Obsessive-Compulsive Disorder in Children and Adolescents

Clinical Phenomenology of 70 Consecutive Cases

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• We reviewed the phenomenology of obsessive-compulsive disorder (OCD) in 70 consecutive children and adolescents studied prospectively at the National Institute of Mental Health, Bethesda, Md, between 1977 and 1987. There is striking similarity between the clinical presentation of OCD in children and in adult patients. Washing, grooming, and checking rituals and/or preoccupation with disease, danger, and doubt account for the great majority of cases. Twenty-five percent of subjects had a first-degree relative with OCD. The fixed content and style of symptoms within and across subjects, and the identical presentation across a wide age range, suggest an ethological model for OCD.

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Obsessive-compulsive disorder (OCD) is unfamiliar to most child psychiatrists, even though classic descriptions of the disorder featured cases with childhood presentation. The present review of the phenomenology of the disorder in childhood covers the scant literature and summarizes clinical data from the National Institute of Mental Health (NIMH) (Bethesda, Md) cohort, the largest pediatric group studied to date and the only one to be studied prospectively. We were interested in the presenting symptoms in pediatric cases: Could these symptoms be meaningfully organized and is there some theoretical superstructure to account for them? We were interested specifically in the similarity of compulsive behaviors of these young subjects both within and across subjects from an ethological view as it has been defined to encompass the biology of human behavior.[1] Conversely, in cases with affected family members, we were interested in the symptom pattern within families to determine if there was support for modeling in symptom formation.

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Although Janet[2] described a 5-year-old with typical obsessive-compulsive symptoms in 1903, the child psychiatric literature per se begins with Kanner's classic textbook of 1935,[3] in which the older, primarily German reports on childhood OCD are reviewed. Kanner[3] stressed the social isolation of these children and their constricted premorbid personalities, making the important observation that the families became overinvolved with the rituals of the child, as also occurs in adult cases.

Favoring a psychological interpretation, Kanner[3] stated that the children were reared with an "overdose of parental perfectionism" and strong moralistic thinking. Kanner also recorded the children's heroic efforts to "reason things out," and to "think of something else" to deal with their illness. He too noted the resemblance of some of the "compulsive" movements to tics, and in some cases may have been describing mixed cases of Tourette's syndrome and OCD.

Berman[4] described four cases of childhood OCD in which patients had symptoms identical to the profiles found in adults (sexual thoughts, counting, fear parent might be killed, and doubts).

Despert's[5] comprehensive article "Differential Diagnosis Between Obsessive Compulsive Neurosis and Schizophrenia in Children" presents 68 children (of 401 consecutive child psychiatric cases) who received the diagnosis of obsessive-compulsive neurosis. Male patients outnumbered female patients by more than 3:1. These cases demonstrated the abnormality and undesirability of the symptoms, and also showed that the treating psychotherapist may not be directly told of the obsessive-compulsive symptoms while other (often secondary) symptoms, such as anxiety or depression, are brought forward.

Freud[6-8] never described cases of childhood obsessional neurosis but stressed the retrospective recall of obsessional behavior in childhood. Freud's theories of pregenital sexual organization as being causative in the "choice" of obsessional neurosis have been particularly stressed, but his formulations are interspersed with speculation about the strong "constitutional" influence (heredity was stressed) on the choice of these symptoms.[8]

Anna Freud[9(p151)] pointed out a crucial difference in the clinical picture of childhood cases:

> While in adults, the individual neurotic symptom usually forms part of a genetically related personality structure, this is not so with children. In children, symptoms occur just as often in isolation, or are coupled with other symptoms and personality traits of a different nature and unrelated origin. Even well defined obsessional symptoms, such as bedtime ceremonials or counting compulsions, are found in children with otherwise uncontrolled, restless, impulsive personalities...."

Similarly, Sandler and Joffee[10] stressed the *variety* of clinical settings in which obsessive-compulsive symptoms appear in childhood.

Judd's[11] descriptive report of five obsessive children, the total population from an inpatient chart survey of 425 childhood psychiatric cases, found premorbid normality and no striking stressful or stringent parental practices.

Adams[12] reported a series of 49 clinical cases from chart reviews at three different institutions. His sample of 39 boys and ten girls 15 years old or younger had not been subject to punitive bowel training, and precipitating events were relatively uncommon. Boys outnumbered girls and, in some cases, very early onset (by 3 years of age) was documented. Interestingly, aggression toward parents was common in his sample as in ours, as noted below.

