

CONTINENCE CARE



Environmental Cues to Urgency and Leakage Episodes in Patients With Overactive Bladder Syndrome

A Pilot Study

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PURPOSE: To assess the frequency with which environmental cues, which might constitute Pavlovian-conditioned stimuli, occur with urgency and leakage symptoms associated with overactive bladder syndrome (OAB).

SUBJECTS AND SETTINGS: The sample group comprised 17 adults (13 women and 4 men); their median age was 74.71 years.

METHODS: A semistructured interview was conducted with a convenience sample of 17 patients diagnosed with OAB. Patients were interviewed about interoceptive and environmental cues they related to instances of urinary urgency and leakage. Interviews persisted for 6.11 to 59.38 minutes ($M = 21.86$ minutes) and were conducted by an interviewer who was trained to administer the interview guide.

RESULTS: Most respondents associated at least 1 environmental cue with urgency and leakage, respectively. A mean of 6.1 urgency-related and 4.0 leak-related environmental cues were reported. The most commonly reported environmental cues were "on my way to the bathroom" reported by 88% and "opening the front door of my home" reported by 71%.

CONCLUSION: These findings support the hypothesis that Pavlovian conditioning plays a role in OAB symptoms and suggest that treatment might be enhanced by inclusion of Pavlovian extinction procedures.

■ Introduction

Overactive bladder syndrome (OAB) is a highly prevalent condition¹ that the International Continence Society defines as a symptom syndrome characterized by urinary urgency that occurs with or without urgency urinary incontinence, and is usually associated with voiding frequency and nocturia.² The condition is often reported to be bothersome³ and costly to society¹ and to negatively affect quality of life.⁴ Overactive bladder syndrome is usually treated with antimuscarinic medications⁵ and/or behavioral interventions aimed at providing patients with improved urinary control skills.^{6,7} While these treatments

have proven effective for some OAB symptoms,⁸ pharmacological treatments are costly and have adverse side effects, and behavioral treatments may not adequately relieve all bothersome symptoms.⁹

The purpose of this study was to investigate the extent to which environmental cues are related to OAB symptoms. The cue that is most often mentioned is an individual's front door. Referred to as "latchkey incontinence," this is a loss of urine that occurs when one arrives home and puts the key in the lock of one's front door. While latchkey incontinence is frequently described in publications and consumer Web sites about incontinence,¹⁰ the etiology of this symptom is rarely recognized. Like Pavlov's classic experiment leading a dog to salivate to the sound of a bell, latchkey incontinence is an example of a conditioned response. Frequent concurrence of immediate urination with arriving home leads to a conditioned response of a strong urge to urinate and, at times, actual loss of urine upon arriving home. Pavlovian conditioning (formerly called classical conditioning) has been found to underlie a wide range of responses, from drug tolerance to emotional reactions.^{11,12}

We identified 1 study that specifically addressed environmental stimuli associated with bladder symptoms of urgency and incontinence. Ghei and Malone-Lee¹³ used responses to 4 environmental cues ("latchkey," waking/

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rising, running water, and cold weather) and 2 mood cues (tired and worried) to create a measure of the severity of urgency in 1797 patients with OAB. They reported that 52% of the sample had latchkey urgency and 26% had latchkey incontinence, 63% had waking rising urgency and 30% had waking rising incontinence, 42% had running water urgency while 15% had running water incontinence, and 46% reported cold weather urgency (data pertaining to cold weather incontinence were not reported). Ghei and Malone-Lee also reported that mood (either tired or worried) exacerbated urgency in 23% of cases (mood-exacerbated incontinence was not reported).

Mechanisms based on Pavlovian conditioning suggest that other cues such as approaching a familiar bathroom may also be conditioned stimuli for urinary responses. If cues provoke bladder symptoms in the ways that conditioned stimuli lead to conditioned responses, then a Pavlovian conditioning paradigm may be used to explain the development of some lower urinary tract symptoms. Additionally, new work on extinction of Pavlovian conditioning¹⁴ could be extended to the treatment of urinary urgency and incontinence through stimulus control training. This pilot study sought to identify possible cues associated with bladder symptoms in a sample of patients with diagnosed OAB using structured interview techniques.

