Creation and Testing of the Geriatric Self-Efficacy Index for Urinary Incontinence

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OBJECTIVES: To report on the content development, construct validity, and reliability testing of the Geriatric Self-Efficacy Index for Urinary Incontinence (GSE-UI).

DESIGN: Prospective cohort study.

SETTING: Six UI outpatient clinics in Quebec, Canada.

PARTICIPANTS: Community-dwelling incontinent men and women aged 65 and older.

MEASUREMENTS: Thirty-eight items were generated using a literature search and interdisciplinary panel of experts. Item reduction was achieved through field-testing with 75 older men and women with UI attending an information session. The final 20-item draft, measuring older adults' level of confidence in preventing urine loss, was administered to a new group of consecutive patients 1 week before and at the time of their first visit to the UI clinic to enable evaluation of test–retest reliability. A 3-day voiding diary, quantifying the frequency of UI, and the Incontinence Quality of Life questionnaire were used to test construct validity.

RESULTS: One hundred sixteen of 300 eligible patients (39%) participated (mean age ± standard deviation 74 ± 6, range 65–87). The GSE-UI items showed normal distributions and no ceiling effects. Self-efficacy scores ranged from 16 to 193 (mean 104 ± 41, possible range 0–200) and correlated positively with quality of life scores ($r = 0.7$, $P < .001$) and negatively with UI severity ($r = -0.4$, $P < .001$). Internal consistency for the GSE-UI was 0.94 (Cronbach alpha). Initial test–retest reliability of the 20 items using intraclass correlations ranged from 0.50 to 0.86.

CONCLUSION: The GSE-UI will enable measurement of whether a person's confidence in their ability to prevent urine loss is an important mechanism contributing to improvements in UI. **J Am Geriatr Soc 56:542–547, 2008.**

Key words: urinary incontinence; elderly; questionnaire; self-efficacy

Urinary incontinence (UI) is common, costly, and bothersome and affects quality of life and function.[1–5] Up to 50% of community-dwelling women and 20% of community-dwelling men aged 65 and older experience UI.[6,7] Despite its high prevalence, many of the mechanisms through which UI occurs and remits in elderly people remain incompletely understood.[8–13] Patients who experience marked improvements in UI may show minimal or immeasurable changes in urodynamic parameters.[9,10] Among the potentially important but understudied factors that influence UI are psychological factors. A better understanding of the various physical, behavioral, and psychological factors that underlie UI could lead to the development of more-effective treatment strategies.

Evidence suggests that psychological factors play an important role in UI. For instance, placebo treatment of UI in randomized, controlled pharmaceutical trials has yielded reductions in incontinence episodes ranging from 32% to 65%.[14] This so-called placebo effect could have a strong behavioral component as patients become aware of their voiding habits and risk factors for UI, although psychological factors, such as greater self-efficacy for retaining urine, could also explain it. Self-efficacy derives from social-learning theory and is defined as the confidence or belief a person has in his or her ability to perform specific behaviors, such as preventing unwanted urine loss.[15–17] Greater self-efficacy has been shown to improve outcomes and function for a variety of geriatric conditions, including falls.[18–20] Exercise,

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tai-chi, and fall-related multifactorial interventions, for example, have all demonstrated effectiveness for increasing self-efficacy for not falling as well as reducing falls.[21]

Preliminary work supports the application of self-efficacy to UI.[22–24] A small intervention trial using a nurse-driven Continence Efficacy Intervention Program for continence management in 48 mid-life women with stress UI in Japan showed increases in self-efficacy, improved adherence to physiotherapy for UI, and improvements in self-reported severity of UI.[22] It is currently not possible to measure the potential effect of interventions aimed at increasing mastery over lower urinary tract symptoms in elderly people, however, because there are no validated UI questionnaires integrating the concept of self-efficacy that have been developed specifically for geriatric UI. Rather, existing outcome measures focus primarily on UI symptoms or UI-specific quality of life and fail to capture older adults' level of confidence for preventing urine loss during activities of daily living and under different sets of circumstances.