More recently, Hollingsworth et al[13] reported 17 cases (13 male, four female) in a retrospective examination of more than 8000 clinical records of inpatients and outpatients combined. In addition to male preponderance, frequently there were associated medical disturbances and poor outcome. Ten patients were contacted 1½ to 14 years later; of these, seven still suffered from obsessive-compulsive symptoms. Other authors have continued to document how OCD is one of the few psychiatric conditions found in children that has substantial continuity into adulthood.[14]

SUBJECTS AND METHODS

The NIMH Sample

The NIMH sample of children and adolescents with severe primary OCD is the largest cohort of pediatric cases assembled to date and the only group to be studied prospectively. A more extensive account of clinical and research data from this project has been presented in monographs published elsewhere.[15,16]

The early age at onset in our patients and the prospective nature of this study offered several advantages. Developmental history could be collected, psychiatric interviews of family members could be obtained with relative ease, and there were fewer complicating disorders to confound observations.

The diagnosis of OCD can be difficult because of the patients' secrecy and the treating clinicians' lack of familiarity with the disorder. The availability of parent observations as well as direct observations by clinical personnel in all cases allowed an unusual degree of documentations of obsessive-compulsive behaviors. Although the series consists of referred (often self-referred) cases, the size of the sample and systematic observations permitted a unique view of the syndrome, lending new perspective to a puzzling and often intractable disorder. The present report is on the first 70 consecutive cases included in the present study.

Methods

Between 1977 and 1987, we recruited subjects who were 18 years of age or under and who had preoccupations and/or rituals that were regarded as unreasonable by the subjects and that caused substantial interference with their lives. These subjects were obtained by referral from area clinicians, and increasingly through contacts made as a result of attention by the local and national media, In addition, subjects had to be interested in a trial of drug treatment. With the increasing awareness of the frequency of the disorder and of the efficacy of behavioral and pharmacologic treatments, referrals increased steadily.[15,16]

Seventy children and adolescents (47 boys and 23 girls) who were eventually enrolled in clomipramine treatment trials are the subjects of this report. The inclusion criterion was the presence of rituals and/or repetitive thoughts deemed unreasonable by the patient and experienced as distressful and causing substantial interference in his or her home or interpersonal functioning. In addition to these *DSM-III*[17] criteria, symptoms had to have been present for at least one year. Exclusion criteria were a concurrent diagnosis of Tourette's syndrome, schizophrenia, primary major depression, organic mental disorder, or mental retardation. Secondary depression, lifetime depression, and the childhood Axis II disorders such as specific developmental disabilities[17] were not exclusionary. The exclusion criteria were based in part on our desire to have a homogeneous group for a pharmacologic treatment trial.

Approximately 20 applicants meeting these criteria were excluded because their symptoms became too mild by the time of evaluation or because they could not cooperate with study procedures.

Because we relied increasingly on telephone screening, the exact number of patients rejected from the study is unavailable. There were a few isolated inquiries from patients with Tourette's syndrome, none of whom had obsessive-compulsive symptoms of sufficient severity to qualify for the study (even if Tourette's syndrome was not present). Approximately ten patients were rejected because of severe concurrent depression.

Diagnostic Instruments

A battery of standardized behavior ratings was used in addition to informal clinical interviews. Ratings included the Diagnostic Instrument for Children and Adolescents (DICA)[18-20] and a revised version of the Addendum for Compulsive Personality Disorder from the Interview Schedule for Children (M. Kovacs, PhD, oral communication, 1986), which covers compulsive personality disorder. In addition, the Comprehensive Psychiatric Rating Scales,[21] Hamilton Depression Rating Scale, and several standardized scales for rating obsessive-compulsive symptoms[22] were completed by the interviewing psychiatrist about the patient at baseline and during each treatment week.

Parents were interviewed about the child using the DICA-P,[18,19] and the children also completed the Children's Behavior Inventory.[23] Parents and siblings 6 years of age and older were also interviewed with the Schedule for Affective Disorders and Schizophrenia–Lifetime version and the DICA, respectively.

