Original Research

Group Exercise for Improvement in Urinary Incontinence using Motor Learning and Sensory Awareness based on the Feldenkrais Method® of Somatic Education

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Abstract

Background: Purpose and Rationale

The pelvic floor functions as an integrated neuromuscular system. Dysfunction and motor control problems in the pelvic floor system cause various kinds of pelvic distress, including urinary incontinence (UI) and dyscoordination. Many women have pelvic floor dysfunction and do not know it or have UI and do not seek physical therapy. There is a need for effective group treatment programs to reduce and prevent incontinence and promote pelvic health. The purpose of this report is to present a group exercise model that used a sensory motor learning method drawing from the Feldenkrais Method® of Somatic Education, health education and group support. The Feldenkrais Method is a sensory motor learning educational process. The program's goal was to improve sensory motor coordination in order to reduce symptoms of UI and pelvic distress.

Case Description

This mixed method case report describes a five-week group treatment program for 12 self-referred women with UI. There were five weekly two-hour classes, for a total of 10 hours. The program included, (1) Feldenkrais Method Awareness Through Movement® lessons, (2) relevant health education information about the bony, muscular and organ anatomy of the pelvis, (3) bladder training, including the reflex relationship between the bladder and pelvic floor, and healthy voiding habits, (4) the role of the parasympathetic and sympathetic nervous systems, and (5) how the pelvic floor works as an integrated system. Each class included group support and discussion. Home practice was with provided pre-recorded Awareness Through Movement audio lessons on CD.

Outcomes

The measures used were the Urogenital Distress Inventory 6 (UDI-6) and Incontinence Impact Questionnaire 7- short form (IIQ-7). The results from these scales demonstrated the effectiveness of the program for reducing mild to moderate UI and symptoms of pelvic distress, such as pelvic pain, in women. As measured by the UDI-6, 66% of the women had reduced distress.

Conclusion

This pelvic floor program using Feldenkrais Method Awareness through Movement lessons, health education including bladder training and group support is an effective option for reducing mild-moderate

urinary incontinence and improving quality of life. Further research would be valuable to expand on this approach.

Keywords
Urinary incontinence, pelvic floor, Feldenkrais Method, motor control, sensory awareness, group exercise, women's health

Please cite: (First published in the) *Feldenkrais Research Journal, volume 7*; 2025.

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Impact of Urinary Incontinence

The quality of a woman's life is adversely affected by urinary incontinence (Shumaker et al. 1994). Urinary incontinence (UI) affects a person's health status, quality of life, including productivity, and healthcare expenses (Tang et al. 2014). In addition, Ge et al. (2017) reported significant disruption of sleep and an increase in fatigue with UI. Pereira et al. (2019) studied 80 women who were in physical therapy treatment and had a co-morbidity of UI, found that sexual satisfaction, expression and self-image had been negatively impacted, and this was part of a reduction in their quality of life.

The impact on caregivers has also been studied. Talley et al. (2021) described an increase in caregiver burden, and an increase in institutionalization for elderly people with UI. These impacts have social consequences: they reported 'physical, financial, and social consequences, changes in family roles and support, and a need for training on incontinence management strategies' (2021: 2).

In 2008, Nygaard et al. reported that 15.7% of non-pregnant women over 20 years of age had moderate-severe urinary incontinence. This percentage increases with aging (Nygard et al. 2008). Depending on how UI is defined, the method of measurement, the age of women, whether community dwelling or in an institutional facility, then the percentage can range from 5% to 66% (Choi et al. 2007). This figure may be even higher as many women do not discuss UI with any healthcare provider. UI affects the physical, social, and psychological well-being of women whether living in the community or in an institutional facility. There is also a high financial cost, somewhere in the range of USD $16 to $26 billion annually, with 37% of the money spent on absorbent products and laundry (Choi et al. 2007; Koch 2006). One only needs to look at the volume of incontinent products on display for sale at the local pharmacy to see that dealing with UI costs money for the consumer and seems hugely profitable for the companies who make the products.