The global aim of this study was to develop an evaluative tool that assesses self-efficacy for reducing or preventing UI. The specific objectives were to generate self-efficacy items specific to UI; to develop and refine the Geriatric Self-Efficacy Index for Urinary Incontinence (GSE-UI); and to assess the GSE-UI's psychometric properties, including construct validity and test–retest reliability. The Institutional Review Board of the Institut Universitaire de Gériatrie de Montréal, Quebec, Canada approved the study.

METHODS

Index Development

The development phase of the GSE-UI included three steps. First, potential items were generated using an extensive review of the literature, including published self-efficacy, UI symptom, and UI-specific quality-of-life questionnaires and through consultation with a multidisciplinary panel of six clinicians and researchers with expertise in UI and geriatric rehabilitation. From these various sources, an original set of 38 items was obtained. Phrasing of the items and the response scaling was done in accordance with Bandura's Conceptual Model of Self-Efficacy and Guide for Constructing Self-Efficacy Scales,[25] whereby all items began with "How confident are you that you can hold in your urine . . ." followed by a description of a specific situation, for example, "when you are at home and have to go to the bathroom?" Response options were presented as per Bandura's guide on a 10-point horizontal visual analog scale with three anchors (0 = not at all confident I can do, 5 = moderately confident I can do, and 10 = extremely confident I can do). A "nonapplicable" response option was eventually included on items such as walking long distances, exercising, or running that might apply to some, but not all, respondents.

The 38 items, originally developed in English, were forward-translated into French and then back-translated into English using rigorous standardized methodology. A bilingual expert panel then reviewed the draft of the GSE-UI for face validity in terms of capturing all factors and situations governing control of UI and for any redundancies or omissions in the items. Each reviewer also evaluated the items for clarity of phrasing in English and French and for any apparent differences in the cultural aspects of the wording. Based on this process, 25 of the 38 items were selected for field-testing. No new items were generated.

Field-testing for content validation and further item reduction were performed by administering this draft of the GSE-UI to a convenience sample of English- and French-speaking incontinent older community-dwelling adults attending three different public information sessions on UI. Specifically, 75 older adults who indicated that they were incontinent completed the 25-item draft GSE-UI and were asked for written feedback on the items' clarity and their relevance to and comprehensiveness for capturing their experience of UI. To verify that these participants represented a heterogeneous sample of older adults in terms of symptoms and severity (an important aspect of the validation process), each completed the International Consultation on Incontinence Questionnaire (ICIQ).[26] The ICIQ queries UI frequency and amount and the circumstances under which UI occurs. Thirty-one percent of the sample was male, and 69% was female and the mean age ± standard deviation was 72 ± 7 years (median 72, range 54–88). Two-thirds of the sample experienced UI at least once per day, and 42% reported moderate to large quantities of urine loss. Forty-two percent reported UI on the way to the bathroom; 41% reported urine loss with coughing, laughing, or sneezing or while exercising; and 27% reported urine loss for no obvious reason on the ICIQ diagnostic item. (Respondents were permitted to select more than one response option.)

Individual items on the 25-item draft GSE-UI were evaluated for potential item reduction by examination of endorsement patterns for response options and missing responses. Items with missing values of greater than 10% were reviewed to identify whether there was a lack of clarity or ambiguous wording, and if so, rephrasing was attempted. Items with ceiling or floor effects, defined as more than 50% of the respondents indicating the highest possible score on the item or 50% indicating the lowest possible score, respectively, were eliminated. Item-to-item correlation analyses were performed, and items on which the interitem correlation exceeded 0.75 were reviewed for potential redundancy. When the two items appeared to be measuring a similar concept, the item that appeared less important to participants based on their endorsement patterns and comments was removed. Based on these various forms of item reduction, five items were eliminated, leaving a 20-item index for further testing.