Interrater reliabilities have been established for all of these rating instruments for four raters (the authors) about OCD, obsessive-compulsive personality disorder, subclinical variants, and no diagnosis. The clinical diagnoses of OCD and obsessive-compulsive personality disorder were assessed in a separate study of first-degree relatives of the probands, with an overall κ of .73 for these same categories.[24]

There was virtually no disagreement on classification of major presenting symptoms (Table 1), but reliability for this classification was not formally assessed.

Differential Diagnosis

While several disorders theoretically might be difficult to distinguish from OCD, in practice most differentiation was straightforward because of the severity of OCD and the age of our patients. Patients with eating disorders may exhibit marked compulsive features, and 15% of adult women with OCD have reported previous anorexia.[25] However, none of our patients had food intake as a major preoccupation. Obsessive-compulsive rituals may superficially resemble the stereotypies seen in pervasive developmental disorder, but such stereotypies are usually simpler in form and not ego-dystonic.

The greatest difficulty was encountered in distinguishing primary phobic disorders and OCD. For example, a boy with an obsessive preoccupation with contamination organized his life around his avoidance of contaminants. He and several similar patients exhibited features of both simple phobia and social phobia. The ultimate diagnosis of OCD was based on the content of the preoccupation and, for most patients, a history of other more typical obsessive-compulsive behaviors such as counting or washing.

A few unique cases were seen in which patients had both classic obsessive features, such as washing rituals, as well as features reminiscent but not quite typical of Tourette's syndrome. For example, a 15-year-old boy with long-standing washing rituals was "compelled" to tell silly jokes in class. This was not in keeping with his personality and put him at risk for expulsion from a highly rated private academy

Table 1.—Major Presenting Symptoms in 70 Consecutive Children and Adolescents With Severe Primary Obsessive-Compulsive Disorder

Compulsions	Reported Symptom at Initial Interview, No. (%) of Patients*
Excessive or ritualized hand washing, showering, bathing, tooth brushing, or grooming	60 (85)
Repeating rituals (eg, going in/out door, up/down from chair)	36 (51)
Checking (doors, locks, stove, appliances, emergency brake on car, paper route, homework, etc)	32 (46)
Rituals to remove contact with contaminants	16 (23)
Touching	14 (20)
Measures to prevent harm to self or others	11 (16)
Ordering/arranging	12 (17)
Counting	13 (18)
Hoarding/collecting rituals	8 (11)
Rituals of cleaning household or inanimate objects	4 (6)
Miscellaneous rituals (eg, writing, moving, speaking)	18 (26)
Concern with dirt, germs, or environmental toxins	28 (40)
Something terrible happening (fire, death/ illness of self or loved one, etc)	17 (24)
Symmetry, order, or exactness	12 (17)
Scrupulosity (religious obsessions)	9 (13)
Concern or disgust with bodily wastes or secretions (urine, stool, saliva)	6 (8)
Lucky/unlucky numbers	6 (8)
Forbidden, aggressive, or perverse sexual thoughts, images, or impulses	3 (4)
Fear might harm others/self	3 (4)
Concern with household items	2 (3)
Intrusive nonsense sounds, words, or music	1 (1)

*Obsessions or compulsions are totaled, so the total exceeds 70.

despite his excellent grades. Both Tourette's syndrome and OCD have common features, including preoccupation with the unacceptable, partial voluntary control, and fluctuating course. This patient received the diagnosis of OCD, which was retained at a two-year follow-up visit and proved appropriate.

Patient Characteristics/Demographics

The 70 subjects, 47 boys and 23 girls, had a mean (±SD) age of 13.7 (±2.67) years and a mean age at onset of 10.1 (±3.52) years, with seven of the patients having become ill before 7 years of age.

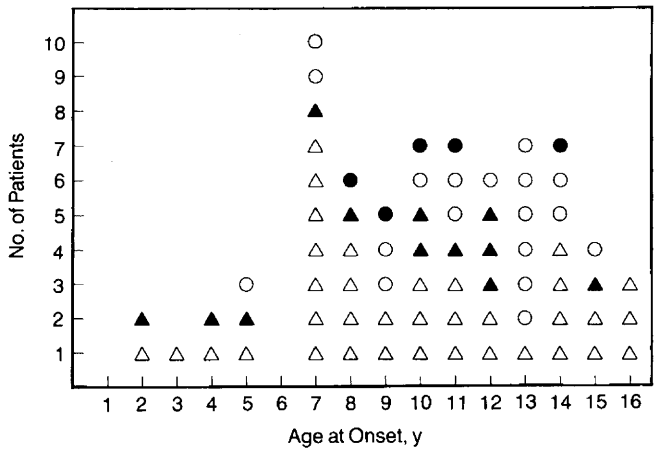
Because boys predominated in all pediatric series with OCD, the age at onset was compared for boys and girls using an unpaired one-tailed Student t test. As shown in the Figure, the boys tended to have an earlier onset than girls (mean age at onset for boys: 9.6 [±3.8] years; for girls, 11.0 [±2.7] years; $t = 1.56$; $P < .06$). The boy-girl ratio in the NIMH study sample changed with age, with the earliest age at onset having the greatest male predominance.

