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Behavior Profiles in Children With Functional Urinary Incontinence Before and After Incontinence Treatment

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What's Known on This Subject

Since the 1980s, urinary incontinence and bed-wetting started to be seen as functional problems, with behavioral problems secondary to the bed-wetting. Behavioral problems in bed-wetting is studied extensively, but much less has been studied regarding behavioral problems in functional incontinence.

What This Study Adds

Abnormal behavior scores in children with functional incontinence were studied prospectively, before and after treatment for incontinence, as part of a randomized controlled trial.

ABSTRACT

OBJECTIVE. The purpose of this work was to analyze prospectively the prevalence of behavioral disorders in children with urinary incontinence because of nonneuropathic bladder-sphincter dysfunction before and after treatment for incontinence.

METHODS. A total of 202 children with nonneuropathic bladder-sphincter dysfunction were enrolled in the European Bladder Dysfunction Study, in branches for urge syndrome (branch 1) and dysfunctional voiding (branch 2); 188 filled out Achenbach's Child Behavior Checklist before treatment and 111 after treatment. Child Behavior Checklist scales for total behavior problems were used along with subscales for externalizing problems and internalizing problems.

RESULTS. After European Bladder Dysfunction Study treatment, the total behavior problem score dropped from 19% to 11%, the same prevalence as in the normative population; in branch 1 the score dropped from 14% to 13%, and in branch 2 it dropped from 23% to 8%. The prevalence of externalizing problems dropped too, from 12% to 8%: in branch 1 it was unchanged at 10%, and in branch 2 it dropped from 14% to 7%. The decrease in prevalence of internalizing problems after treatment, from 16% to 14%, was not significant.

CONCLUSION. More behavioral problems were found in dysfunctional voiding than in urge syndrome, but none of the abnormal scores related to the outcome of European Bladder Dysfunction Study treatment for incontinence. With such treatment, both the total behavior problem score and the score for externalizing problems returned to normal, but the score for internalizing problems did not change. The drops in prevalence are statistically significant only in dysfunctional voiding.

FUNCTIONAL URINARY INCONTINENCE is a leading symptom of both urge syndrome and dysfunctional voiding. These 2 clinical entities occur mainly in girls,¹⁻³ as manifestations of nonneuropathic bladder-sphincter dysfunction (NNBSD), and have always been associated with behavior problems; the *International Classification of Diseases, 10th Revision*, lists both "enuresis of nonorganic origin" and "urinary incontinence of nonorganic origin" in the category of mental and behavioral disorders.^{4,5} For primary monosymptomatic nocturnal enuresis (MNE), this association has been studied quite extensively,⁶⁻¹² and in terms of temperament, emotional stress, and anxiety, most studies indicate that children with MNE are not different from those without. The only specific links between MNE and behavior problems belong to the domain of secondary nocturnal enuresis.¹³⁻¹⁵

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Key Words

urinary incontinence, nonneuropathic bladder-sphincter dysfunction, urge syndrome, dysfunctional voiding, behavior profile, child behavior checklist, European Bladder Dysfunction Study, attention-deficit disorder, urinary tract infection

Abbreviations

NNBSD—nonneuropathic bladder-sphincter dysfunction
MNE—monosymptomatic nocturnal enuresis
ADD—attention-deficit disorder
CBCL—Child Behavior Checklist
EBDS—European Bladder Dysfunction Study
UTI—urinary tract infection
TBP—total behavior problem
CI—confidence interval

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TABLE 1 Entry Characteristics for the 202 Children Enrolled in the EBDS

Variable	Branch 1, Urge Syndrome						Branch 2, Dysfunctional Voiding			
	Placebo		Verum		Training		Standard		Training	
	T0	T6	T0	T6	T0	T6	T0	T6	T0	T6
Girls	20	17	22	21	28	28	42	35	47	45
Boys	13	12	8	8	6	6	8	5	8	8
Total	33	29	30	29	34	34	50	40	55	53

Ninety-seven children were allocated to branch 1, and 105 were allocated to branch 2. T0 indicates time allocated for treatment; T6, time when treatment was completed; verum, oxybutynin chloride.

Much less is known about behavior profiles in children with functional urinary incontinence, but most reports emphasize the comorbidity from behavior problems and personality disorders, and some advocate psychiatric treatment.¹⁶ Attention-deficit disorders (ADDs) somewhat confound the issue, because here the wetting constitutes the comorbidity.^{17,18} The prevalence of ADDs is higher in boys than in girls, and the wetting consists of uncontrolled voidings at daytime, or nighttime, or both, quite different from the small amounts of urine lost in functional urinary incontinence.¹⁹

Achenbach's Child Behavior Checklist (CBCL)^{20,21} was incorporated in a multicenter prospective study comparing different treatment modalities for NNBSD: the European Bladder Dysfunction Study (EBDS).²² With the CBCL scores before and after EBDS treatment, we can document the behavior profiles in children with functional urinary incontinence and analyze the influence of abnormal profiles on the outcome of treatment for urinary incontinence.