The environmental impact of increased adult diaper disposal is a significant problem and

growing. Adult diapers now exceed the amount of baby diapers in the waste stream, as shown by a recent Australian study by (Brewster et al. 2022). In one rehabilitation hospital in Japan, eight out of 10 residents wear diapers and 400 pounds of diaper waste is produced daily by 200 residents (Rich and Inoue 2021).

Rationale for Group Exercise

Many patients are seeking greater control of their health and are looking for affordable self-care options. Health education classes offer a self-care model that appeals to many consumers and its affordability makes them an attractive choice. Pelvic floor dysfunction leading to mild to moderate UI can be addressed in small group exercise classes using Awareness Through Movement® lessons. Literature supports inclusion of pelvic floor exercise in a general exercise program for women to improve pelvic floor function (Kim et al. 2011).

Research reports found that five is the median treatment visits for UI treatment reported in a multicentre observational study in Australia (Neumann et al. 2005). For group pelvic floor training and treatment, groups of 8 to 10 students were reported in the Netherlands (Janssen et al. 2001).

Pelvic floor muscle training is often called Kegel exercises. Dr Arnold Kegel promoted the idea that stress UI resulted from a lack of awareness of function and coordination of pelvic floor muscles (Kegel 1948; and also Cho and Kim 2021). Dr Kegel drew on midwives' traditional methods used to restore a mother's bladder and pelvic floor function after giving birth. These traditional methods included instructions for a woman to use her own finger to sense the contraction of the pelvic floor musculature. Dr Kegel invented a device, called a perineometer, used internally in the vagina, which recorded the force of the contractions of the pelvic floor muscles (Kegel 1948). The use of the perineometer is a Kegel exercise, and a type of biofeedback device. Currently, any pelvic floor exercise is commonly called a Kegel, but without the use of the perineometer biofeedback device, it is a different exercise. A woman may not have the awareness or sensory feedback to exercise these muscles properly. This may lead to a lack of confidence in whether-or-not they are doing the PFME correctly. It may also result in a lack of improvement in symptom reduction. This can lead to women not doing pelvic floor muscle exercises (PFME). In addition, many women are not comfortable physically or psychologically using an internal device. They may not be able to or want to purchase a device or use the device with a therapist. Some women may prefer a self-directed awareness based program that can be done independently and non-invasively, or they may not have access to a trained pelvic floor therapist.

A 2013 study by Fan et al. used measures UDI-6 and IIQ-7 and found significant improvement in quality of life for women with UI from PFMT (pelvic floor muscle training). Pelvic floor training can have a progression of phases. Gödel-Purrer suggests that Phase 1 is "development of the ability to become aware of the region" (2006: 253).

This case report describes a treatment approach unique in the literature. It is a group exercise program, offered as a self-referred public wellness program, with a semi-standardized protocol, using the Feldenkrais Method, a sensory-motor learning process (Feldenkrais 1991; Hillier and Worley 2015; Stephens and Hillier 2020). A successful program to improve continence will develop awareness of the muscular system of the pelvic floor. As the pelvic floor is functionally integrated with other deep muscles of the body, one can make use of concrete, observable feedback in the form of one's own whole body movements, including the spine, pelvis, shoulder girdle, hips and breathing. It has been proposed that this process of directing one's attention and noticing changes to many aspects of sensory motor learning causes a change in how the nervous system manages or organizes the whole self to perform the action. The theory of neuroplasticity may explain how changes in efficiency, coordination, musculoskeletal configuration, timing and ease can occur relatively quickly. In Awareness Through Movement lessons clarification of the image of the movement as connected to one's sensation is emphasized (Doidge 2007; Stephens and Hillier 2020).