■ Methods

A convenience sample of patients diagnosed with OAB was recruited from a urologist's office in a large metropolitan city. Eligibility criteria included ability to speak and read English, and a diagnosis of OAB based on the subject's score on the Overactive Bladder Symptom Scale (OABSS).¹⁵ The OABSS is a self-administered questionnaire consisting of 7 questions on a 5-point Likert scale (minimum score = 7, maximum score = 35). The 7 questions relate to all symptoms of OAB, including urinary frequency, nocturia, urgency, urge incontinence, and bladder control.¹⁵ On average, persons with OAB score 7.9 ± 4.5 points (mean \pm SD) higher than persons without OAB (SD = 2.5) and 3.4 ± 4.4 points higher than persons with lower urinary tract symptoms.¹⁵ Participants were excluded if they had cognitive or other impairments that would interfere with completing the structured interview and if their OAB was secondary to another diagnosis. The study was reviewed and approved by the institutional review board at Teachers College, Columbia University. Participants recruited from the urologist's office were asked to sign a consent form and were interviewed either at their urologist's office or by phone.

Study Procedures

Twenty-four percent of participants (n = 4) were interviewed over the phone at their homes or work offices. The

remaining 76% of the interviews were conducted in person at the urologist's office before or after the patient's scheduled appointment. The interviews were conducted with participants using a semistructured interview guide. Interviews lasted between 6.11 and 59.38 minutes ($M = 21.86$ minutes) and were conducted by an experienced interviewer (E.V.) trained to administer the interview guide. All sessions were digitally recorded, so that they could be reviewed later with the exception of 1 session where a recording was not available for one interview due to equipment failure. Responses from that session were written down during the interview and were entered as data.

The interview included open- and closed-ended questions and can be conceptually divided into 3 parts. The first part comprised open-ended questions about the respondent's general history and experiences with OAB and incontinence. In the second part of the interview, a list of 36 cues was read to the participants who were asked to indicate the frequency with which each cue was associated with urgency and with incontinence. Several types of cues were mentioned, including interoceptive (internal cues, such as symptoms and moods) and environmental cues, as well as stress incontinence triggers (laughing, coughing, sneezing, and lifting heavy objects). To assess the extent to which participants tended to relate any cue to their symptoms, the items included 4 "improbable" cues, defined as situations that would be unlikely to be related to voiding. These cues described situations that are not typically associated with voiding: I get a call on my phone at my house; I am at work; I run into a friend in a public place; I get a call on my cell phone when I am away from my house. Part 4 of the interview queried demographic information.

Data Analysis

We used descriptive statistics to summarize the frequency that each of the cues was endorsed and how often participants who endorsed the cue experienced it (*rarely* to *always*, scored on a 1 to 5 scale).

■ Results

The majority of participants (76%, n = 13) were female and white (88%, n = 15). The mean age of the participants was 74.7 ± 9.64 years (mean \pm SD). Seven respondents (41%) held a graduate degree, 5 (29%) held a bachelor of science or arts as their highest degree, and 3 (18%) had completed high school but not college. All but 1 participant (94%) indicated that they experienced urine leakage with a sudden desire to urinate, and 47% (n = 8) indicated that they experienced urine leakage daily or more than once a day. Urodynamic testing in this group of patients revealed a mean cystometric bladder capacity of 360.19 mL (range = 97–636 mL). The mean OABSS for subjects was 18.67 ± 4.17 , indicating severe OAB¹⁵ (Table 1).

TABLE 1.
Descriptive Statistics of Participants (N = 17)

Factor	M	n	%	SD	min	max
Gender		17				
Female		13	76			
Male		4	24			
Ethnicity		17				
White		15	88			
African American		1	6			
Latino		1	6			
Age, y	74.71			9.64	59	89
Highest level of education		17				
High school degree		3	18			
College degree		5	29			
Graduate degree		7	42			
Urine leakage: yes		16	94			
Everyday, more than once		8	47			
Treatments (tried)						
Medications		16	94			
Bladder training		6	35			
Pelvic floor muscle training		7	42			
Surgical procedure		7	42			
Bladder capacity, mL	360.19			156.06	97	636
Amount when detrusor contracts, mL	225.18			99.60	50	394
Overactive Bladder Symptom Scale	18.67	17		4.16	9	24

Cues Survey Results

The respondents were asked to indicate which, if any, of a list of 36 cues were related to urgency and incontinence. Table 2 shows the responses according to frequency of endorsement for urgency and for leakage, respectively. When participants were asked about whether each of the 36 cues was associated with leakage and with urgency, 100% ($n = 17$) reported at least 1 cue associated with urgency and 94% ($n = 16$) reported at least 1 cue associated with leakage. The following cues were endorsed as leading to urgency by at least 50% of the participants: (a) first waking up in the morning, (b) my bladder is particularly full, (c) I am on the way to the bathroom, (d) opening the front door of my home, (e) I am in cold weather, and (f) arising from a lying-down position (Table 2). With the exception of “cold weather” and “arising from a lying-down position,” the same cues were endorsed by at least 50% of the participants as associated with leakage (Table 2).