PATIENTS AND METHODS

Study Population

In the EBDS, 159 girls and 43 boys with functional urinary incontinence because of NNBSD have been included: entry characteristics are listed in Table 1. Exclusion criteria were as follows: age <6 or >12 years, documented urinary tract infections (UTIs) <4 weeks before enrollment, neurologic conditions, structural abnormalities of the urinary tract, any preceding urinary tract surgery, MNE, documented adverse reactions to oxybutynin chloride, and inability to follow protocol. The design of the EBDS has been reviewed favorably by the Cochrane Incontinence Review Group.²³

Treatment Plans in the EBDS

After a 3-month run-in period, eligible children were included in 1 of the 2 branches of the study, according to history and urodynamic parameters. In branch 1, children with urge syndrome (detrusor overactivity during bladder filling) were randomly allocated to either bladder rehabilitation with feedback or pharmacotherapy (oxybutynin chloride or placebo). In branch 2, children with dysfunctional voiding (pelvic floor overactivity during voiding) were randomly allocated to either standard therapy alone or bladder rehabilitation with feedback.

In both branches, all of the children received standard therapy: careful explanation of the problem to children

and parents by a urotherapist; instructions on adequate intake of fluids; instructions on proper voiding habits and personal hygiene; and instructions on keeping monthly voiding diaries. Standard therapy was composed of 3 office visits with the urotherapist over a 6-month period and was complemented by a "course book."

Preliminary outcome of EBDS treatment was assessed after treatment²² and defined as "cured" (incontinence and/or UTI disappeared completely), "no change" (urinary incontinence and/or UTI persisting), and "worse" (worsening of incontinence and/or UTI). These outcome categories were used to assess the influence of abnormal behavior on results of EBDS treatment.

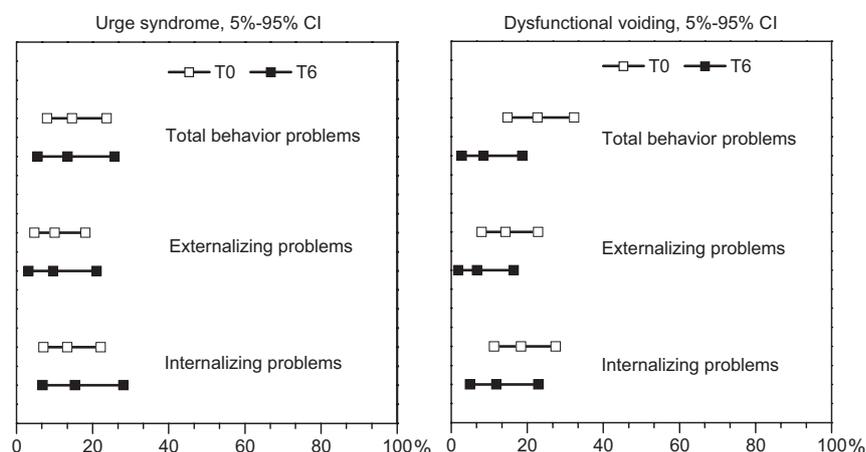
CBCL

At entry, a first CBCL, designed for children between 4 and 18 years, was handed out to the parents, to be filled out at home and returned to the urotherapist. A second CBCL had to be filled out 12 months after completion of treatment. The CBCL is an established and validated checklist documenting social competence and problem behavior in children.^{21,24} The scores on social competence were not taken into account in the EBDS, because at the time the study took place these scores were not validated for European countries.

With the CBCL, parents or caretakers rate their child's behavior on 113 items. The items cover 8 domains, each of which takes different behavioral aspects into account: withdrawn behavior, somatic complaints, anxious or depressed behavior, social problems, thought problems, attention problems, delinquent behavior, and aggressive behavior.²⁰ Together, these 8 domains render a total behavior problem (TBP) score. The CBCL has subscales for internalizing of problems and for externalizing: the internalizing subscale is based on the domains of withdrawn behavior, somatic complaints, and anxious or depressed behavior; the externalizing subscale is linked to the domains of aggressive behavior and delinquent behavior.