Pelvic Floor exercise has been shown to improve or even cure UI symptoms (Bø and Sherburn 2005; Liebergall-Wischnitzer et al. 2009). In addition, specific bladder training also is an important part of a UI treatment program (Choi et al. 2007, UCSF 2022-2024). Women with UI benefit from education that explains the reciprocal relationship between the bladder and the pelvic floor. Effective full contractions of the pelvic floor can inhibit bladder contraction and stop urination, the urge to urinate, and involuntary urine leakage. Bladder training requires awareness of the sensations of urination, the urge to urinate and the skill to use the pelvic floor muscles to manage urination. Pelvic floor exercise is recommended by medical doctors and physical therapists as the initial intervention for incontinence (Koch 2006).

A 2018 systematic review of 31 research trials, concluded

> Based on the data available, we can be confident that pelvic floor muscle training can cure or improve systems of SUI [stress urinary incontinence] and all other types of UI [urinary incontinence]. It may reduce the number of leakage episodes, the quantity of leakage…, and symptoms on UI specific questionnaires….The findings of the review suggest that PFMT could be included in first-line conservative management programs for women with UI. (Dumoulin et al. 2018)

Bladder retraining is a valuable element to be included in programs for improving UI symptoms. A systematic review of 15 trials published in 2023 (Funada et al.) showed mild to moderate evidence of its value in UI treatment. Bladder training was included in the health education aspect of this study.

Most often UI treatment is provided on an individual basis and in a medical setting from a physical therapist or nurse with special training (Choi et al. 2007). There are limitations to this model in the United States, as the cost of individual treatment is expensive and prohibitive for many women. Without health insurance coverage, many women would pay out of pocket for

individual treatment. In addition, health insurance may not cover physical therapy, a medical referral may be needed from the primary care provider to receive services, and there may be high co-payments to make. Even in the best situation, the woman must first ask for help with this condition. Yet less than 38% of women have ever discussed urinary incontinence with their health care provider (Koch 2006).

The reasons for not seeking treatment for UI include the belief that UI is a normal process of aging, or they were embarrassed or ashamed. Some women thought the problem could not be solved or that their doctor would treat their problem lightly or they were afraid that the physician would suggest surgery. Women who did not find surgery an acceptable solution were less likely to seek help (Koch 2006).

A pelvic floor training program offered as a wellness or pelvic health program can address some barriers to treatment. Group classes are cost effective. The educational component can address misconceptions about UI. Group discussion can provide support and motivation. Advertisements for group classes bring the issue out in the open and could help educate the public about the prevalence of the problem and that there are solutions. In one study (Koch 2006), 16% of women said they sought help for UI due to a public health campaign. If the class has a wellness component, women who feel embarrassment may be encouraged to attend. Each pelvic health educator could positively affect the lives of more women. Group treatment with pelvic floor exercise and bladder training is as effective as individual treatment (Janssen et al. 2001).

Research describes effective pelvic floor muscle training programs. However, there are a range of parameters for the type of PFME to be performed, the repetitions needed to decrease symptoms, and the duration of the exercise program (Koch 2006). There are differences shown in effective programs in type of (1) exercise, (2) duration, (3) repetitions, (4) intensity, and (5) length of time needed to show improvement. According to Cho and Kim (2021), “Specific exercise regimens vary considerably in frequency and intensity, and the ideal exercise regimen has not yet been determined” (2021: 383).

Women with UI have difficulties with pelvic floor motor control and also with coordination of the pelvic floor system (Madill et al. 2009; Sapsford 2004). Borello-France et al. 2006 found that the prognosis for improvement of stress UI symptoms is very good with at least 65% of women improving and 16% having a complete cure. Similar results are seen in individual and group exercise pelvic floor training programs that prescribe a set number of exercises and repetitions (Choi et al. 2007; Janssen et al. 2001).

The identified literature at the time of the research study emphasized pelvic floor exercises to be done for a particular number of repetitions. This number varied, ranging from one to dozens of contractions per day. This study was designed to explore if a sensory-motor learning approach that did not emphasize the number of repetitions could be effective. Rather than a preset number of repetitions, in this study, repetitions of exercises were determined by an individual’s comfort with moving and the ability to move with focused attention. Another important

characteristic was the use of exploratory movement. Stephens and Hillier (2020), citing Corbetta et al. (2018) note that they “confirmed the effectiveness of the exploratory learning process in their study of infant skill acquisition” (2018: 230).

