognosis had less eye contact and more eye closures during an interview than patients with a good prognosis. Troisi *et al.* (1998) found that 28 drug-free, male schizophrenia patients showed less prosocial behavior and displacement and fewer gestures than 12 healthy controls or 13 medical students. Troisi *et al.* (1989) found that 14 depressed individuals who responded to medication (amitriptyline) showed more affiliation and assertion. These findings, though based on small sample sizes, support the use of this system for assessing nonverbal behaviors in the context of an interview, but not emotional behavior per se.

Laboratory paradigms and coding systems

Borrowing directly from the basic emotion literature, researchers have used a number of laboratory paradigms to elicit emotion in persons with different psychological disorders. These studies typically involve presenting patients with emotionally evocative stimuli (e.g. film clips, pictures, slides, odors) and asking them to rate their experience of emotion following the presentation. Facial expressions are often videotaped and later coded and, in some cases, psychophysiological measures are also employed. The advantages to this approach are many. First, stimuli often have been used in a number of studies, thus bolstering confidence in their emotion-eliciting capabilities. Furthermore, a number of studies have also used these stimuli with patient populations, further confirming their applicability to psychopathology research. Second, these studies are conducted in laboratory settings where a number of extraneous variables can be brought under experimental control, thus making interpretation of findings more clear. Third, these studies typically involve assessments of multiple components of emotion allowing for a more comprehensive understanding of emotion function (or dysfunction) in a particular patient group. Fourth, methods used to assess emotion behaviors, such as facial expression, are often well-validated systems used in a number of studies.

This approach is not without limitations, however. For example, the ecological validity is less than ideal. Knowing how patients respond to emotionally evocative films clips does not necessarily translate into knowing how patients respond to emotional events in daily life. In addition, certain emotions (e.g. anger) are more difficult to elicit in a laboratory context than others (e.g. happiness), limiting the range of emotions that can be studied. Finally, these studies often examine emotional behavior in the individual, without regard to contextual influences (e.g. social interaction).

A range of emotionally evocative stimuli have been used in laboratory studies of emotion and psychopathology. While all laboratory inductions of emotion are somewhat artificial in nature, viewing film clips is a relatively common activity for most people. This method is also not reliant on subjects' ability to recall past experiences. Slides or still photographs present momentary emotional scenes, whereas film clips

present a more realistic context in which emotional experiences typically develop over time. Additionally, this procedure has been used successfully with different patient populations (e.g. Berenbaum & Oltmanns 1992; Kring & Earnst 1999; Kring *et al.* 1993; Kring & Neale 1996; Litz *et al.* 2000; Rottenberg *et al.* 2002). Finally, film clips ensure that the nature of emotional stimuli is consistent across all subjects. Other widely used stimuli in laboratory research include pictures of facial expression (e.g. Kring *et al.* 1999; Sloan *et al.* 2002) and emotionally evocative slides (e.g. Allen *et al.* 1999; Sloan *et al.* 1997, 2001)

Studies that videotape facial expressions for later coding have used a variety of coding systems, such as the Facial Action Coding System (FACS: Ekman & Friesen 1978; Ekman *et al.* 2002) and the Facial Expression Coding System (FACES: Kring & Sloan 1992). These systems have been developed with nonpatient populations and used in several studies of basic emotion processes in both patient and nonpatient populations. Other studies have created a coding scheme for a particular study and not for widespread use by other investigators. Decisions about which method of measurement to adopt should be driven by both theoretical and practical considerations.

Widely considered the standard in observational coding systems, FACS was designed to provide a comprehensive assessment of all visible facial muscle movements without explicitly making reference to the meaning of those movements. FACS coders are trained to identify 44 anatomically distinct muscle movements (e.g. lip corner puller), labeled action units (AUs), but they are not asked to make inferences about underlying emotional state (e.g. happy expression). Directions for identifying particular AUs believed to be signs associated with emotional expressions is provided with FACS. FACS is theoretically aligned with a discrete emotions perspective, whereby a set of biologically based and functionally significant basic emotions are postulated (e.g. Ekman 1992). The emphasis, therefore, is on identifying AUs that are relevant to seven basic emotions: fear, anger, disgust, happiness, sadness, surprise, and contempt.

Kring and Sloan (1992) developed FACES as a systematic method for rating dimensional expressivity. Rather than assessing discrete emotions associated with specific muscle movements, FACES coders rate the changes in facial musculature that are associated with valence and intensity. We adopted the assumption that coders will be culturally familiar with facial expressions and, thus, will be able to identify facial muscle changes of positive and negative valence. FACES has been used in studies of emotional responding in various patient populations (e.g. Aghevli *et al.* 2003; Kring *et al.* 1993; Kring & Neale 1996; Wagner *et al.* 2003) and college students (e.g. Kring *et al.* 1994b; Kring & Gordon 1998).

Other laboratory approaches to assessing nonverbal behavior in psychopathology include the role play test (RPT: e.g. Bellack *et al.* 1990b). Patients are given a number of different scenarios (e.g. someone asks to borrow money and you were planning to spend the money on something for yourself) and are asked to act out how they would respond in the scenario. These role plays are videotaped and later rated for verbal and nonverbal behaviors. The impetus for the development of the RPT was to develop a system upon which objective assessment of social competence among psychiatric patients could be based. In the RPT, the videos are rated for gaze appropriateness,

speech duration, meshing (smooth conversation), and affect. Other RPTs include the Assessment of Interpersonal Problem Solving Skills (AIPSS; Donahoe *et al.* 1990).

Approaches in action: emotion and psychopathology

In this section, we review selected findings on emotional behavior in adult psychopathology. This review is intended to highlight the promise of adopting basic emotion paradigms to the study of emotion in psychopathology, despite the numerous complexities associated with psychopathology research.

