Published in final edited form as:

Clin Pediatr (Phila). 2013 August ; 52(8): 753–758. doi:10.1177/0009922813492376.

THE RELATIONSHIP BETWEEN TEMPERAMENT, GENDER AND CHILDHOOD DYSFUNCTIONAL VOIDING

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Abstract

Objective—Dysfunctional voiding (DV) is an extremely common pediatric complaint. The goal of this study was to examine the relationship between DV and childhood temperament.

Methods—Information about the voiding behaviors and temperaments of 50 children was examined using a case-control model. Caregivers were asked to fill out the children's behavior questionnaire (CBQ) in order to rate their child on the dimensions of surgency, negative affect, and effortful control. The relationship between DV and these dimensions was then evaluated.

Results—Males with DV were found to have lower effortful control than males with normal voiding habits. Females with DV did not demonstrate a difference in effortful control, but did demonstrate a higher rate of surgency.

Conclusions—The results suggest that temperament does have an association with dysfunctional voiding. These findings are in line with temperamental associations with other externalizing trouble behaviors and may inform potential treatment strategies for DV.

Keywords

temperament; voiding dysfunction

Introduction

Dysfunctional Voiding (DV) refers to involuntary intermittent contractions of the striated muscle of the external urethral sphincter or pelvic floor during voiding in neurologically normal individuals, resulting in intermittent or fluctuating uroflow rates. This is a unique entity reflecting detrusor-sphincter dyssynergy and should not be confused with the general term voiding dysfunction which is used to describe any abnormality involving bladder filling or emptying: the diagnosis of DV requires repeat uroflow measurements with curves demonstrating a staccato or interrupted pattern (unless verified by invasive urodynamic

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All authors certify that they have no commercial associations that may pose a conflict of interests in connection with the submitted article. This study has no funding source or corporate affiliations. There are no conflicts of interest to report.

Contributor's Statement Page

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investigation).¹ While the classic presenting symptoms include daytime wetness secondary to urge incontinence, DV can present with any constellation of symptoms including frequency, infrequency, stress incontinence, incomplete voiding, and increased rates of urinary tract infection.² This is an extremely common clinical problem that represents approximately 40 percent of general pediatric urology visits, and causes significant distress to parents and caregivers.³ Despite the prevalence of the disorder, understanding of the underlying pathology is relatively sparse.

Currently DV is thought to have a multifactorial etiology involving learned behavior, maturational delay, and the perpetuation of infantile patterns (as well as possible underlying anatomical factors).⁴ While all of these aspects likely factor into voiding difficulties, they do not account for the possibility of an underlying, intrinsic psychological component. Thus we suggest that the innate, unlearned aspects of personality known as temperament should be examined. Young children's temperament is commonly broken down into three dimensions: surgency/extroversion, negative affect, and effortful control.⁵ Surgency/extroversion is the aspect of personality that reflects high positive affect. It is characterized as being high in activity and impulsivity, low in shyness, and generally high in levels of happiness. Negative affect reflects the opposite: it is the aspect of personality that represents a child's irritability and anger. This dimension includes levels of fear, frustration, sadness, and difficulties in sooth-ability. Finally, effortful control reflects a child's ability to self-restrain. This dimension is characterized by the ability to focus attention, avoid distractions, and derive pleasure from low intensity activities. These dimensions are thought to represent the interactions between children's impulses and their efforts to control them, therefore temperament would seem vital to the development and later eradication of DV.

The purpose of this study is to identify whether temperament among DV patients is different than among non-dysfunctional voiding patients. If a difference in association is found between temperament and DV patients vs. non-DV patients, there might be early interventions that are appropriate to address prior to the symptomatic presentation of DV. . If no difference is found, temperament might still predict success with various types of treatment for the condition. We hypothesize that children with behavioral issues are more likely to experience DV. Therefore, we expect DV to be associated with lower Surgency, higher Negative Affectivity, and lower Effortful Control. The extent to which results vary based on demographic characteristics will also be explored.

Methods

This study used a case-control model with participants drawn from the patient population of a single New Jersey private practice pediatric urology office. Written informed consent from caregivers was obtained prior to the initiation of any study procedures.

Participant Population

For the disease group, patients with ages ranging from 4 to 7 who were originally presented to the practice with symptoms of incontinence, frequency, or urgency were considered. All potential participants had undergone history and physical examination, urine analysis and uroflow with surface patch electromyography monitoring of pelvic floor activity, and had demonstrated a staccato pattern with poor pelvic floor muscle relaxation. All patients had also undergone renal and bladder ultrasounds to assess for residual urine as part of their diagnostic evaluation. Any patient found to have an alternative etiology to their symptoms (such as UTI, hydronephrosis, constipation, or anatomical or neurological abnormality), and all patients who were found to have continuous incontinence were excluded as not having pure DV. The caregivers of eligible patients were then approached and asked to complete a

15 minute questionnaire with regards to their child's behaviors. All caregivers approached for this study agreed to participate.