One hundred percent of respondents reported at least 1 interoceptive cue (mean 2.2 out of 6 interoceptive items) associated with urgency and 88% reported at least 1 interoceptive cue (mean 1.4 out of 6 items) associated with leakage. Similarly, all study participants endorsed at least 1 environmental cue (mean 6.1 out of 23 environmental items) associated with urgency and 88% cited at least 1 environment cue (mean 4.0 out of 23 environmental items) associated with leakage.

Responses to stress incontinence cues indicate that almost half of the patients have mixed stress and urge incontinence symptoms: 10 (59%) reported at least 1 stress cue (mean 0.7 out of 3 items) leading to urges and 47% reported at least 1 stress cue (mean 0.47 out of 3 items) leading to incontinence. Three participants (18%) agreed that an improbable cue was associated with urgency, but only 1 associated such improbable cues with incontinence.

Discussion

This pilot study indicates that individuals diagnosed with OAB associate environmental cues with urgency and incontinence. Moreover, participants report an average of 6 different environmental cues related to urgency and 4 related to urinary incontinence. The most frequently reported environmental cues were environments associated with being on the way to a bathroom, opening the front door, and cold weather. We have labeled awakening in the morning as an interoceptive cue because we assume it is frequently accompanied by a full bladder. However, respondents may have 1 or more episodes of nocturia and may awaken in the morning with a bladder that is not at or near capacity. If this were the case, then it may not be a full bladder but the environmental cues associated with voiding in the early morning that led to symptoms. On the other hand, we classified “I am on my way to the bathroom” as an environmental cue

TABLE 2.**Cues for Urgency and Leakage (N = 18)**

	Cues for Urgency Episodes			Cues for Leak Episodes		
	N	%	Frequency (1-5)	N	%	Frequency (1-5)
Interoceptive cues						
First waking up in the morning	17	100	4.5	10	59	3.5
My bladder is particularly full	13	76	4.85	11	65	2.82
I am worried	4	24	4.25	3	18	3.33
I am especially depressed	2	12	3.50	0	0	0
I am tired	1	6	4.00	0	0	0
I am especially happy	1	6	3.00	1	6	3.00
Environmental cues						
I am on the way to the bathroom	15	88	3.93	13	76	3.54
Opening the front door of my home	12	71	3.75	11	65	2.60
I am in cold weather	13	76	2.38	7	42	2.71
Arising from a lying-down position	10	59	3.42	6	35	2.83
I see running water	7	42	3.43	6	35	3.00
I have had caffeine	6	35	3.83	4	24	3.50
I think about going to the bathroom	5	29	3.80	2	12	4.00
I am in the bathroom for another reason besides urinating	4	24	3.00	2	12	5.00
I know I will not be near a bathroom for a while	5	29	3.20	3	18	3.00
I am suddenly exposed to cold water	5	29	3.20	3	29	2.33
Removing my undergarments to take a shower/change clothes	4	24	3.50	2	12	2.00
I am near a bathroom I often use	4	24	3.50	1	6	3.00
I have had alcohol	4	24	3.25	0	0	0
Another person mentions going to the bathroom	4	24	3.00	0	0	0
I am near a bathroom I occasionally use	4	24	2.50	2	12	3.00
I am suddenly exposed to hot water	3	18	3.67	2	12	3.50
I don't know the location of a bathroom	2	12	4.50	1	6	5.00
I have completed a task	2	12	3.00	2	12	3.00
I am near a bathroom I have never used before	2	12	2.50	1	6	3.00
Arising from a seated position	1	6	3.00	1	6	3.00
Someone mentions going to the bathroom	1	6	2.00	0	0	0
I read about bathrooms	0	0	0	0	0	0
I see signs/advertisements for bathrooms	0	0	0	0	0	0
I am answering this questionnaire	0	0	0	0	0	0
Noncues						
I get a call on my phone at my house	2	12	3.00	1	6	3.00
I am at work	2	12	2.00	0	0	0
I run into a friend in a public place	1	6	3.00	1	6	3.00
I get a call on my cell phone away from my house	0	0	0	0	0	0
Stress incontinence cues						
I am laughing, coughing, or sneezing	6	35	3.00	4	24	2.5
I am lifting something heavy	3	18	4.00	3	18	3.67
I am doing physical activity	3	18	2.33	1	6	3.00

because the stimuli encountered on the way to the bathroom are clearly environmental ones. However, this cue could be confounded with a full bladder and it may be the full bladder that is leading to symptoms.