Schizophrenia

A number of investigators have used methods for eliciting emotion and measuring emotion behavior that were developed by researchers studying basic emotion in order to investigate emotional responding among patients with schizophrenia. These studies, most of which were conducted in the last 12 years, have yielded a consistent and well-replicated set of findings.

Schizophrenia patients are less expressive (both facially and vocally) than nonpatients in response to a variety of contexts and stimuli, including emotionally evocative films (Berenbaum & Oltmanns 1992; Kring & Earnst 1999; Kring & Neale 1996; Kring *et al.* 1993; Mattes *et al.* 1995), cartoons (Dworkin *et al.* 1996), and social interactions (Borod *et al.* 1989; Krause *et al.* 1989; Martin *et al.* 1990; Kring *et al.* 1994a; Mattes *et al.* 1995). In addition, schizophrenia patients' pattern of facial and vocal expression have been distinguished from other patient groups with symptoms that bear resemblance to flat affect, including depression, Parkinson's disease, and patients with right hemisphere brain damage (Borod *et al.* 1989; Levin *et al.* 1985; Martin *et al.* 1990; Berenbaum & Oltmanns 1992). Despite their diminished expressive behavior, schizophrenia patients reported experiencing similar and, in some cases, greater amounts of emotion compared to nonpatients (Berenbaum & Oltmanns 1992; Earnst & Kring 1999; Kring & Earnst 1999; Kring & Neale 1996; Salem & Kring 1999).

It is important to point out that we, and others, have found this same pattern both when patients were on medication (Berenbaum & Oltmanns 1992) and when they were off medication (Kring *et al.* 1993; Kring & Neale 1996; Kring & Earnst 1999). Moreover, we have found that both facial expression and subjective experience are remarkably stable across time and medication status (Kring & Earnst 1999). Additional evidence shows that schizophrenia patients exhibit very subtle, microexpressive displays in a manner consistent with the valence of the stimuli (Mattes *et al.* 1995; Earnst *et al.* 1996; Kring *et al.* 1999; Kring & Earnst 2003). For example, we have shown that in response to positive stimuli, schizophrenia patients exhibit more zygomatic (cheek) muscle activity, which is typically associated with positive emotion, than corrugator (brow) muscle activity, which is typically associated with negative emotion. By contrast, in response to negative stimuli, patients exhibit more corrugator activity than zygomatic activity (Kring & Earnst 2003).

Although schizophrenia patients may exhibit subtle facial expressions, these displays are not observable to others, and this relative inexpression has a number of

interpersonal consequences. For example, spouses of schizophrenia patients with negative symptoms, including flat affect, reported greater marital dissatisfaction (Hooley *et al.* 1987). Healthy individuals reported experiencing more fear and sadness and were themselves less expressive when they interacted with a schizophrenia patient than when they interacted with another healthy individual (Krause *et al.* 1992). Using symptom rating scales to measure diminished expressivity, Bellack *et al.* (1990a) found that patients who were the least expressive had poorer interpersonal relationships and poorer adjustment at home and in other social domains. Without the benefit of overt signs of emotion, others may misinterpret the ongoing emotional state of a patient with schizophrenia. Moreover, there is some evidence indicating that schizophrenia patients may not be aware of how unexpressive they are (Kring 1991). Thus, patients may not understand others' reactions in ongoing interactions, and they may not take alternate measures to make their emotional state known.

There is some evidence to suggest that schizophrenia patients may display fewer facial expressions (particularly positive expressions) prior to the onset of the illness. For example, Walker and colleagues (1993) obtained home movies of adults with schizophrenia that were made before these adults developed schizophrenia. They coded facial expressions from the home movies of pre-schizophrenic boys and girls and found that girls displayed fewer joy expressions and that both boys and girls displayed *more* negative facial expressions compared to their healthy siblings. Findings from prospective, high-risk studies have reported similar findings. High-risk studies identify a group of children at risk for developing schizophrenia (typically defined as having a biological parent with schizophrenia) and then follow them from childhood through the period of risk (Neale & Oltmanns 1980). Teacher ratings from the Copenhagen High-Risk Study indicated that boys and girls who were later diagnosed with schizophrenia were more emotionally labile, socially withdrawn, socially anxious, and relatively unexpressive than children who did not develop schizophrenia (Olin *et al.* 1995; Olin & Mednick 1996). Findings from the New York High-Risk Project indicated that flat affect was greater among adolescents at risk for developing schizophrenia than adolescents at risk for developing affective disorders (Dworkin *et al.* 1991).

Mood disorders

Accumulated evidence indicates that individuals with major depressive disorder (hereafter referred to as depression) exhibit dampened facial, vocal, and gestural expressive behavior (Berenbaum & Oltmanns 1992; Ekman & Friesen 1974; Gotlib & Robinson 1982; Hargreaves *et al.* 1965; Jones & Pansa 1979; Kaplan *et al.* 1999; Murray & Arnott 1993; Scherer 1986; Schwartz *et al.* 1976; Ulrich & Harms 1985; Waxer 1974). In addition, dampened expressive behavior among individuals with depression may be specific to positive expressions, though this needs additional study. For example, Berenbaum and Oltmanns (1992) found that depressed individuals showed fewer facial expressions in response to positive stimuli (but not to negative stimuli) than nonpatients and schizophrenic patients with flat affect.

In other studies, researchers examining emotion and other nonverbal behavior in social interactions found that currently depressed individuals exhibited less eye contact

than recovered depressed individuals (e.g. Hinchliffe *et al.* 1971; Waxer 1974, 1976) or nonpatients (Troisi & Moles 1999) and that greater eye contact and gaze were associated with a reduction in symptoms over the course of inpatient treatment (Ellgring 1986). Other findings suggest that depressed individuals exhibit less eye contact in more interactions that are unobtrusively observed than in laboratory paradigms (Segrin 1992). In a review of social functioning and depression, Feldman and Gotlib (1993) noted a number of studies that found depressed individuals to exhibit little eye contact, few smiles, and monotonous speech in interactions with unfamiliar others, yet exhibited more negative emotions and disruptions with spouses.