Validity and Reliability Testing of the GSE-UI Index

The construct validity, internal consistency and test-retest reliability of the revised 20-item GSE-UI were tested on a new sample of patients seeking care at six outpatient urology, gynecology, or geriatric incontinence clinics in Montreal and Sherbrooke, Quebec, between September 2005 and June 2006. Those who were aged 65 and older and who had symptoms of UI, defined as one or more episodes of involuntary urinary loss during the previous 3 months, were eligible. Exclusion criteria included evidence of cognitive impairment indicated by a score of less than 24 on the Mini-Mental State Examination,[27] other neurological conditions or severe demyelinating illnesses, terminal cancer, use of a

permanent or intermittent urinary catheter, residence in a nursing home, or a history of surgery to treat UI within the previous 2 years. The analyses presented in the rest of this article refer to this second group of patients.

The two primary hypotheses used to test construct validity were that the GSE-UI scores would correlate negatively with UI severity, such that those with more-severe UI would score lower on the index, and correlate positively with UI effect on everyday life, such that those with better UI-specific quality of life would report higher self-efficacy scores. UI severity was measured using a self-recorded 72-hour voiding diary,[28] which has been shown to be a valid and reliable means of ascertaining UI frequency in elderly people. UI-specific quality of life was measured with the Incontinence Quality of Life questionnaire (I-QOL),[29,30] a validated 22-item questionnaire where higher scores indicate better quality of life.

A research assistant who met with them 1 week before a scheduled UI clinic visit enrolled individuals who consented to participate in the study. At the time of the visit (Time 1), the research assistant administered the 20-item GSE-UI, the Mini-Mental State Examination, the ICIQ, and several sociodemographic questions such as age and educational attainment. All participants were instructed on how to keep a 72-hour voiding diary to record episodes of micturition and leakage and to describe the circumstances of each leakage. One week later (Time 2), each participant saw a physician specializing in UI (urologist, urogynecologist, or geriatrician), who documented a presumed diagnosis of UI-type—stress, urge, mixed, or other. The research assistant met with each participant immediately before this appointment to administer the I-QOL. The GSE-UI was also readministered, and participants were queried to determine whether they had experienced a change in UI frequency between Times 1 and 2.

Analysis

Total scores for the GSE-UI were computed by summing the scores from each of the 20 items (minimum 0, maximum 10 points per item, range of total score 0–200). If one or more items were scored as "nonapplicable," the total GSE-UI score was recalibrated on a scale of 200.

Construct validity was evaluated in two ways: by correlating the total scores from the GSE-UI with UI severity as determined according to the mean number of UI episodes per day over the 3 days as reported in the patient's voiding diary and by correlating the total scores on the GSE-UI with the I-QOL scores. Known-groups validity was evaluated by categorizing participants according to UI severity (<1, 1–3, or >3 episodes of UI per day) and according to the effect of UI on their quality of life (mild, moderate, severe)[29] and then testing differences in the mean self-efficacy scores per group using analysis of variance ($P<.05$). To determine differences in GSE-UI scores between treatment-naïve patients and those who had previously consulted for UI, a two-tailed t-test with $P<.05$ was used to evaluate statistical significance.

Two types of reliability of the GSE-UI were determined. Internal consistency of the final 20-item index was evaluated using a Cronbach alpha coefficient. Test–retest reliability was assessed by comparing the participants' responses to each item from the two visits using intraclass correlation coefficients (weighted kappa). Kappa values greater than 0.75 represent excellent agreement beyond chance, values less than 0.40 represent poor agreement beyond chance, and values between 0.40 and 0.75 represent fair to good agreement beyond chance.[31] Only subjects who reported no change in UI status during the week between administrations of the GSE-UI were included in the test–retest analysis.

RESULTS

Six hundred twenty-one consecutive new clinic patients were screened for study eligibility. Three hundred twenty-one patients were excluded; 152 did not experience UI, an additional 114 were younger than 65, and 55 met other exclusion criteria. Of the 300 eligible patients, 116 (39%) agreed to participate in the validity and test–retest phase. The three most common reasons for refusing to participate were disinterest in becoming a research subject (33%), busy schedules (25%), and poor health status (15%). Characteristics of the study participants are shown in Table 1. The study group comprised mainly older females with variable UI severity and a predominance of mixed UI symptoms. UI data on eligible patients who refused to participate were not available for comparison.