A sensory motor approach to exercise, as found in the theory and practice of the Feldenkrais Method, suggests that the ability to sense movement is essential for learning new movement patterns, such as pelvic floor contractions and the activation of the pelvic floor system. The ability to maintain attention to the sensation of the contractions is an important part of the learning. In addition, comfortable movement reinforces engagement with the learning process, and enhances motivation and a sense of success. In this context, a proscribed number of repetitions is less important, and may be less effective, than a sensory motor approach.

The literature indicates that there was a wide range of treatment variables possible and this program was consistent with other pelvic floor programs in (1) the size of the group, (2) symptom history of participants, (3) the number of sessions offered, and (4) the health education provided (Choi et al. 2007; Janssen et al. 2001). The author anticipated the program would be effective for improving UI, but it was important to discover if the program was effective for (1) women with mild or moderate UI, (2) with what type of risk factors, and (3) to identify any unanticipated benefits or barriers to participation in the program and (4) the use of a home exercise component.

Students participated in novel movement explorations, called Awareness Through Movement lessons. Instead of emphasizing the number of repetitions, the emphasis is for students to develop increased kinesthetic ability to sense and feel the pelvic floor working as a coordinated system. In this program, Awareness Through Movement lessons were combined with education relevant to reducing urinary incontinence.

Sensory-motor learning may be the foundational process for women with UI and other pelvic floor conditions. Women with UI have difficulties with pelvic floor motor control and also with coordination of the pelvic floor system (Madill et al. 2009; Sapsford 2004). Borello-France et al. 2006 found that the prognosis for improvement of stress UI symptoms is very good with at least 65% of women improving and 16% having a complete cure. Similar results are seen in individual and group exercise pelvic floor training programs that prescribe a set number of exercises and repetitions (Choi et al. 2006; Janssen et al. 2001).

Cho and Kim (2021) have noted that “Patients have better outcomes with regular PFME [Pelvic Floor Muscle Exercise] and proper technique. The first step in PFME is to instruct the patient how to identify the pelvic floor muscles and to contract and relax them” (2021: 381).

One of the problems for learning to use the pelvic floor is that the sensory and kinesthetic component is not easily perceived. There is no clear joint movement to sense and in contrast to moving a limb and following external feedback cues, such as changes in pressure on supporting surfaces, or the trajectory of the limb through space, a person is required to sense muscular

work on its own. In cases of trauma and abuse, there may be diminished sensation or other psychosocial aspects that can reduce the ability to perceive muscular sensations of the pelvic floor area.

If one cannot feel or see what is happening as a result of muscle contraction, it is difficult to know what is actually occurring. Women who are given written or verbal instructions to do 'Kegels' may not be doing what they think they are doing and may be using a technique that could promote incontinence, such as pushing the abdomen out and bearing down (Bump et al. 1991).

Why Feldenkrais Method was Utilized

A key concept of the Feldenkrais Method is the proposal "that if a person can attend to kinesthetic processes and the bodily organization underlying any movement, they would be bringing the biological feedback that regulated optimal movement coordination in the perceptual threshold" (Russell 2020: 223) In their discussion of possible mechanisms of action for the Feldenkrais Method, Stephens and Hillier (2020) draw on the work of Vereijken and Whiting (1990), suggesting "the use of intrinsic feedback has been shown to be especially valuable to learning" (1990: 230).

As the function of pelvic floor muscles is integrated with other muscles as a neuro-musculoskeletal functional unit (Sapsford 2004), sensory motor learning using full body movement patterns can offer a solution to improving the function of the pelvic floor system. This is suggested by the work of Sapsford (2004) describing muscle synergies between the pelvic floor muscles, the diaphragm, and the abdominal muscles. The pelvic floor is synergistic with the abdominals responding together to manage any changes in intra-abdominal pressure (Madill et al. 2009; Sapsford 2004). To address all components of the pelvic floor system in both its support and movement functions requires using movements that integrate the use of the legs, abdomen, arms and spine. In movement, the nervous system uses synergies and patterns to organize function (Berthoz 2000). Other researched functional components of the system include the deep muscles of the back and the respiratory diaphragm (Richardson et al. 2004).