For the control group, caregivers of patients age 4 through 7 were approached and solicited to fill out the same questionnaires while awaiting their child's appointments at the same pediatric office. The only exclusion criterion for the control group was that the child must never have been diagnosed with dysfunctional voiding. These patients had all undergone examination appropriate to their urologic dysfunction and equivalent to that of the control group.

Assessing Temperament

Caregivers were asked to fill out a survey assessing demographics, and temperament for their child. The demographic portion collected information on the children's ages (in months) and gender. No other identifying information was collected.

Developed by Rothbert and colleagues, the long form of the Children's Behavior Questionnaire (CBQ) was designed to assess 15 primary temperament characteristics in children ages 3 through 7, and to use these characteristics to assess temperament across the 3 broader dimensions of surgency, negative affect, and effortful control. Adequate psychometric properties, including reliability and validity, have been established for the long form of this scale^{6,7}. However, the full CBQ involves 195 questions and takes approximately 1 hour to administer.

Thus, in order to increase participation rates, we opted to instead use the very short form of the CBQ. Also developed by Rothbert, this instrument consists of 36 questions and only takes approximately 15 minutes to administer, yet still maintains appropriate fit to the three dimensional model (12 questions per subscale) and demonstrates good internal consistency.⁸ Using the very short form CBQ, caregivers were asked to score their children on 36 items such as "seems always in a big hurry to get from one place to another" and "when drawing or coloring in a book, shows strong concentration". Each item was scored on a scale from 1 to 7 with one being "extremely untrue" and seven being "extremely true". Participants were only identified by subject number, age and gender.

Statistical Analysis

Data was analyzed using SPSS Statistics Version 18. Statistical significance was defined as $P < 0.05$. Descriptive statistics were generated for demographic data. CBQ subscale scores were then calculated for surgency, negative affect, and effortful control, and unpaired t-tests were used to compare children who exhibited DV vs. those who did not on these aspects of temperament. The subscale scores were then stratified across gender and unpaired t-testing was again used to compare responses between dysfunctional voiding and non-dysfunctional voiding subjects.

Results

Participants

A total of 50 subjects participated in this study, with 25 composing the DV group and 25 composing the control group (25 male and 25 female). Demographic data for the sample can be found in Table 1. Average age of participants was 5.74 years (SD=1.01), with average age for males being 5.55 years (SD=1.01) and average age for females being 5.92 (SD=0.92). The age most largely represented was 4 years old, comprising 32% of the total population.

The DV cohort was made up of 9 male participants and 16 female participants with an average age of 5.55 years old. This grouping is in accordance with the general population finding of higher rates of DV in girls than boys⁹. Females represented 64% of the DV cohort. The control cohort consisted of 16 male participants and 9 female participants with an average age of 5.94 years old.

Temperament

Tables 2, 3 and 4 show the results of for temperament and DV. Although as an entire group there were no statistically significant findings for any specific dimension, on gender stratification it was found that there are indeed significant differences between DV and non-DV participants. Specifically, for males it was found that there is a significantly higher amount of effortful control within the non-DV group than the DV group (5.40 versus 4.78, $p < 0.05$). Although the female population did not show this finding for effortful control, it did show a significantly higher rate of surgency in the DV group than the non-DV group (4.55 versus 3.90, $p < 0.05$). Neither males nor females showed a significant difference for negative affect between groups.

Discussion

Dysfunctional voiding is an extremely common problem for the pediatric urologist and general pediatrician and as such deserves significant attention. In this study we examined the association between temperament and DV as a possible behavioral component to the currently accepted multifactorial etiology. Although previous researchers have explored the relationship between neuropsychiatric disorders and DV,⁹ as well as the relationship between psychological problems and general voiding dysfunction,^{10,11} to our knowledge this is the first study to examine the link between the dimensions of temperament and DV. While our original intent was to examine surgency, negative affect, and effortful control within the entire pediatric population, our findings indicate that gender is an important factor that influences the aspects of temperament as they relate to DV. This finding in itself is not surprising: sex differences are not uncommon in urological disorders, and rates of urinary incontinence differ between females and males in general.¹² Thus, it is reasonable that gender differences impact how personality aspects affect DV. However, the actual associations were unexpected: while the male participants generated a result in line with our hypothesis, the female population actually presented in a way that was unexpected.

For the male participants, the only dimension that generated a relevant finding was that of effortful control. This finding puts DV in line with many other problem behaviors associated with poor effortful control including impulsivity,¹³ and other forms of chronic behavioral maladjustment.^{14,15} Given the established relationship between DV and behavior maladjustment, the relationship between effortful control and DV is a logical extension of past research. This finding is also consistent with the clinical rationale which supports common treatment regimens for DV. For example, biofeedback and pelvic muscle physical therapy are popular and effective means for eliminating DV.^{16,17} While undergoing these trainings, a child learns to better control his urinary muscles, compensating for his innately low effortful control. The findings that DV and surgency or negative affect were unrelated in males were less expected as these dimensions have also been correlated to behavior maladjustment. This lack of findings may be due to the process of DV itself: as an activity that revolves around the proper coordination of muscular movements, voiding may rely more on effortful control than surgency and negative affect (which would have a larger impact on interpersonal interactions).