Table 2 shows the mean score, ceiling effect, and intraclass correlation for each of the 20 items of the GSE-UI. All 20 items had normal distributions and ceiling effects of less than 20%. The item intraclass correlations ranged from 0.50 to 0.86. Participants answered 34% of the items identically on the 0 to 10 scale during the two administrations, and an additional 61% of the items were answered within plus or minus one response category on both occasions. Internal consistency for the GSE-UI was high (Cronbach alpha 0.94). Five participants reported that their UI status had changed between the two assessment periods, and thus their results were omitted from the test–retest analysis.

The mean total score on the GSE-UI was 104 ± 41 (range 16–193). Total scores had a strong positive correlation with I-QOL scores (correlation coefficient $(r) = 0.7$, $P<.001$) and a moderate, negative correlation with UI severity as measured on the voiding diary ($r = -0.4$, $P<.001$). There was no correlation between GSE-UI score and age or GSE-UI score and type of UI, nor did mean GSE-UI scores differ between treatment-naïve patients and those who had previously consulted for UI. Figures 1A and B illustrate significant known-group relationships between GSE-UI total scores and quality-of-life scores and between GSE-UI total scores and UI severity, respectively.

DISCUSSION

This research reports on the development, validity, and reliability testing of the GSE-UI. Development of the GSE-UI occurred with reference to published literature on important domains affected by UI, clinical input from UI specialists, and consultation with a group of older community-dwelling men and women attending informational sessions on UI. The clinicians and incontinent older adults attested to the GSE-UI's face validity. Acceptable content validity was determined by ensuring that the GSE-UI measured levels of self-efficacy for preventing urine loss in

Table 1. Participant Characteristics (N = 116)

Characteristic	Value
Age, mean ± SD (range)	74 ± 6 (65–87)
Sex, %	
Male	8
Female	92
Language, %	
French	79
English	21
Educational attainment, %	
<12 years	33
High school	34
Postsecondary education	33
Mini-Mental State Examination score, mean ± SD (range)	28 ± 1 (25–30)
General health status, %	
Excellent	14
Very good	34
Good	43
Fair or poor	9
Incontinence quality-of-life questionnaire score, mean ± SD, median (range)	65 ± 21, 68 (5–100)
Number of UI episodes per day recorded on the voiding diary, mean ± SD, median (range)	3 ± 3, 2 (0–20)
International Consultation on Incontinence questionnaire	
Frequency of UI episodes, %	
Once a week or less often	16
2–3 times per week	15
Once a day	16
Several times a day	48
All the time	5
Amount of urine loss per episode, %	
A small amount	52
A moderate amount	34
A large amount	14
Number of pads used per day, %	
0	21
1	25
2 or 3	36
≥4 or more	18
Previous consultation for UI, %	52
Duration of urinary incontinence symptoms, years, %	
<1	9
1–5	52
>5	39
UI specialist diagnosis, %	
Stress	20
Urge	29
Mixed	49
Obstructive	1
Detrusor hyperactivity with impaired contractility, %	1

UI = urinary incontinence; SD = standard deviation.

common situations under which UI potentially occurs in older adults.

After a systematic reduction process, the 20-item GSE-UI proved valid and reliable in a new sample of 116 typical elderly outpatients experiencing UI. Because there is no criterion standard for measuring self-efficacy for UI, the construct validity of the index was tested by theorizing that a person who reports better UI-related quality of life would have greater levels of confidence for controlling their urine under different circumstances and, conversely, that someone with more-frequent UI episodes would experience less confidence for preventing urine loss. As expected, the data showed that greater self-efficacy for controlling UI correlated positively with UI-related quality of life and negatively with UI severity in correlational analyses and with known-group comparisons.

Internal consistency of the index was high, and there were no ceiling effects greater than 20% for any of the items. Acceptable test–retest reliability was a necessary prerequisite to determine whether the index can measure change over time. It had initially been hoped that correlation coefficients in the good to excellent range (i.e., exceeding 0.6) could be obtained for all the items, but two items, "when you are depressed" and "when walking long distances, exercising, or running," did not achieve this cutoff. It is likely that this was because these items did not apply to many patients, and they experienced confusion in answering them. The response options on these items were therefore expanded (by adding a "does not apply to me" option), and it was possible to achieve improvements in the test–retest reliability scores exceeding 0.6 in a subsequent but similar group of 43 clinic patients (data not shown). These results provide compelling cross-sectional validity for the GSE-UI and will allow formal testing of responsiveness in a future study.