For the TBP scores, we computed the 90th percentile from the German normative data (score: >63 points). This 90th percentile is the cutoff for the so-called clinical range: in Germany, children with TBP scores in that range are commonly referred to mental health centers.²⁵ German normative data were also used for the internalizing and externalizing subscales, as well as for the subscales for the individual domains. A normal TBP score

FIGURE 1
Prevalences for abnormal CBCL scores before (T0) and after (T6) treatment for incontinence, with 95% CI, for branches 1 and 2 separately.



does not exclude abnormal scores for internalizing or externalizing subscales.

Statistical Methods

The numbers of all 202 children enrolled in the EBDS at entry, before (T0) and after (T6) treatment are given by frequency table for study branch, treatment group, and gender separately. The influence of the initial CBCL scores (total, internalizing, and externalizing) as predictors on the clinical outcome (cured, same, or worse) is presented graphically and was tested statistically by multifactorial analysis of variances with branch, treatment group, clinical outcome, gender, age, and gender-age interaction as factors in the model.

The predefined level for the assessment of statistical significance was 2α at .05. Prevalences for abnormal CBCL scores before (T0) and after therapy (T6) are given with 5% to 95% confidence intervals (95% CI) for study branch and category of problem scores separately.

RESULTS

Of the 202 EBDS patients, 188 filled out the CBCL before treatment (90 in branch 1 and 98 in branch 2) and 111 after treatment (52 in branch 1 and 59 in branch 2). Table 1 shows baseline characteristics of EBDS branches and treatment groups.

We compared CBCL scores from the 111 children who filled out the score before and after treatment. The 77 children who failed to hand in a second CBCL did not differ in age, gender, or incontinence treatment from the 111 children with an after-treatment CBCL.

CBCL Scores Before and After Incontinence Treatment

TBP Score

In the EBDS, 19% of all of the children had an abnormal TBP score: 14% in branch 1 and 23% in branch 2 (Fig 1). The difference in scores between the 2 branches, urge syndrome and dysfunctional voiding, is not statistically significant (95% CI). After treatment, the overall prevalence of abnormal TBP scores dropped from 19% to 11%, almost the same as the prevalence in the normative population. The significance of this change differs

between the 2 branches: in urge syndrome (branch 1), the drop from 14% to 13% was not statistically significant (95% CI), as opposed to the drop from 23% to 8% in dysfunctional voiding (branch 2).

Externalizing Problems

Overall, 12% of the children had externalizing problems: 10% in branch 1 and 14% in branch 2. The difference in scores between the 2 branches was not statistically significant (95% CI). The overall score for externalizing problems dropped from 12% to 8% after treatment, but the drop was statistically significant (95% CI) in dysfunctional voiding only: from 14% to 7%. In urge syndrome there was no change: 10% externalizing problems before and after treatment.

Internalizing Problems

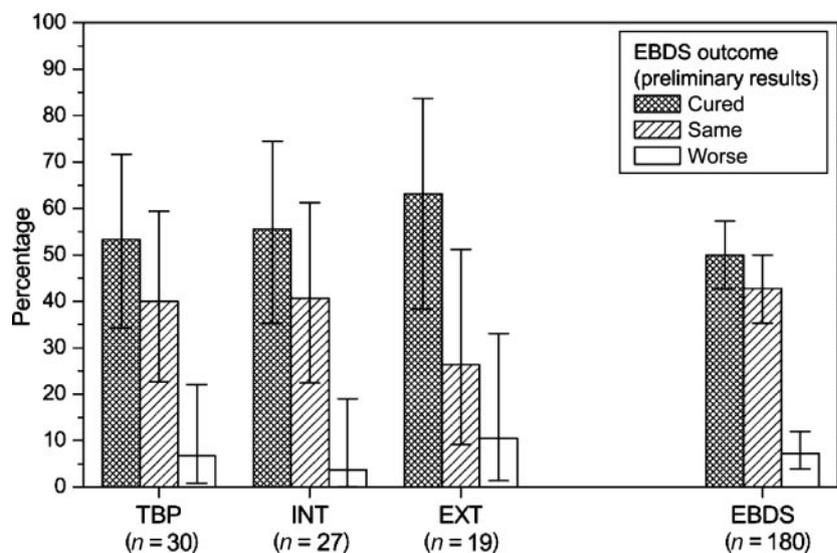
Overall, 16% of the children had internalizing problems: 13% in branch 1 and 18% in branch 2. The difference in score between the 2 branches was not statistically significant (95% CI). The overall score for internalizing problems decreased from 16% to 14% (in branch 1 from 13% to 15% and in branch 2 from 18% to 12%). These changes are not statistically significant (95% CI).