The mean (±SD) IQ for the group was in the high average range (full scale, 107 [±12]; verbal, 109 [±12]; performance, 103 [±13]), but did not suggest any particular intellectual bent for these subjects.

Major Presenting Symptoms

The primary symptoms at time of first contact at the NIMH are shown in Table 1. Subjects often had both rituals and obsessions, and some change in symptom pattern over time had occurred in 90% of patients. In most cases, a particular constellation had dominated for months or years and then yielded to another dominant symptom. Variability in intensity was common during and across time periods. On any given day, rituals and thoughts could be absent or present but lacking in intensity.

As seen, rituals were more frequent than obsessions, and "pure" obsessives were relatively rare compared with "pure" ritualizers who denied any mental content accompanying their rituals, reporting only an urge to carry out their acts. Washing rituals were by far the most common, occurring in 85% of cases, but repeating and checking rituals



Sex, age at onset, and family history of obsessive-compulsive disorder (OCD) in National Institute of Mental Health (Bethesda, Md) childhood/adolescent sample. Circles indicate girls; triangles, boys; and solid symbols, family history of OCD.

were also frequent. Hand washing was slightly more frequent than showering and the two activities accounted for virtually all of the washing rituals (no subject took prolonged baths). A number of children employed chemicals such as alcohol or detergents to clean their hands, provoking eczematoid dermatitis.

Obsessions focus primarily on dirt or germs (increasingly on acquired immunodeficiency syndrome), but fairly often focus on danger to self or a loved one, on symmetry, or on scrupulous religiosity.

Overall, two broad themes are striking: a preoccupation with and/or rituals for cleanliness, grooming, and averting danger, and a pervasive doubt or inability to "know" that one is all right. All of the rituals, including repetitions and counting, reflected the underlying sense that it "didn't feel right yet," whether they focused on contamination, symmetry, or prayer.

Clinical Presentation

Most children initially hid their rituals, often disguising hand washing as more frequent voiding, or "scheduling" ritualization for private time. On the average, children had performed rituals for four to six months before their parents became aware of the problem. Teachers and peers (like the adult obsessive's employer and coworkers) were usually unaware of the problem because of the patient's partial control.

Parents were particularly baffled by the partial control of symptoms, seeing their child suppress rituals at school or with friends but "having" to do them at home. In a manner reminiscent of patients with Tourette's syndrome, the children maintained that they expend a great deal of effort "controlling" their behaviors in public and had to "let go" when at home. As the illness progressed in severity, patients were unable to resist public ritualizing.

Subjects with an early age at onset (below 6 years of age) had begun their rituals or obsessions in typical fashion, with only minor allowances for developmental level. For example, one boy who by 7 years of age still had his severe compulsion to draw zeros had started at 3 years of age to repetitively circle manhole covers when on city streets. His tantrums when disrupted from this behavior, subjective distress at having to do this, and lack of other behavioral abnormalities had led to an unusually early diagnosis of OCD.

Another boy who was a door and light switch checker by 7 years of age had at 3 years of age walked only on the edges of floor tiles to such a degree that his parents had sought psychologic consultation. Two subjects had started excessive handwashing at 4 years of age, while a 5-year-old boy had suddenly become "unable" to enter his garden gate without going back and forth three times. At 9 years of age this boy became unable to get through doorways at all as the number of passages had reached 500, and he was hospitalized.