Developing a new questionnaire for UI requires sound justification, because many quality-of-life and symptom questionnaires for UI already exist. An ideal outcome measure for geriatric UI should be able to establish whether treatment is successful and whether further therapeutic interventions are required to meet a patient's treatment goals. It must be reliable, valid, and responsive and, to be useful, must be brief, acceptable to patients and clinicians, easy to use, easy to interpret, and clinically meaningful with respect to daily functioning. To the authors' knowledge, no such measure exists to capture the concept of self-confidence for controlling urinary symptoms. It is therefore likely that the GSE-UI will be a valuable addition to the armamentarium of tools that exist for measuring different aspects of UI. The main concern is the length of the questionnaire, which is currently 20 items. The next phase of the study is intended to test the responsiveness of the current 20-item long version and a shorter 12-item version. Certain questions with high inter-item correlations (e.g., losing urine with coughing or laughing), as well as those that have too many inapplicable responses, will be eliminated. If the 12-item version can be shown to be responsive to clinical change, then the tool should have even better clinical utility.

Many uses for the index are foreseen. The first is its potential to clarify to what extent improvements in UI are due to psychological effects. It is widely recognized that patients who experience reductions in UI episodes do not always show parallel improvements in physiological parameters.[9,10,13] Within clinical trials, the Hawthorne effect, or the psychological benefits patients receive from the attention afforded to them from participating in a study, has

Table 2. Distribution, Ceiling Effects, and Intraclass Correlation of the 20-Item Self-Efficacy Index

Question	Mean	Standard Deviation	Ceiling, %	Intraclass Correlation
How confident are you that you can hold in your urine . . .				
when you are at home and have to go to the bathroom?	6	3	7	0.61
when you are away from home?	5	3	1	0.62
long enough to get to the bathroom in time during the night?	6	3	11	0.63
for at least 20 minutes when you feel the urge?	4	3	2	0.65
when coughing?	5	3	11	0.71
when sneezing?	5	3	9	0.78
when laughing?	6	3	16	0.76
when walking long distances, exercising, or running?	5	3	3	0.57
when taking long-distance trips (plane, train)?	6	3	6	0.60
when you are nervous?	5	3	6	0.65
when you are depressed ?	6	3	11	0.50
when you are tired?	6	3	8	0.60
when you are frustrated?	6	3	10	0.66
How confident are you that you can . . .				
find ways to distract yourself to overcome the urge to pass urine?	5	3	3	0.61
space out trips to the bathroom so that you don't go too frequently?	5	3	2	0.69
visit places where you may have difficulty locating the bathroom?	5	3	3	0.72
go out to run errands without having to stay near a bathroom most of the time?	6	3	5	0.74
go out on social outings without worrying about urine loss?	6	3	6	0.66
prevent urine loss without relying on pads or protection when you are at home?	5	4	9	0.86
prevent urine loss without relying on pads or protection when you are out?	3	4	3	0.86

been offered as an alternate mechanism. This so-called placebo effect has been shown to yield up to 65% improvement rates in UI.[14] Whether this effect occurs in everyday clinical practice remains unknown. The GSE-UI will permit clarification of whether greater self-efficacy for controlling UI is a causal mechanism for achieving improvements in UI status in older men and women. If so, interventions aimed at increasing self-efficacy for managing UI in UI sufferers could be developed as a conservative treatment option for UI.

Clinically, the GSE-UI might be employed for certain patient groups to identify treatment goals or to distinguish whether patients have greater confidence for "holding in their urine" under circumstances classically related to urge or stress UI. Although not tested specifically as a diagnostic tool, many items in the GSE-UI provide excellent face validity for symptoms that classically occur due to stress UI (urine leakage with coughing, laughing, or sneezing) or urge UI (sudden involuntary losses of urine, associated increased urinary frequency, and a strong urge to void). The latter information could help clinicians prioritize therapeutic options in cases in which stress and urge symptoms coexist. Longitudinal validity and responsiveness are currently being examined, so it is anticipated that the index will be useful as an outcome measure clinically and in research studies.