Scores for Individual Domains

Few children (2%) scored in the abnormal range for somatic problems. The somatic domain includes the following items: being constipated, feeling overtired, having pains, headaches, nausea, stomach aches, and vomiting. Similar low scores were found for all of the other domains: 5% for attention problems, 5% for social incompetence, 5% for aggressive problems, and 5% for delinquent behavior. For anxious behavior, withdrawn behavior, and thought problems, <5% scored abnormal. None of the scores for the individual domains showed a significant difference between the 2 branches of the EBDS (95% CI). After treatment, scores for individual domains varied between 2% and 7%, but the after-treatment changes in individual scores were statistically not significant (95% CI).

FIGURE 2

TBP and internalizing (INT) and externalizing (EXT) problems at entry and their relation with preliminary results of EBDS treatment for incontinence, with 5% to 95% CIs.



Abnormal CBCL Scores and Outcome of Incontinence Treatment

In the EBDS, there was no statistically significant difference between urge syndrome (branch 1) and dysfunctional voiding (branch 2) in total behavior problems or in externalizing or internalizing problems before incontinence treatment. Therefore, we present in Fig 2 the influence of initial CBCL scores on the preliminary outcome categories of the EBDS (cured, same, or worse) for branches 1 and 2 together. The presence of behavioral problems, externalizing problems, or internalizing problems did not correlate with these outcome categories: all 3 of the problem categories have the same distribution for EBDS outcome (95% CI). It is noteworthy that CBCL checklists of 3 children had an urgent plea for help in the margin: careful follow-up by the attending physician turned up evidence for sexual abuse in all 3 of the cases.²⁶

DISCUSSION

Behavioral problems are well established as an expression of comorbidity in NNBSD. Functional urinary incontinence and enuresis were thought to be consequences of underlying emotional problems and conflicts, until the 1980s: only then, urinary incontinence and enuresis started to be seen as functional problems, with behavioral problems secondary to the wetting.²⁷

In the EBDS, before treatment of the NNBSD, a clinical score for behavior problems was found in 19% of the children. After treatment for incontinence, this score dropped to 11%, the same prevalence as in the normative sample (10%). This significant change in score occurred only in children with dysfunctional voiding and not in children with urge syndrome. This indicates that the 2 subtypes of NNBSD, urge syndrome or overactive bladder and dysfunctional voiding, show differences regarding behavioral factors.

In a prospective study, von Gontard et al¹⁶ describe abnormal behavior scores in a cohort of children with urge incontinence ($n = 42$), defined as detrusor insta-

bility, sudden urge to void, and frequent micturition, or children with voiding postponement ($n = 52$), defined by delayed micturition in typical situations and a low voiding frequency. Children with dysfunctional voiding, defined by repeated staccato or fractionated voiding patterns, were excluded in that study: the children with voiding postponement could not be compared with the children with dysfunctional voiding in the EBDS. Prospective studies on children with dysfunctional voiding and behavior problems, comparable to the EBDS, could not be found.

In the cohort of children in the study by von Gontard et al¹⁶ with urge syndrome who were randomly selected in a pediatric unit and a child psychiatry unit, a clinical score for behavior problems of 13.5% was found, which is similar to ours (14%). The prevalence found for externalizing problems in urge syndrome is again similar to ours: 8.1% vs 10%. Only their prevalence for internalizing problems in urge syndrome is higher than ours: 18.9% vs 13%.

The hypothesis by von Gontard et al¹⁶ that urge incontinence is "physiologically determined," with behavioral problems secondary to the wetting, is contradicted by our observation that treatment for incontinence does not change the total behavioral problem score in urge syndrome. Treatment of incontinence in children with dysfunctional voiding significantly changes the total behavioral problem score, as well as the externalizing score: one could hypothesize that dysfunctional voiding is the one that is physiologically determined, with behavioral problems secondary to the wetting. This is contradicted by the fact that no relation is found with treatment outcome.

In the EBDS, inability to follow protocol was an exclusion criterion, and this might have filtered out children with more severe behavioral problems (eg, ADD or "problem families"), which can be the reason for the low abnormal domain scores in all of the EBDS children, in urge syndrome and in dysfunctional voiding. A factor to be taken into account is the significant decrease in CBCL

scores, when CBCLs are repeated after 2 years;²⁸ it is unlikely that the mental health of the population studied increased during that period. No satisfactory explanation can be given for this phenomenon, but studies like the EBDS, using a retest design, have to take this into account.

CONCLUSIONS

Behavioral problems prevail in children with dysfunctional voiding at twice the rate for a normative population. Treatment for urinary incontinence does not change the prevalence of internalizing problems, but it normalizes the prevalences for total behavior problems, and, in dysfunctional voiding, for externalizing problems. In dysfunctional voiding and urge syndrome, behavioral problems have no influence on the cure rate of treatment for urinary incontinence.

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