Three respondents endorsed improbable cues; they were included to determine if respondents would acquiesce to endorsing any cue. One of the respondents endorsed 2 of these improbable cues for both leaks and

urges; this respondent also endorsed the most cues overall (22 for urges and 21 for leaks). This patient had particularly severe symptoms and evinced strong emotional reactions in her interview. With the exception of this individual, our findings are consistent with the idea that conditioned cues for OAB symptoms are those that occur in either temporal or spatial proximity to usual voiding situations.

Literature review identified only 1 study reporting the frequency of cues in OAB. Ghei and Malone-Lee¹³ graded the severity of symptoms by taking into account the situations in which they occurred. Regarding the 5 situational cues included in both studies, our results were largely consistent with their findings, derived from a sample of 1797 patients with OAB symptoms. Sixty-three percent of their sample reported urgency on waking and rising compared with 100% of our sample. Opening the front door of their home was associated with urgency by 52% of their sample and 71% of our sample. Slightly less than half (46%) of their subjects reported urgency in response to cold weather, whereas 76% of our sample reported urgency in response to cold weather. In both studies, 42% reported urgency in the presence of running water. Our study showed that 6% of the sample associated urgency with being tired and 28% with being worried, while 23% of their sample reported associations with being “tired and worried.” Although proportions in our study were somewhat higher for the 5 situations they studied, the mean age of our sample was approximately 20 years older. Nevertheless, both studies show that significant numbers of patients presenting with OAB symptoms associate them with situational cues.

These findings support the hypothesis that Pavlovian conditioning may influence OAB symptoms. Pavlovian conditioning occurs in nearly all animal systems and is believed to help organisms prepare for physiologically significant events such as eating or fleeing a threat.¹² We hypothesize that environmental cues affect 2 different systems related to incontinence. Some cues may contribute to the symptom of urgency (such as arriving home) while others (such as a nearby bathroom) may cause sphincteric incontinence. It has been well documented that sphincteric incontinence is, in large part, a mechanical event; that is, urine is forced out through a urethral sphincter mechanism that cannot withstand the increased vesical pressure generated by activities such as coughing and laughing.¹

Extinction of Pavlovian conditioning is possible,¹⁴ exemplified in many studies of rats' freezing to conditioned stimuli that had been paired with shock and the subsequent extinction of the freezing response by numerous presentations of the conditioned stimuli without the shock. However, protocols for extinction of bladder responses to cues have yet to be developed. Extinction relies on the presentation of the conditioned stimulus, that is, the front door, without allowing it to be paired with the

unconditioned stimulus, in this case, voiding or actions leading to voiding. Therefore, extinction protocols for OAB might include unlinking of the arrival at home with voiding, for example, consciously choose other activities when arriving at home. In addition, avoidance of conditioned stimuli by taking different routes to the bathroom or using alternative bathrooms may be necessary for those times when voiding cannot be delayed. Moreover, education that discourages voluntary pairing of cues with voiding should also be considered.

■ Limitations

One of the primary limitations of the study is the use of a small convenience sample that was mostly educated and white. Furthermore, many of the participants came to the study with intractable bladder problems that had persisted for many years, despite a variety of treatments. These points may limit the generalizability of the observations to the OAB patient population at large. Additionally, responses to cues depended on the respondent's memory and self-report. It is possible that respondents may not have been aware of the cues that actually do operate in their urge and leakage episodes.

Given these limitations and the results of this study, additional research is needed that collects data from a much larger and diverse sample. This sample should include participants with less complicated cases of OAB, as these patients may benefit more from behavioral treatments focused on environmental cues and not necessarily have symptoms severe enough for pharmaceutical aids. Future studies might also assess episodes of urgency and leakage with real-time symptom-monitoring devices, decreasing recall errors. Finally, studies should continue to investigate how the recognition of environmental cues to urgency and leakage may, in fact, help people with OAB recognize how certain situations in their environment may exacerbate their symptoms.

■ Conclusion

Results of our study suggest that Pavlovian conditioning may influence episodes of urgency and urge incontinence in patients with OAB. We suggest that researchers include protocols for extinction of bladder responses or avoidance of conditioned stimuli for OAB treatment and prevention.

KEY POINTS

- ✓ This study assessed environmental cues to OAB symptoms of urgency and leakage using a semistructured interview.
- ✓ Participants cited environmental and internal cues as cooccurring with increased urge and leakage symptoms.

✓ Results suggest the value of investigating how environmental cues could be incorporated into behavioral treatments for OAB symptoms.

✓ Behavioral treatments targeting environmental cues could focus on avoiding cues or on extinguishing responses to cues.

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