Feldenkrais Method is congruent with principles of motor control postural control retraining (Connors et al. 2010). Feldenkrais Method group Awareness Through Movement lessons use components of motor learning to improve action. The ability to perform functional tasks requires the use of coordinated muscle action; so that stability and motion are in optimal balance, with appropriate timing, organization of breathing, imagery, and specific sequencing of muscle activation (Lee 2004; Sapsford et al. 2013). Women with SUI have altered motor control patterns, specifically in the timing of the pelvic floor muscles with the abdominals (Madill et al. 2009). Awareness Through Movement lessons emphasize awareness of timing to improve function.

Outcome Measures for Urinary Incontinence

At the time of this study there were several scales for measuring improvement in UI symptoms and to assess quality of life related to those symptoms. The Urogenital Distress Inventory-UDI-6 Short form and the Incontinence Impact Questionnaire-IIQ-7 were used as both pre and post measures. (Shumaker et al. 1994; Ubersax et al. 1995). Subsequent studies have also confirmed the value of these measures (Fan et al. 2013). The measures, validated by research, are simple to administer and score and have been used in other research studies for the treatment of UI. The type of UI for each person is not differentiated by the measures. The measures have been validated and are reliable (Uebersax et al. 1995). The World Health Organization's Second International Consultation on Incontinence rated the UDI and the IDI-6 among the five highly recommended questionnaires to assess symptoms of incontinence, and the IIQ and the IIQ-7 among the five highly recommended questionnaires for assessing the impact of incontinence on (Shumaker et al. 1994; Uebersax et al. 1995).

The scale for Urogenital Distress Inventory-UDI-6 Short form and the Incontinence Impact Questionnaire-IIQ-7 have scores from 0-100. Skorupska et al. 2021 categorized scores lower than 33 on the UDI-6 as having a mild impact and scores higher than 33 as causing greater distress (Shumaker et al. 1994; Uebersax et al. 1995). Skorupska et al. (2021) found, "The higher impact of UI on health-related quality of life is seen in women who scored 9 or more in the IIQ7 questionnaire, and such women felt impaired quality of life" (Abstract).

The goals of the program were to (a) reduce symptoms of stress, urge and mixed UI; (b) to improve motor control in movement that included pelvic floor muscles, (c) to improve the coordination of breathing with exercise, (d) to improve sensory awareness of the pelvic floor muscles, (e) to include the pelvic floor system in functional movements such as moving from sit to stand, and (f) to provide relevant health education for healthy pelvic and bladder function.

Methods

Student Selection

An opportunity sample of twelve women was selected for the group class from a pool of approximately thirty women who responded to the researcher's Practice newsletter announcing the program and asking for volunteer participants. Many women received the newsletter directly from the author, others heard about the program from a friend or healthcare provider.

Each respondent was screened by phone to determine her suitability for the group classes and if she met the requirements for participation. Requirements included (1) having symptoms of UI, stress, urge or mixed, (2) English proficiency, (3) ability to lie supine on a floor exercise mat, (4) ability to sit for thirty minutes, (5) access to a CD player in order to use the recorded home program Awareness Through Movement lessons on CD, and (6) the ability to attend all five classes. Reasons for exclusion from participation were (1) recent history of injury, serious illness

or surgery, (2) severe pain, or (3) certification as a Feldenkrais Method Teacher. No medical prescription was required as the exercise program was considered a self-improvement or wellness type of program offered on a self-referral basis.

A longer history of UI symptoms was gathered from the women who passed through the initial screening. A range of risk factors for developing UI were identified in the screening (Seshan et al. 2016).

Women reporting symptoms consistent with stress, urge, and/or mixed urinary incontinence were admitted into the study.