Expressive vocal deficits have also been studied in depression. Broadly, the speech of depressed individuals has been qualitatively described as flat, dull, and slow in tempo (Buck 1984; Hargreaves *et al.* 1965; Levin *et al.* 1985; Murray & Arnott 1993; Scherer 1986). Acoustic analyses, such as those derived through the analysis of digitized waveform representations of speech, have also proven useful in distinguishing between the speech of depressed and nondepressed individuals. For example, Bettes (1988) reported that mothers with self-reported symptoms of depression produced infant-directed speech with narrower pitch contours than were observed in the infant-directed speech of control mothers. Similarly, Kaplan *et al.* (1999) also noted different patterns of pitch modulation and variability in the infant-directed speech of mothers with symptoms of depression. Other researchers have shown that depressed individuals exhibit less affection, fewer gazes, flat affect, and less playing with their infants (reviewed in Feldman & Gotlib 1993).

Even fewer researchers have examined emotional behavior in bipolar disorder. Simoneau and Miklowitz (1991) developed a coding system for nonverbal behaviors exhibited during family interactions called the Nonverbal Interactional Coding System (NICS). Using this system, bipolar patients have been found to exhibit greater affiliative behaviors (e.g. gestures, leaning) yet similar amounts of distancing behaviors (e.g. looking away, leaning away) in interactions with parents than schizophrenia patients (Simoneau *et al.* 1996). Bipolar patients from families rated low in expressed emotion (EE) displayed more positive nonverbal behaviors in a family interaction than bipolar patients from families rated high in EE (Simoneau *et al.* 1998). There is also some evidence to suggest that an empirically supported psychosocial intervention for bipolar disorder, family focused treatment (FFT; Miklowitz & Goldstein 1990; Miklowitz *et al.* 2003), has an effect on emotional behavior in bipolar patients. Compared to pre-treatment, patients exhibited more positive nonverbal behavior after receiving FFT (Simoneau *et al.* 1999).

Anxiety disorders

Surprisingly, little is known about emotional behavior among patients with anxiety disorders, with the most research on nonverbal behavior and anxiety being conducted with social phobia. Social phobia is characterized by anxiety, fear, and avoidance of social situations, performance, and evaluations. Indeed, individuals with social phobia do not experience such anxiety when alone, but rather experience extreme anxiety when confronted with a social situation that involves interaction or presumed evaluation (Barlow 2002).

Findings from one study suggest that individuals with social phobia display nonverbal behaviors characteristic of anxiety. Marcus and Wilson (1996) studied social anxiety among college women during an observed speaking task. Observers' ratings of anxiety were significantly related to speakers' reports of anxiety, even though speakers rated themselves as more anxious than they were rated by observers. These findings indirectly suggest that social anxiety is comprised of relatively easily recognizable nonverbal behaviors and cues. Fydrich *et al.* (1998) developed the Social Performance Rating Scale (SPRS) to assess verbal and nonverbal behaviors exhibited by social phobia patients during a role play test. Items rated include voice quality, gaze, discomfort, and talk time, and these items distinguished socially phobic adults from a non-patient control group. Wallace and Alden (1997) found that individuals with social phobia exhibited fewer positive nonverbal behaviors and less warmth and interest during a dyadic social interaction. Socially phobic individuals also were rated as more visibly anxious than their non-anxious counterparts.

Conclusions

Given the central role emotion plays in several psychological disorders, the assessment of nonverbal and emotion behaviors can be of tremendous benefit to furthering our understanding of the symptoms, course, and treatment of psychopathology. We have suggested that the methods developed to study emotion in nonpatient populations are extremely useful for psychopathology research. Indeed, as briefly reviewed here, adopting methods from basic emotion research has allowed investigators to study multiple components of emotional response in emotionally evocative situations and has revealed a number of important findings about emotional behavior in psychopathology.

Laboratory-based measures of emotional responding can provide important information that is not easily accessed with clinical rating scales. For example, ratings of flat affect might be misinterpreted to mean that a schizophrenia patient is without feeling. Indeed, studies that rely solely on clinical rating scales that typically assess only one component of emotion may fail to adequately capture the essence of the emotional disturbance in schizophrenia, which appears to be the lack of coordinated engagement of emotion response components. Although the experimental control offered by a laboratory manipulation of emotion answers important questions, its generalizability is limited. Results from these laboratory studies can suggest a number of hypotheses that can then be tested in a more ecologically valid (but less well-controlled) setting. For example, examining emotional response tendencies in contexts such as social interaction with family members is a direction that deserves further empirical attention. Thus, a combination of both laboratory and naturalistic research, augmented with information from self-report and clinical rating scales, will likely yield the most complete picture of emotion disturbances in psychopathology.

There is no question that emotional disturbances figure prominently in psychopathology. Additional research is needed, however, to more fully illuminate the manner in which emotional behaviors may contribute to the onset, maintenance, and long-term

consequences of the disorders. Research that encompasses a wide variety of methods and multiple levels of analysis is the most promising approach not only to understanding emotion dysfunction, but also to developing effective interventions.