Approximately one third of our patients reported that certain stimuli seemed to trigger their rituals. One 16-year-old girl with elaborate front-door touching and stepping rituals would sneak into her house by the side door to avoid seeing the front door, sometimes

Table 2.—Comparison of Primary Symptoms in 14 Probands and Affected First-Degree Relatives

Proband		Relative		
Sex/Age at Onset, y	Primary Symptoms	Relationship	Age Onset, y	Primary Symptoms
M/11	Checking, rituals	Mother	12	Counting, rituals regarding eating and drinking
F/10	Rituals, checking, fear of illness	Father	8	Scrupulosity
M/13	Washing	Father	5	Hand washing (now mild)
M/12	Hand washing, perfectionism, checking	Father	17	Obsessive preoccupation with moral things, checking
F/11	Checking	Father	26	Compulsion to talk
M/12	Obsessive thoughts, checking	Father	6	Tapping, hoarding
M/7	Hand washing, showers, checking, blinking	Mother	7	Obsessive thoughts, preoccupation with numbers, perfectionistic, worry, over whether "done right," and repeats until "right"
		Father	8	Checking
		Sister	3	Hair pulling
F/9	Hand washing, showering	Father	5	Checking, counting
M/12	Obsessive thoughts, hand washing, and bathing	Father	Unknown	List making, organizing, checking, from early childhood
F/15	Checking rituals	Father	13	Checking
M/6	Obsessive thoughts, washing rituals	Father	7	Fear of contamination
		Sister	5	Repetition of words, demanding others say certain words
M/5-8	Washing, checking	Brother	10	Washing, fear of contamination
M/7	Obsessive fear of vomiting	Mother	7	Superstitions, jerky mannerism
F/12	Checking, washing, rituals, hoarding	Mother	8	Ordering compulsions, perfectionism
		Brother	16	Hand washing, showering
F/9	Repeating phrases, ritual crawling	Mother	8	Bureau drawer arranging
M/3	Touching	Father	14	Ritual dressing
M/5	Doorway rites, washing, dressing	Sister	10	Contamination fears, avoidance

averting her rituals thereby. Several hoarders reported closing their eyes to avoid seeing scraps of paper on the street that would set off an urge to collect trash. Once started, if complex rituals were interrupted patients complained of "having" to start them over.

When observed in the ward, washing and other rituals were highly stereotyped in a fashion characteristic of each subject. Approximately 12 hand washers could not touch the faucets and had to turn the water on and off with their elbows.

All but the most severely affected patients reported that keeping very busy, having others structure their time, and carrying out physical activity were temporarily helpful in suppressing thoughts and rituals. Conversely, stress of any sort invariably aggravated symptoms.

In addition to clinical interviews, some specific approaches seemed particularly helpful. When we indicated a belief in the child's inability to control his or her "habits" and in his or her basic sanity, we found bright, curious children ready to form what was initially a rather intellectual alliance. Young children responded to the analogy between obsessive thoughts and "hiccups of the mind."

Symptoms usually changed over time. Most children experienced a single obsession or compulsion at onset, continued with this for months to years, and then shifted gradually to new ones. Over time, at least 85% of patients went through a period of excessive washing. In obsessives, sexual thoughts or rituals are common in adolescence but usually dissipate by 18 years of age. As with adults, the disease has a fluctuating course. Although the transition from severe to less severe interference is almost always gradual, the transition from less to more severity can be either gradual or sudden.

Children's Explanations of Their Symptoms

When asked why they thought they had to wash excessively, or why they had certain preoccupations, our subjects' most frequent response was that they had no idea. Often their own theories about germs came only after they had been washing for months, had asked themselves why, and seized on a possible answer; we came to have a James-Lange theory for explanations of rituals. Like William James,[26] who proposed that emotions can be secondary responses to self-observation of a physiologic response, children often seemed to devise their explanation only after they saw themselves carrying out their peculiar rituals. A few children, however, had more ingenious explanations. One 9-year-old boy had seen a television show at 7 years of age in which friendly martians made contact with humans by putting thoughts in their heads. The boy, who had no sign of thought disorder, retained this hopeful theory for two years and gave it up with reluctance when he was never contacted by martians; in any case, he had become skeptical of such notions. Another patient, a 10-year-old girl, had seen Pinocchio and decided that she had "something like Jiminy Cricket." Although the thought told her to count and repeat, she thought is was a message from a helpful if invisible conscience. She discarded this idea one year later with reluctance, as it became clear that no good came from carrying out her repetitions. Additional cases are presented in detail elsewhere.[14,15]

A family history of OCD was relatively common, occurring in approximately 25% of our series.[24] Father-son pairs predominated (n = 10), but two mother-son, two mother-daughter, and three father-daughter pairs were also seen. Three of the eight patients having the earliest onset (before 6 years of age) had an affected parent.