For the female participants the findings were much more puzzling. The only dimension to show a meaningful finding was surgency, and it was found that surgency was positively

correlated with DV. This finding is surprising because surgency is generally considered to be a positive trait: children with high surgency are found to be more active in group play and more socially outgoing.¹⁷ As such, it seems counterintuitive that such a trait would be associated with a maladaptive behavior such as DV. In addition, whereas in males effortful control was an integral (and expected) factor, in females this was not the case: effortful control was not significantly higher in the non-DV group than the DV group.

One possible explanation to our findings is in the nature of surgency itself and its subsequent impact on females. Although surgency is associated with positive social skills, it is likewise associated with an increased risk of emotional dysregulation and subsequent externalizing behavior problems.¹⁸ Furthermore, poor emotional regulation has been found to be a stronger predictor of externalizing behavior problems in girls, while boys' problems have been better predicted by inattention.¹⁹ Thus it is possible that DV represents a manifestation of such an externalized problem, and consequently shares the same temperament associations.

Limitations

There are several limitations associated with this study. First, total sample size was small and analysis based on gender stratification required applying our metrics to even smaller sub-populations. Second, as data was collected in a private practice office in the Northeast, there is the possibility that our findings apply only to a specific population subset and do not generally apply to the entire pediatric urology population. We also did not assess for the possibility of comorbid neuropsychiatric disorders (such as ADHD), and these findings could have influenced our outcomes. Third, our data collection procedure also has limitations. While the very short form CBQ has been used as a research tool and found valid in prior studies, it still carries the inherent possibility of self-report bias. Our data relied upon the observations of caregivers, and thus is subject to the possibility of inaccurate recall and the desire to respond in a favorable (or unfavorable) manner. As each child had only one caregiver completing the questionnaire, it is also possible that our findings were skewed by the child-caregiver interpersonal relationship and do not represent the child's true global temperament. Lastly, a case-control research design was employed and participants were not drawn from a random sample.

Implications for Clinical Practice

Despite the aforementioned limitations, this study makes important contributions to both the understanding of and potential treatment strategies for DV. In males, our findings support the current treatment regimen of muscle training and physical therapy. These techniques are useful in that they develop an external locus for effortful control to counteract the innately low internal sense of effortful control, and thus should be effective. The same, however, may not hold true in females. For the female with DV, there appears to be a significant emotional aspect associated with the physical dysfunction. DV therapy for female children should address this finding, and may be more successful if it involves psychological intervention to address emotional concerns, in addition to the physical therapy.

Conclusions

This study provides preliminary evidence of a relationship between temperament and dysfunctional voiding in a pediatric urology population that may vary based on gender. While in males low effortful control is associated with DV, in females high surgency was the only aspect of temperament linked with this common pediatric urological concern. These findings, although unexpected, fit with findings for general externalizing behavior. Given the multifactorial etiology of DV and the likely behavioral component, it therefore seems

reasonable that the impact of temperament reflects other behavioral problems. Further research is needed to replicate and extend these findings.

Abbreviations

DV	dysfunctional voiding
CBQ	Children's Behavior Questionnaire

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Table 1

Demographic statistics

	Males	Female	Total
Number of Participants (<i>n</i>)	25	25	50
Cases of DV (<i>percentage</i>)	9 (36%)	16 (64%)	25 (50%)
Average Age (years)	5.55	5.92	5.74
SD	1.05	0.92	1.01

Table 2

Comparison Statistics Total

	Dysfunctional Voiding	Normal Voiding
Surgency		
Average	4.71	4.38
SD	0.58	0.76
α		0.10
Negative Affect		
Average	4.19	4.23
SD	1.08	0.94
α		0.12
Effortful Control		
Average	5.24	5.53
SD	0.62	0.85
α		0.20

Table 3

Comparison Statistics Male

	Dysfunctional Voiding	Normal Voiding
Surgency		
Average	4.97	4.65
SD	0.51	0.71
α		0.25
Negative Affect		
Average	3.92	4.32
SD	0.98	0.91
α		0.31
Effortful Control		
Average	4.79	5.46
SD	0.36	0.83
α		0.03

Table 4

Comparison Statistics Female

	Dysfunctional Voiding	Normal Voiding
Surgency		
Average	4.55	3.90
SD	0.59	0.89
α		0.02
Negative Affect		
Average	4.34	4.06
SD	1.16	1.07
α		0.54
Effortful Control		
Average	5.50	5.64
SD	0.61	0.95
α		0.67