References

- Aghevli, M.A., Blanchard, J.J., & Horan, W.P. (2003). The expression and experience of emotion in schizophrenia: a study of social interactions. *Psychiatry Research*, *119*, 261–70.
- Allen, N.B., Trinder, J., & Brennen, C. (1999). Affective startle modulation in clinical depression: preliminary findings. *Biological Psychiatry*, *46*, 542–50.
- American Psychiatric Association (2000). *Diagnostic and statistical manual of mental disorders* (4th edn, text revision). Washington, DC: APA.
- Andreasen, N.C. (1984). *The Scale for the Assessment of Negative Symptoms (SANS)*. The University of Iowa, Iowa City, Iowa.
- Andreasen, N.C. (1984). *The Scale for the Assessment of Positive Symptoms (SAPS)*. The University of Iowa, Iowa City, Iowa.
- Barlow, D.H. (2002). *Anxiety and its disorders* (2nd edn). New York: Guilford.
- Barnett, P.A. & Gotlib, I.H. (1988). Psychosocial functioning and depression: distinguishing among antecedents, concomitants, and consequences. *Psychological Bulletin*, *104*, 97–126.
- Beck, A.T., Ward, C.H., Mendelson, M., Mock, J., & Erbaugh, J. (1961). An inventory for measuring depression. *Archives of General Psychiatry*, *4*, 651–71.
- Bellack, A.S., Morrison, R.L., Wixtead, J.T., & Mueser, K.T. (1990a). An analysis of social competence in schizophrenia. *British Journal of Psychiatry*, *156*, 809–18.
- Bellack, A.S., Morrison, R.L., Mueser, K.T., Wade, J.H., & Sayers, S.L. (1990b). Role play for assessing the social competence of psychiatric patients. *Psychological Assessment*, *2*, 248–55.
- Berenbaum, H. & Fujita, F. (1994). Schizophrenia and personality: exploring the boundaries and connections between vulnerability and outcome. *Journal of Abnormal Psychology*, *103*, 148–58.
- Berenbaum, H. & Oltmanns, T.F. (1992). Emotional experience and expression in schizophrenia and depression. *Journal of Abnormal Psychology*, *101*, 37–44.
- Berenbaum, H., Raghavan, G., Le, H.-N., Vernon, L.L., & Gomez, J.J. (2003). A taxonomy of emotional disturbances. *Clinical Psychology: Science and Practice*, *10*, 206–26.
- Bettes, B. (1988). Maternal depression and mothers: temporal and intonational features. *Child Development*, *59*, 1089–96.
- Birdwhistell, R.L. (1970). *Kinesics and context*. Philadelphia, PA: University of Pennsylvania Press.
- Blanchard, J.J. & Neale, J.M. (1992). Medication effects: conceptual and methodological issues in schizophrenia research. *Clinical Psychology Review*, *12*, 345–61.
- Blanchard, J.J., Brown, S.A., Horan, W.P., & Sherwood, A.R. (2000). Substance use disorders in schizophrenia: review, integration, and a proposed model. *Clinical Psychology Review*, *20*, 207–34.
- Blanchard, J.J., Mueser, K.T., & Bellack, A.S. (1998). Anhedonia, positive and negative affect, and social functioning in schizophrenia. *Schizophrenia Bulletin*, *24*, 413–24.
- Borod, J.C., Alpert, M., Brozgold, A., Martin, C., Welkowitz, J., Diller, L., et al. (1989). A preliminary comparison of flat affect schizophrenics and brain-damaged patients on measures of affective processing. *Journal of Communication Disorders*, *22*, 93–104.
- Bos, E.H., Geerts, E., & Bouhys, A.L. (2002). Non-verbal interaction involvement as an indicator of prognosis in remitted depressed subjects. *Psychiatry Research*, *113*, 269–77.
- Brown, S., Sweeney, D.R., & Schwartz, G.E. (1979). Differences between self-reported and observed pleasure in depression and schizophrenia. *The Journal of Nervous and Mental Disease*, *167*, 410–15.
- Buck, R. (1984). *The communication of emotion*. New York: Guilford Press.
- Carpenter, W.T. Jr., Heinrichs, D.W., & Alphas, L.D. (1985). Treatment of negative symptoms. *Schizophrenia Bulletin*, *11*, 440–52.
- Chapman, L.J., Chapman, J.P., Kwapil, T.R., Eckblad, M., & Zinser, M.C. (1994). Putatively psychosis-prone subjects 10 years later. *Journal of Abnormal Psychology*, *103*, 171–83.
- Chapman, L.J., Chapman, J.P., & Raulin, M. (1976). Scales for physical and social anhedonia. *Journal of Abnormal Psychology*, *85*, 374–82.
- Coid, J.W. (1993). An affective syndrome in psychopaths with borderline personality disorder. *British Journal of Psychiatry*, *162*, 641–50.
- Coyne, J.C. (1994). Self-reported distress: analog or ersatz depression? *Psychological Bulletin*, *116*, 29–45.
- Darwin, C. (1872). *The expression of the emotions in man and animals*. Oxford, England: Murray Press.
- Donahoe, C.P., Carter, M.J., Bloem, W.D., Hirsch, G.L., Laasi, N., & Wallace, C.J. (1990). Assessment of interpersonal problem-solving skills. *Psychiatry*, *53*, 329–39.
- Dworkin, R.H., Bernstein, G., Kaplansky, L.M., Lipsitz, J.D., Rinaldi, A., Slater, S.L., et al. (1991). Social competence and positive and negative symptoms: a longitudinal study of children and adolescents at risk for schizophrenia and affective disorder. *American Journal of Psychiatry*, *148*, 1182–8.
- Dworkin, R., Clark, S.C., Amador, X.F., & Gorman, J.M. (1996). Does affective blunting in schizophrenia reflect affective deficit or neuromotor dysfunction? *Schizophrenia Research*, *20*, 301–6.
- Earnst, K.S. & Kring, A.M. (1999). Emotional responding in deficit and nondeficit schizophrenia. *Psychiatry Research*, *88*, 191–207.
- Earnst, K.S., Kring, A.M., Kadar, M.A., Salem, J.E., Shepard, D., & Loosen, P.T. (1996). Facial expression in schizophrenia. *Biological Psychiatry*, *40*, 556–8.
- Eckblad, M. & Chapman, L.J. (1983). Magical ideation as an indicator of schizotypy. *Journal of Consulting & Clinical Psychology*, *51*, 215–25.
- Ekman, P. (1992). Facial expression and emotion. *American Psychologist*, *48*, 384–92.
- Ekman, P. (1994). Strong evidence for universals in facial expression: a reply to Russell's mistaken critique. *Psychological Bulletin*, *115*, 268–87.
- Ekman, P. (1998). *Charles Darwin's 'The expression of the emotions in man and animals'*. London, England: Harper Collins/New York, NY: Oxford University Press.