To gain possible evidence for some modeling of symptom "choices" in these familial cases, the major presenting symptom was compared for the proband and the affected relative in the 14 patients in whom a major pattern could be identified. As seen in Table 2, symptom patterns were often different, giving no evidence either that parents provided a model for ritual behaviors, or for familial subtypes of OCD. While both parents and probands' symptoms changed over

Table 3.—Associated Psychopathology at First Admission in 70 Children and Adolescents With Severe Primary Obsessive-Compulsive Disorder

Associated Diagnosis	No. (%) of Patients		
	Boys (N=47)	Girls (N=23)	Total (N=70)*
Axis I			
No other diagnosis	12	6	**18** (26)
Major depression			
Current	12	6	**17** (26)
Lifetime	4	2	**6** (9)
Adjustment disorder with depressed mood	6	3	**9** (13)
Separation anxiety disorder	1	4	**5** (7)
Overanxious disorder	4	7	**11** (16)
Simple phobia	8	4	**12** (17)
Alcohol abuse	2	1	**3** (4)
Substance abuse	1	0	**1** (1)
Conduct disorder	3	2	**5** (7)
Attention-deficit disorder	7	0	**7** (10)
Oppositional disorder	6	2	**8** (11)
Enuresis	2	1	**3** (4)
Encopresis	1	1	**2** (3)
Axis II			
Compulsive personality	7	1	**8** (11)
Specific developmental disability	12	5	**17** (24)

*Multiple diagnosis given, so the total exceeds 70.

time, in many instances the family members' symptoms were entirely unfamiliar to the proband.

Associated Disorders

Eleven percent of our sample was judged to have associated or predating compulsive personality disorder. As discussed below, the relationship between compulsive personality disorder and OCD appears complex.

Concurrent psychiatric diagnoses for the sample are given in Table 3. It should be recalled that mental retardation, psychosis, eating disorders, and Tourette's syndrome were exclusionary and so, of course, would not be represented here. With these exceptions, the pattern of associated disorders follows that reported for adult clinical series, as well as that in epidemiologic studies in adults and children.[27-29] Only 18 (26%) of subjects had OCD as their only diagnosis, although in several cases the secondary diagnosis was mild. Depression, either lifetime or current, and anxiety disorders were most common, occurring in 35% and 40% of the group, respectively. In approximately one half of the cases, the anxiety or affective disorder predated OCD, while in the rest of the subjects it appeared that the symptoms were reactive.

While occurring less frequently than affective or anxiety disorder, 33% of the sample had either a disruptive behavior disorder or abused a substance, an association that has been described previously.[30] In virtually all cases, the disruptive disorder had predated the OCD. There were 17 children with a coexisting developmental disability. Because the definitions vary considerably, we believe this 24% of our sample represents an increased prevalence, but we do not have a systematically studied control group for comparison.

Major medical or neurologic disorders were exclusionary criteria. However, we noted minor motor tics in 20% of the NIMH study patients that occurred more often in acute cases, in boys, and in younger patients. In some cases, touching rituals were utilized to disguise an involuntary tic. It is unknown how the pattern and severity of obsessive-compulsive symptoms differ between cases of Tourette's syndrome and primary cases. Preliminary impressions are that compulsions associated with Tourette's syndrome are less likely to involve washing and are usually less severe than in primary OCD (David Pauls, PhD, oral communication, 1988).

COMMENT

These systematic observations in a cohort of 70 children and adolescents with severe primary OCD replicate and extend earlier findings. Boys outnumbered girls, in contrast to the approximately equal ratio in adult samples. Symptom patterns were strikingly similar to those in adults, with a slightly greater predominance of washing rituals. In addition to the expected co-occurrence of affective and anxiety disorder, developmental disability (reading or language delay) occurred in one fourth of the sample.

It is possible that fewer children than adults with OCD have associated compulsive personality disorder, but the lack of standardized instruments for diagnosis of compulsive personality disorder has limited work in this area. In both our epidemiologic study and in the present clinical studies, however, compulsive personality disorder was uncommon, making it unlikely that this finding was an artifact of referral bias. Similarly, the marked association with anxiety and affective disorders also follows the pattern in our community sample of adolescents with OCD[28].