Some limitations warrant discussion. A research assistant administered the GSE-UI, and no precautions were taken to ensure that the responses were recorded correctly. Although the GSE-UI could be self-administered, only the results obtained by research assistant testing can be commented on. There is some concern that the visual analog scale may prove difficult for older patients without super-

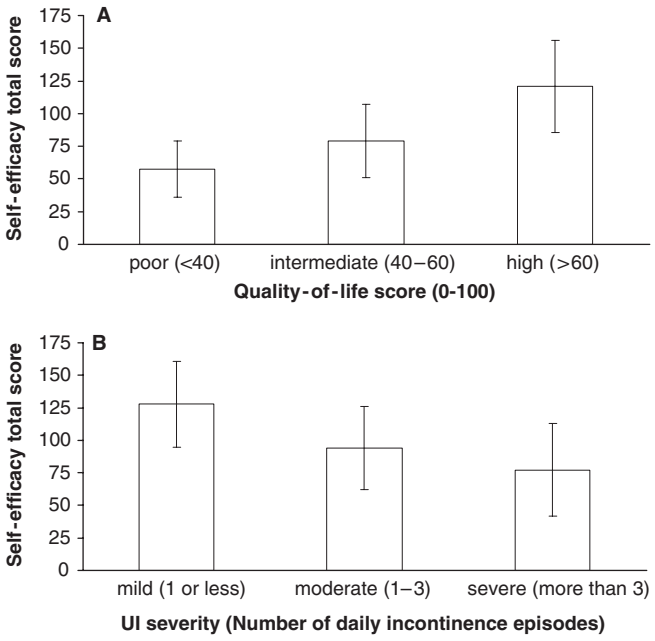

Figure 1. A. Relationship between urinary incontinence (UI)-related quality-of-life scores and total self-efficacy scores. The quality-of-life scores are derived from the Incontinence Quality of Life questionnaire (range 0–100). The range of possible self-efficacy scores was 0 to 200. $P < .001$ for all three groups; horizontal lines are standard deviations. B. Relationship between UI severity (mean number of UI episodes recorded on the voiding diary, range 0–20) and total self-efficacy scores (range 0–200). $P < .001$ for all three groups; horizontal lines are standard deviations.

vised guidance. It was necessary to keep the 10-point scale to conform to Bandura's original requirements for self-efficacy scales and to increase the sensitivity for the test–retest and responsiveness analyses. Whether a 5-point Likert scale performs equally will be investigated in future analyses. Also, the acceptance rate for participation in this study was low (39%), and the study sample might therefore consist of a biased group of healthy patients, because only 9% reported fair or poor health. This could threaten the generalizability of the findings to sicker patient groups, particularly those that did not consent to participate in the study. Finally, the GSE-UI will not be useful for patients with cognitive impairment, a frequent co-phenomenon of UI in elderly people.

The GSE-UI is valid, reliable, and a valuable addition to measurement tools currently in use. Further research is needed with the GSE-UI to determine responsiveness and ascertain the relevance of interventions aimed at improving self-efficacy for preventing UI.

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Author Contributions: Cara Tannenbaum designed the study, collected and analyzed the data, and drafted the first version of the manuscript. Judith Brouillette collected, analyzed, and helped interpret the data. She also helped draft the first version of the manuscript. Nicol Korner-Bitensky designed the study, analyzed and interpreted the data, and drafted and revised the manuscript. Chantale Dumoulin analyzed and helped interpret the data and revised the first draft of the manuscript. Jacques Corcos Marie-Claude Lemieux aided in the design of the study, collected the data, and revised the first draft of the manuscript. Le Mai Tu, Stephane Ouellet, and Luc Valiquette collected the data and revised the first draft of the manuscript. All authors approved the final version of the manuscript for submission.

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