- Ekman, P. & Friesen, W.V. (1974). Nonverbal behavior and psychopathology. In *The psychology of depression: contemporary theory and research* (ed. R.J. Friedman & M.M. Katz), pp. 203–32. Washington, DC: John Wiley.
- Ekman, P. & Friesen, W.V. (1978). *The Facial Action Coding System*. Palo Alto, CA: Consulting Psychological Press.
- Ekman, P., Friesen, W.V., & Hager, J.C. (2002). *The Facial Action Coding System*. Salt Lake City, UT: A Human Face.
- Ellgring, H. (1986). Nonverbal expression of psychological states in psychiatric patients. *Acta Psychiatrica Scandinavica*, 236, 31–4.
- Farchaus-Stein, K. (1996). Affect instability in adults with a borderline personality disorder. *Archives of Psychiatric Nursing*, 10, 32–40.
- Feldman, L.A. & Gotlib, I.H. (1993). Social dysfunction. In *Symptoms of depression* (ed. C.G. Costello), pp. 85–111. New York: John Wiley.
- First, M.B., Spitzer, R.L., Gibbon, M., & Williams, J.B.W. (1994). *Structured Clinical Interview for Axis I DSM-IV disorders – Patient Edition (SCID-I/P, version 2.0)*. New York: Biometrics Research Department.
- Fossi, L., Faravelli, C., & Paoli, M. (1984). The ethological approach to the assessment of depressive disorders. *Journal of Nervous and Mental Disease*, 172, 332–41.
- Frijda, N. (1986). *The emotions*. Cambridge, England: Cambridge University Press.
- Fydrich, T., Chambliss, D.L., Perry, K.J., Buergener F., & Beazley, M.B. (1998). Behavioral assessment of social performance: a rating system for social phobia. *Behaviour Research and Therapy*, 36, 995–1010.
- Geerts, E. & Bouhuys, N. (1998). Multi-level prediction of short-term outcome of depression: non-verbal interpersonal processes, cognitions, and personality traits. *Psychiatry Research*, 79, 59–72.
- Geerts, E., Bouhuys, N., & Van den Hoofbakker, R.H. (1996). Nonverbal attunement between depressed patients and an interviewer predicts subsequent improvement. *Journal of Affective Disorders*, 40, 15–21.
- Gotlib, I.H. & Robinson, L.A. (1982). Responses to depressed individuals: discrepancies between self-report and observer-rated behavior. *Journal of Abnormal Psychology*, 91, 231–40.
- Gotlib, I.H., Lewinsohn, P.M., & Seeley, J.R. (1995). Symptoms versus a diagnosis of depression: differences in psychosocial functioning. *Journal of Consulting and Clinical Psychology*, 63, 90–100.
- Gunderson, J.G. & Phillips, K.A. (1991). A current view of the interface between borderline personality disorder and depression. *American Journal of Psychiatry*, 148, 967–75.
- Gunderson, J.G., Carpenter, W.T., & Strauss, J.S. (1975). Borderline and schizophrenic patients: a comparative study. *American Journal of Psychiatry*, 132, 1259–64.
- Hamilton, M. (1959). The assessment of anxiety states by rating. *British Journal of Medical Psychology*, 32, 50–5.
- Hamilton, M. (1960). A rating scale for depression. *Journal of Neurology, Neurosurgery and Psychiatry*, 12, 56–62.
- Hammen, C.L. (1980). Depression in college students: beyond the Beck Depression Inventory. *Journal of Consulting and Clinical Psychology*, 48, 126–8.
- Hargreaves, W., Starkweather, J., & Blacker, K. (1965). Voice quality in depression. *Journal of Abnormal Psychology*, 70, 218–29.
- Hinchliffe, M.K., Lancashire, M., & Roberts, E.J. (1971). A study of eye contact changes in depressed and recovered psychiatric patients. *British Journal of Psychiatry*, 119, 213–15.
- Hooley, J.M., Richters, J.E., Weintraub, S., & Neale, J.M. (1987). Psychopathology and marital distress: the positive side of positive symptoms. *Journal of Abnormal Psychology*, 96, 27–33.
- Jones, I.H. & Pansa, M. (1979). Some nonverbal aspects of depression and schizophrenia occurring during the interview. *Journal of Nervous and Mental Disease*, 167, 402–9.
- Kaplan, P.J., Bachorowski, J.-A., & Zarlengo-Strouse, P. (1999). Infant-directed speech produced by mothers with symptoms of depression fails to promote learning in four-month-old infants. *Child Development*, 70, 560–70.
- Katz, M.M., Wetzler, S., Cloitre, M., Swann, A., Secunda, S., Mendels, J., et al. (1993). Expressive characteristics of anxiety in depressed men and women. *Journal of Affective Disorders*, 28, 267–77.
- Kay, S.R., Opler, L.A., & Fiszbein, A. (1986). *Positive and negative syndrome scale (PANSS) rating manual*. Albert Einstein College of Medicine/Montefiore Medical Center and Schizophrenia Research Unit, Bronx Psychiatric Center, Bronx, NY.
- Keltner, D. & Kring, A.M. (1998). Emotion, social function, and psychopathology. *Review of General Psychology*, 2, 320–42.
- Kendall, P.C., Hollon, S.D., Beck, A.T., Hammen, C.L., & Ingram, R.E. (1987). Issues and recommendations regarding use of the Beck Depression Inventory. *Cognitive Therapy & Research*, 11, 289–99.
- Krause, R., Steimer, E., Sanger-Alt, C., & Wagner, G. (1989). Facial expressions of schizophrenic patients and their interaction partners. *Psychiatry*, 52, 1–12.
- Krause, R., Steimer-Krause, E., & Hufnagel, H. (1992). Expression and experience of affects in paranoid schizophrenia. *Revue européenne de Psychologie Appliquée*, 42, 131–8.
- Kring, A.M. (1991). *The relationship between emotional expression, subjective experience, and autonomic arousal in schizophrenia*. Unpublished doctoral dissertation.
- Kring, A.M. (1999). Emotion in schizophrenia: old mystery, new understanding. *Current Directions in Psychological Science*, 8, 160–3.
- Kring, A.M. (2001). Emotion and psychopathology. In *Emotions: current issues and future directions* (ed. T.J. Mayne & G.A. Bonanno), pp. 337–60. New York: Guilford Press.
- Kring, A.M. & Bachorowski, J.-A. (1999). Emotion and psychopathology. *Cognition and Emotion*, 13, 575–99.
- Kring, A.M. & Earnst, K.S. (1999). Stability of emotional responding in schizophrenia. *Behavior Therapy*, 30, 373–88.
- Kring, A.M. & Earnst, K.S. (2003). Nonverbal behavior in schizophrenia. In *Nonverbal behavior in clinical settings* (ed. P. Philippot, E. Coats, & R.S. Feldman), pp. 263–86. New York: Oxford University Press.
- Kring, A.M. & Gordon, A.H. (1998). Sex differences in emotion: expression, experience, and physiology. *Journal of Personality and Social Psychology*, 74, 686–703.
- Kring, A.M. & Neale, J.M. (1996). Do schizophrenic patients show a disjunctive relationship among expressive, experiential, and psychophysiological components of emotion? *Journal of Abnormal Psychology*, 105, 249–57.