Black[31] summarized the available literature for adults with OCD, finding that moderate to marked obsessional traits were reported in 71% of 383 patients and no premorbid traits were reported in 29% of 451 patients, and noting that criteria for obsessional traits vary widely among studies. From 16% to 36% of patients with OCD had no premorbid obsessional traits, while 55% of control patients did. More recently, Rasmussen and Tsuang[32] found that the same percentage (55%; 24 of their 44 adult patients with OCD) had premorbid compulsive personality traits.

On the other hand, more recent studies using structured personality measures have not found such a predominance of compulsive personality disorder in obsessive-compulsive adult subjects, while other personality disorders occurred with greater frequency.[33]

Preliminary findings from a follow-up study of a community-based sample (C. Z. Berg, MD, oral communication, 1988), suggest that some children with early-onset OCD (without obsessive-compulsive personality) appear to "form" compulsive personality traits as part of an adaptive coping pattern. If, for example, a child initially had felt compelled to write the number 7 perfectly, he describes now "deliberately" being slow, careful and rigid in an effort to "get it right the first time" and "beat the compulsion!" It is not clear what mediates the development of ego dystonicity, and this may be central to understanding the relationship between OCD and compulsive personality. Systematic data are currently being gathered on the development of compulsive personality disorder in relationship to OCD in childhood.

Tourette's syndrome was exclusionary, so it is not surprising that our group had no subjects with Tourette's syndrome. However, no cases of Tourette's syndrome were found in first-degree relatives, all of whom were examined personally,[24] nor had Tourette's syndrome developed, to our knowledge, in any of our patients at this writing. We are unable to reconcile these findings with those of Pauls et al,[34] who reported a strong familial association between the disorders. It is possible that a family history of Tourette's syndrome is only found in patients exhibiting both Tourette's syndrome and OCD, and such a group deserves particular study.

While 25% of our sample had a first-degree relative with OCD, there was no support for familial subtypes with respect to symptom pattern. More recent observations further substantiated this point: monozygotic 15-year-old twin boys, cur-

rently under study, had pure obsessions (religiosity) and washing rituals (without obsessive thoughts), respectively, as their only presenting symptoms. Both responded well to drug treatment, and we believe them to have the same disorder, providing a clear instance in which particular symptom "choice" was not genetically determined.

Preliminary follow-up of the first 27 of these subjects, 25 of whom were seen personally two to five years after initial contact, suggests that the associated depression and anxiety continues regardless of the progression of obsessive-compulsive symptom pattern.[35] A prospective follow-up study of this larger sample is under way.

The extraordinary opportunity to observe 70 children with severe obsessions and compulsions and to study them systematically, including one week of direct behavioral observations in a ward setting, has led us toward an ethological perspective on this disorder.

Lorenz[36] provided an observational definition for his concept of "inherited drives of fixed behavior." The behaviors should resemble behaviors in other species, and should be those typically released in functional situations. Lorenz thought one of the most obvious criteria was that animals reared in isolation would still exhibit the pattern. The pattern of the behavior should be invariant, but its amplitude can vary widely. It should be possible in principle to elicit the whole behavior by physiological methods such as localized drug injection or electrical brain stimulation. Actions performed incompletely or in nonappropriate circumstances constituted another criterion of innate drives, such as the Greylag goose that made fragmented efforts to build a nest, or the kitten that "stalked" a ball of yarn. Finally, the fixity and rigidity of behavioral patterns themselves bespoke innately determined chains rather than individually acquired responses.

We are fully aware of the controversies concerning the designation of any human behavior as innate or inherited.[37-41] However, the present study of a large series of obsessive-compulsive children brought to mind several of Lorenz' criteria.

The rituals and compulsions of OCD match the features of a species-typical act only approximately, at best. But such is our current understanding of human ethology that even the suggestion of a relationship between OCD and the control of species-typical acts is encouraging. Some of the rituals appear to correspond to behaviors that we would expect, by extension from other mammals, to be inherited by the human animal.

The phylogenetic baseline of mammalian behavior has been described[42] as follows: (1) use of communication and sense organs; (2) comfort movements, including pelage-cleaning movements; (3) nest-building movements; (4) elimination behavior; (5) locomotion and digging; (6) capture of prey and mastication; (7) courtship and mating; (8) parental care behaviors, including nest building; (8) autogrooming; (9) breathing; (10) drinking; (11) feeding, including gathering food; (12) construction of artifacts, such as burrows in earth and nests; (13) orientation to the environment, both animate and inanimate, including associated offensive and defensive protective behaviors; (14) social interactions; and (15) play behavior.