Group Size and Duration

The two-hour classes met on a Saturday morning for five consecutive weeks at the author's private movement studio. The number of weeks was set at five. This decision was based on the need for consecutive weeks of treatment and that the literature reported that five was the median number of treatment visits (Neumann et al. 2005). The class size was limited to 12 by several factors: recommended group size from the literature (Janssen et al. 2001), as well as the space requirements at the author's private practice, the need for the teacher to visually observe the quality of each student's movement, especially the movement of the abdomen, and to allow for group discussion. The author also expected that 1-3 students would drop out, however, 100% enrollment and class participation remained throughout the study.

The Guide for Physical Therapist Practice (APTA 2003), recommends people with findings of pelvic floor dysfunction are classified into the pattern 4C Impaired Muscle Performance. The recommended intervention plan for pattern 4C includes therapeutic exercise, breathing and relaxation, health education, group support, and a home program of exercise and journal writing. Reviewing each woman's history, as well as the results of the participants initial UD-6 and IIQ-7 measures, suggested that these women likely had pelvic floor muscle dysfunction. Women with UI have difficulties with pelvic floor motor control and also with coordination of the pelvic floor system (Madill et al. 2009; Sapsford 2004). Consideration of all these factors led to the design for the intervention.

Intervention

The intervention included weekly sensory-motor learning processes called Awareness Through Movement Lessons from the Feldenkrais Method, as well as health education for pelvic floor function, bladder training, group support, and journal writing. The health education included information on, for example, voiding habits, relevant anatomy and physiology, emotional aspects of UI, and included group discussion. In the first meeting, participants were given, (1) journals to record observations, insights, questions and home practice activities, (2) an audio CD program of six Awareness Through Movement lessons to use for the home exercise program (Bowes 2006), (3) a handout including health education information about the pelvic floor system and

healthy voiding habits, and (4) UDI-6 and the IIQ-7 was given and collected. Participants signed an informed consent. In weeks two through five, participants received additional written materials designed to develop participants' knowledge of their pelvic floor, what bodily sensations are associated with voiding, and voiding hygiene. In each week there was 30 minutes for sharing of experience, discussion, and questions and answers.

Bladder training included information on the reflex relationship between the pelvic floor muscles and the bladder, how to urinate in a way that reduces strain on the pelvic floor, frequency of urination, body position for urinating, fluid intake, using pelvic floor muscles to appropriately inhibit urination. Many women have been told to stop the flow of urine during each urination event and it was important to communicate that this is misinformation in that it disrupts healthy voiding patterns.

Awareness Through Movement Lessons: Somatic Education

Awareness Through Movement, the group exercise component of the Feldenkrais Method is verbally directed, with no demonstration of the movements. Students are guided by the teacher to explore movement sequences, to self-organize to perform the task and to attend to sensory cues such as pressure response on the floor or breathing pattern.

The Awareness Through Movement lesson began with a body scan. In the body scan, the teacher directs the student's attention to contact with the floor, the sense of length of the spine and relationships of body parts, the quality of the breathing and various other physical sensations related to the intent of the lesson. In lessons for improving the pelvic floor, attention is given to (1) the sense of the spine, pelvis, hip joints and legs, (2) breathing in the lower abdomen and lower back, (3) the movement of the ribcage with the breath, and (4) the overall feeling of relaxation that is possible in the moment. After the scan, the teacher gives a verbal direction for a movement. While the student explores this movement, further directions are given to focus the student's attention to various aspects of the movement. A non-judgmental attitude is fostered toward a student's experience of movement and bodily experience. The movements gradually link together promoting full body participation in an easy and coordinated manner. Movement variables are introduced in a structured way congruent with the intention of the learning possibilities in the lesson. Changes felt in pressure against the floor give feedback as to the use of ground forces and to how the whole body is moving. Verbal guidance brings attention to the change between internal and external focus. Noticing the relationship of the breathing cycle to the movement, i.e. whether one is inhaling or exhaling, ensures that the student does not hold the breath and can also be used to calibrate the intensity and quality of the movement. In Awareness Through Movement lessons, the student is asked to move in an easy and relaxed manner while continuing to breathe. Attention is given to the quality of the movement, i.e. is it smooth throughout the range, or jerky; is the movement reversible, i.e. can one stop and start at any point in the trajectory; and what is the timing of the movements of different body parts with breathing. The student is asked to develop a coherent sense of the movement pattern (Berthoz