- Kring, A.M. & Sloan, D. (1992). *The facial expression coding system (FACES): a users guide*. Unpublished manuscript.
- Kring, A.M., Alpert, M., Neale, J.M., & Harvey, P.D. (1994a). A multichannel, multimethod assessment of affective flattening in schizophrenia. *Psychiatry Research*, 54, 211–22.
- Kring, A.M., Kerr, S.L., & Earnst, K.S. (1999). Schizophrenic patients show facial reactions to emotional facial expressions. *Psychophysiology*, 36, 1–7.
- Kring, A.M., Kerr, S.L., Smith, D.A., & Neale, J.M. (1993). Flat affect in schizophrenia does not reflect diminished subjective experience of emotion. *Journal of Abnormal Psychology*, 102, 507–17.
- Kring, A.M., Smith, D.A., & Neale, J.M. (1994b). Individual differences in dispositional expressiveness: development and validation of the Emotional Expressivity Scale. *Journal of Personality and Social Psychology*, 66, 934–49.
- Kruegelbach, N., McCormick, R.A., Schultz, S.C., & Grueneich, R. (1993). Impulsivity, coping styles, and triggers for craving in substance abusers with borderline personality disorder. *Journal of Personality Disorders*, 7, 214–22.
- Kwapil, T. (1998). Social anhedonia as a predictor of the development of schizophrenia-spectrum disorders. *Journal of Abnormal Psychology*, 107, 558–65.
- Lang, P.J., Bradley, M.M., & Cuthbert, B.N. (1990). Emotion, attention, and the startle reflex. *Psychological Review*, 97, 377–95.
- Le Couteur, A., Rutter, M., Lord, C., Rios, P., Roberston, S., Holdgrafer, M., et al. (1989). Autism diagnostic interview: a standardized investigator-based instrument. *Journal of Autism and Developmental Disorders*, 19, 363–88.
- Levenson, R.W. (1992). Autonomic nervous system differences among emotions. *Psychological Science*, 3, 23–7.
- Levin, S., Hall, J.A., Knight, R.A. & Alpert, M. (1985). Verbal and nonverbal expression of affect in speech of schizophrenic and depressed patients. *Journal of Abnormal Psychology*, 94, 487–97.
- Linehan, M.M. (1987). Dialectical behavior therapy for borderline personality disorder. *Bulletin of the Menninger Clinic*, 51, 261–76.
- Linehan, M.M. (1993). *Cognitive behavioral treatment of borderline personality disorder*. New York: Guilford Press.
- Linehan, M.M. & Schmidt, H. (1995). The dialectics of effective treatment of borderline personality disorder. In *Theories of behavior therapy: exploring behavior change* (ed. W.T. O'Donohue & L. Krasner), pp. 553–84. Washington, DC: American Psychological Association.
- Litz, B.T., Orsillo, S.M., Kaloupek, D., & Weathers, F. (2000). Emotional processing in posttraumatic stress disorder. *Journal of Abnormal Psychology*, 109, 26–39.
- Lord, C., Risi, S., Lambrecht, L., Cook, E.H., Leventhal, B.L., DiLavore, P.C., et al. (2000). The Autism Diagnostic Observation Schedule – Generic: a standard measure of social and communication deficits associated with the spectrum of autism. *Journal of Autism and Developmental Disorders*, 30, 205–23.
- Lord, C., Rutter, M., DiLavore, P.C., & Risi, S. (1999). *Autism Diagnostic Observation Schedule-WPS (ADOS-WPS)*. Los Angeles, CA: Western Psychological Services.
- Lord, C., Rutter, M., Goode, S., Heemsbergen, J., Jordan, H., Mawhood, L., et al. (1989). Autism Diagnostic Observation Schedule: a standardized observation of communicative and social behavior. *Journal of Autism and Developmental Disorders*, 19, 185–212.
- Lynch, T.R., Robins, C.J., Morse, J.O., & MorKrause, E.D. (2001). A mediational model relating affect intensity, emotion inhibition, and psychological distress. *Behavior Therapy*, 32, 519–36.
- Marcus, D.K. & Wilson, J.R. (1996). Interpersonal perception of social anxiety: a social relations analysis. *Journal of Social and Clinical Psychology*, 15, 471–87.
- Marder, S.R., Wirshing, W.C., & Van Putten, T. (1991). Drug treatment of schizophrenia: overview of recent research. *Schizophrenia Research*, 4, 81–90.
- Martin, C.C., Borod, J.C., Alpert, M., Brozgold, A., & Welkowitz, J. (1990). Spontaneous expression of facial emotion in schizophrenic and right brain-damaged patients. *Journal of Communication Disorders*, 23, 287–301.
- Mattes, R.M., Schneider, E., Heimann, H., & Birbaumer, N. (1995). Reduced emotional response of schizophrenic patients in remission during social interaction. *Schizophrenia Research*, 17, 249–55.
- Mineka, S., Watson, D., & Clark, L.A. (1998). Comorbidity of anxiety and unipolar mood disorders. *Annual Review of Psychology*, 49, 377–412.
- Miklowitz, D.J. & Goldstein, M.J. (1990). Behavioral family treatment for patients with bipolar affective disorder. *Behavior Modification*, 14, 457–89.
- Miklowitz, D.J., George, E.L., Richards, J.A., Simoneau, T.L., & Suddath, R.L. (2003). A randomized study of family-focused psychoeducation and pharmacotherapy in the outpatient management of bipolar disorder. *Archives of General Psychiatry*, 60, 904–12.
- Mishlove, M. & Chapman, L.J. (1985). Social anhedonia in the prediction of psychosis proneness. *Journal of Abnormal Psychology*, 94, 384–96.
- Mitchell, R.W. & Thompson, N.S. (1986). *Deception: perspectives on human and nonhuman deceit*. Albany, NY: State University of New York Press.
- Murray, I.R. & Arnott, J.L. (1993). Toward the simulation of emotion in synthetic speech: a review of the literature on human vocal emotion. *Journal of the Acoustical Society of America*, 93, 1097–108.
- Neale, J.M. & Oltmanns, T.F. (1980). *Schizophrenia*. New York, NY: John Wiley.
- Nuechterlein, K.H. & Dawson, M.E. (1984). A heuristic vulnerability/stress model of schizophrenic episodes. *Schizophrenia Bulletin*, 10, 300–12.
- Olin, S.S. & Mednick, S.A. (1996). Risk factors of psychosis: identifying vulnerable populations premorbidly. *Schizophrenia Bulletin*, 22, 223–40.
- Olin, S.S., John, R.S., & Mednick, S.A. (1995). Assessing the predictive value of teacher reports in a high risk sample for schizophrenia: an ROC analysis. *Schizophrenia Research*, 16, 53–66.
- Pansa-Henderson, M., De L'Horne, D.J., & Jones, I.H. (1982). Nonverbal behaviour as a supplement to psychiatric diagnosis in schizophrenia, depression, and anxiety disorders. *Journal of Psychiatric Treatment and Evaluation*, 4, 489–96.
- Pederson, J., Schelde, J.T.M., Hannibal, E., Behnke, K., Nielsen, B.M., & Hertz, M. (1988). An ethological description of depression. *Acta Psychiatrica Scandinavia*, 78, 320–30.
- Rifkin, A., Quitkin, F., & Klein, D.F. (1975). Akinesia: a poorly recognized drug-induced extrapyramidal behavioral disorder. *Archives of General Psychiatry*, 32, 672–4.
- Robins, C.J., Ivanhoff, A.M., & Linehan, M.M. (2001). Dialectical behavior therapy. In *Handbook of personality disorders: theory, research, and treatment* (ed. J.W. Livesly) pp. 437–59. New York, NY: Guilford Press.