How do the compulsions match the expected inherited repertoire of the human mammal? Hand washing, showering, bathing, and tooth brushing are clearly autogrooming behaviors. Going in and out of doors or getting up from or sitting down in chairs rely on patterns of locomotion. Rituals to remove contaminants may be either a grooming behavior or a defensive pattern. Taking compulsive measures to prevent harm to oneself and others is, again, a defensive behavior, with social overtones. Hoarding and collecting might be related to nest building, as might rituals of household cleaning or cleaning of inanimate objects. Miscellaneous rituals such as those of writing and speaking reflect that most human species-typical behavior, language. Certain obsessions also correspond to a predicted behavioral heritage for mammals. Concern with dirt, germs, or toxins calls on autogrooming and defensive reactions. The fear of something terrible happening or of harm to oneself or others invokes protective defense. Concern or disgust with bodily wastes invokes elimination behaviors, and perhaps autogrooming as well. Obsession over forbidden, aggressive, or perverse sexual thoughts relates to mating and courtship behavior, while concern with household items may involve nesting behaviors, and obsession with intrusive nonsense sounds or words again invokes language.

Of course, the above-listed designations do not constitute an explanation for any of the rituals and obsessions. However, certain of the remaining symptoms might be seen in terms of epistemic behavior: ordering, arranging, counting, checking, obsession with symmetry, order, and exactness, or scrupulous religious obsession might reflect aberration of the inherited cognitive capabilities of humans.

Like Lorenz'[43] fixed action patterns, obsessive-compulsive symptoms usually occur in an exact manner that, once started, must be executed to completion. They may be set off by certain external stimuli, although inner drive states, clearly influenced by stress, can augment the response.

The relief provided by successful drug treatment and the otherwise-normal functioning of many of our pediatric subjects has led us to speculate that OCD is a set of species-specific adaptive acts, such as grooming or sensitivity to danger, that are released abnormally by an altered drive state.

Neuroethology covers the manner in which an organism becomes sensitive to certain physical, biotic, and social factors as key stimuli, and the means by which these stimuli are presented and integrated into the brain. To support an ethological model, similar biochemical mechanisms and neuroanatomical localization would need to be demonstrated between animals and humans, in addition to the behavioral similarities described herein.[44]

There is growing indirect support for a neuroethology of obsessive-compulsive behaviors from recent brain-imaging studies,[45,46] as well as from studies finding a high incidence of OCD in adolescents with Sydenham's chorea,[47,48] all implicating frontal lobe/basal ganglia dysfunction in OCD. Animal studies have shown the basal ganglia to be necessary for the execution of some fixed action patterns.[49,50,51] MacLean[51] has indicated that frontal lobes may fail to inhibit subcortical, particularly basal ganglia, brain systems, providing a further link between positron emission tomography findings,[45] the association with basal ganglia disorders, and the behavioral "routines" of OCD.

Moreover, a recent study by one of us (S.E.S., unpublished data, 1988) has shown that patients with trichotillomania, a chronic disorder with onset in childhood in which there is an uncontrollable urge to pull out one's hair, responds selectively to clomipramine (and not to desmethylimipramine), providing another tie between what may be seen as unleashed "grooming behaviors" and OCD.

In summary, OCD is a major disturbance of childhood. The rational irrationality of children with OCD causes them to underreport their symptoms, so a clinician must be particularly sensitive to the diagnosis. The similarity of content of obsessions and form of rituals among children never exposed to adult models of this behavior is striking, although further identification of the subunits of these behaviors needs to be established. Environmental factors seem insufficient and the behaviors have superficial resemblance to certain fixed action patterns in lower species, coupled with a more elusive phenomena of uncertainty and the inability for certain stimuli to "register" as reassuring. A broad research program addressing such divergent topics as cross-cultural variation in OCD

and the effect of antiobsessional agents on atypical animal behaviors is indicated.[52]

With recognition of OCD's relative frequency and the availability of effective treatments, it is vital that clinicians be trained to recognize this handicapping condition. It is also likely that understanding the new biology of OCD will bring insight into the nature of other ego-dystonic compelling behaviors not previously classified as OCD, such as trichotillomania, and lay the groundwork for a biology of doubt and of knowledge.

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