- Rottenberg, J., Kasch, K.L., Gross, J.J., & Gotlib, I.H. (2002). Sadness and amusement reactivity predict concurrent and prospective functioning in major depressive disorder. *Emotion*, 2, 135–46.
- Russell, J.A., Bachorowski, J.-A., & Fernández-Dols, J.-M. (2003). Facial and vocal expressions of emotion. *Annual Review of Psychology*, 54, 329–49.
- Salem, J.E. & Kring, A.M. (1999). Flat affect and social skills in schizophrenia: evidence for their independence. *Psychiatry Research*, 87, 159–67.
- Santor, D.A. & Coyne, J.C. (2001). Evaluating the continuity of symptomatology between depressed and nondepressed individuals. *Journal of Abnormal Psychology*, 110, 216–25.
- Schelde, J.T.M. (1998). Major depression: behavioral markers of depression and recovery. *Journal of Nervous and Mental Disease*, 186, 133–40.
- Scherer, K.R. (1986). Vocal affect expression: a review and model for future research. *Psychological Bulletin*, 99, 143–65.
- Schwartz, G.E., Fair, P.L., Salt, P., Mandel, M.R., & Klerman, G.L. (1976). Facial muscle patterning to affective imagery in depressed and nondepressed subjects. *Science*, 192, 489–91.
- Segrin, C. (1992). Specifying the nature of social skill deficits associated with depression. *Human Communication Research*, 19, 89–123.
- Sher, K.J. & Trull, T.J. (1996). Methodological issues in psychopathology research. *Annual Review of Psychology*, 47, 371–400.
- Simoneau, T.L. & Miklowitz, D.J. (1991). *Nonverbal behavior in high and low expressed emotion families of schizophrenic and bipolar patients*. Paper presented at the 6th annual meeting of the Society for Research in Psychopathology, Cambridge, MA.
- Simoneau, T.L., Miklowitz, D.J., Goldstein, M.J., Nuechterlein, K.H., & Richards, J.A. (1996). Nonverbal interactional behavior in the families of persons with schizophrenic and bipolar disorders. *Family Process*, 35, 83–102.
- Simoneau, T.L., Miklowitz, D.J., Richards, J.A., Saleem, R., & George, E.L. (1999). Bipolar disorder and family communication: effects of a psychoeducational treatment program. *Journal of Abnormal Psychology*, 108, 588–97.
- Simoneau, T.L., Miklowitz, D.J., & Saleem, R. (1998). Expressed emotion and interactional patterns in the families of bipolar patients. *Journal of Abnormal Psychology*, 107, 497–597.
- Sloan, D.M., Bradley, M.M., Dimoulas, E., & Lang, P.J. (2002). Looking at facial expressions: dysphoria and facial EMG. *Biological Psychology*, 60, 79–90.
- Sloan, D.M., Strauss, M.E., Quirk, S.W., & Sajatovic, M. (1997). Subjective and expressive emotional responses in depression. *Journal of Affective Disorders*, 46, 135–41.
- Sloan, D.M., Strauss, M.E., & Wisner, K. (2001). Diminished response to pleasant stimuli by depressed women. *Journal of Abnormal Psychology*, 110, 488–93.
- Smith, W.J. (1985). Consistency and change in communication. In *The development of expressive behavior* (ed. G. Zivin), pp. 51–76. San Diego, CA: Academic Press.
- Snyder, S. & Pitt, W.M. (1985). Characterizing anger in the DSM-III borderline personality disorder. *Acta Psychiatrica Scandinavica*, 72, 464–9.
- Soloff, P.H. (1981). A comparison of borderline with depressed and schizophrenic patients on a new diagnostic interview. *Comprehensive Psychiatry*, 22, 291–300.
- Soloff, P.H. & Ulrich, R.F. (1981). Diagnostic interview for borderline patients: a replication. *Journal of Abnormal Psychology*, 90, 686–93.
- Sommers, A.A. (1985). Negative symptoms: conceptual and methodological problems. *Schizophrenia Bulletin*, 11, 364–79.
- Spohn, H.E. & Strauss, M.E. (1989). Relation of neuroleptic and anticholinergic medication to cognitive functions in schizophrenia. *Journal of Abnormal Psychology*, 98, 367–80.
- Troisi, A. (1999). Ethological research in clinical psychiatry: the study of nonverbal behavior during interviews. *Neuroscience and Biobehavioral Reviews*, 23, 905–13.
- Troisi, A. & Moles, A. (1999). Gender differences in depression: an ethological study of nonverbal behavior during interviews. *Journal of Psychiatric Research*, 33, 243–50.
- Troisi, A., Pasini, A., Bersani, G., Grispi, A., & Ciani, N. (1989). Ethological predictors of amitriptyline response in depressed outpatients. *Journal of Affective Disorders*, 17, 129–36.
- Troisi, A., Pasini, A., Bersani, G., Di Mauro, M., & Ciani, N. (1991). Negative symptoms and visual behavior in DSM-III-R prognostic subtypes of schizophreniform disorder. *Acta Psychiatrica Scandinavica*, 83, 391–4.
- Troisi, A., Spalletta, G., & Pasini, A. (1998). Non-verbal behavior deficits in schizophrenia: an ethological study of drug-free patients. *Acta Psychiatrica Scandinavica*, 97, 109–15.
- Trull, T.J. (1995). Borderline personality disorder features in nonclinical young adults: 1. Identification and validation. *Psychological Assessment*, 7, 33–41.
- Trull, T.J., Useda, J.D., Conforti, K., & Doan, B.T. (1997). Borderline personality disorder features in nonclinical young adults: 2. Two-year outcome. *Journal of Abnormal Psychology*, 106, 307–14.
- Ulrich, G. & Harms, K. (1985). A video analysis of the nonverbal behavior of depressed patients and their relation to anxiety and depressive disorders. *Journal of Affective Disorders*, 9, 63–7.
- Van Putten, T. & Marder, S.R. (1987). Behavioral toxicity of antipsychotic drugs. *Journal of Clinical Psychiatry*, 48 (9, Suppl.), 13–19.
- Van Putten, T., May, P.R.A., & Wilkins, J.N. (1980). Importance of akinesia: plasma chlorpromazine and prolactin levels. *American Journal of Psychiatry*, 137, 1446–8.
- Ventura, J., Lukoff, D., Nuechterlein, K.H., Liberman, R.P., Green, M.F., & Shaner, A. (1993). Manual for the Expanded Brief Psychiatric Rating Scale. *International Journal of Methods in Psychiatric Research*, 3, 227–43.
- Wagner, A.W., Roemer, L., Orsillo, S.M., & Litz, B.T. (2003). Emotional experiencing in women with posttraumatic stress disorder: congruence between facial expressivity and self-report. *Journal of Traumatic Stress*, 16, 67–75.
- Walker, E.E., Grimes, K.E., Davis, D.M., & Smith, A.J. (1993). Childhood precursors of schizophrenia: facial expressions of emotion. *American Journal of Psychiatry*, 150, 1654–60.
- Wallace, S.T. & Aiden, L. (1997). Social phobia and positive social events. The price of success. *Journal of Abnormal Psychology*, 106, 416–24.
- Watson, D., Clark, L.A., & Carey, G. (1988). Positive and negative affectivity and their relation to anxiety and depressive disorders. *Journal of Abnormal Psychology*, 97, 346–53.
- Waxer, P.H. (1974). Nonverbal cues for depression. *Journal of Abnormal Psychology*, 83, 319–22.
- Waxer, P.H. (1976). Nonverbal cues for depth of depression: set versus no set. *Journal of Consulting and Clinical Psychology*, 44, 493.
- World Health Organization (1992). *International statistical classification of diseases and related health problems* (1989 revision) (10th edn). Geneva: WHO.