2000). This sense is reported by students as a pleasant whole body feeling of a movement pattern that is harmonious, integrated, and coordinated (Berthoz 2000; Feldenkrais 1991; Smyth 2018; Stephens and Hillier 2020).

Other attentional aspects and movement variables can be included in an Awareness Through Movement lesson depending on the teacher's perceived needs of the student.

Motor control may be improved by noticing one's speed, initiation of movement, planes of action, orientation, the effort used or the sequence of the movement of parts of the body, and timing. The Awareness Through Movement teacher does not demonstrate a movement, but continues to give kinesthetically based verbal cues (questions, suggestions, directions) or images to promote independent motor learning and awareness. Throughout the lesson students are asked to move in a comfortable and pain-free range. At the end of the lesson, the body scan is repeated to foster the student's learning through the noticing of change in elements such as differences in body organization, breathing, and mood as compared to the start of the lesson.

Pelvic Health and Awareness Lessons Brief Description

Lessons are done in different exercise positions for both novelty and to activate the full musculature of the pelvic floor system. Body positions used were supine with legs long or knees bent, sitting on the floor, and standing. It is interesting that a study by Borello-France et al. (2006) demonstrated that position for performing exercises did not affect outcomes.

The reader is directed to Appendix B for a brief description of each Awareness Through Movement lesson. The brief description of the six basic lessons does not convey the sensory-motor richness of each lesson, as directed attention to different parts of the body makes the movements progressively more complex. All lessons emphasize breathing, and sensing movement through the whole spine. The movement instructions include resting and relaxing in between contractions of the pelvic floor. Slowness and ease are qualities that are emphasized in the Awareness Through Movement lessons. Two lessons were taught each week and were similar to lessons on the audio CDs for home use.

Health Education

Health education included anatomy topics: (1) bones of the pelvis, hips, and vertebral column, including their shape, muscles and joints; (2) respiratory diaphragm; (3) bladder system; (4) uterus and rectum, specifically their position and relationship to each other and the pelvic floor. The physiology topics included the micturition–pelvic floor reflex, physiology of elimination, and the relationship of breathing to the sympathetic and parasympathetic nervous system. Health topics included (1) definitions of types of UI, (2) healthy voiding habits, (3) aligning student's images of their body parts closer to reality. For example, one woman thought the excursion of the respiratory diaphragm was much greater than it was, another did not know that the ribs

moved. An anatomical musculo-skeletal model of the pelvic floor was demonstrated and illustrations from *The Female Pelvis* by Blandine Calais-Germain (2003) were used.

Group Support

Confidentiality was requested for the program from all participants. During the discussion, students asked questions or shared their experiences. The time allotted for discussion could have been longer as the participants requested this. Most participants reported that they had never discussed these issues with others who shared similar experiences. The Awareness Through Movement lessons seemed to stimulate deep reflection and responses in many of the participants. Many students reported an increased awareness of the pelvic floor, and gained insights into their life, their habits of voiding, and how their self-image was changing with the improvement in sensation and control of the pelvic floor.

Table 1: Interventions weekly

Week	Movement Lessons	Health Education	Group Support
One	Breathing, Leg Tilts (ATM lessons 1, 2)	Healthy voiding habits, pelvic floor system, pelvic floor illustrations	Introductions, Use of journal
Two	Breathing, Leg Tilts with head raise (ATM lessons 1, 3)	Incontinence definitions, Demonstration with pelvic floor model, Urge incontinence strategies.	Q & A of first week, homework, imagery in lessons, confusion about breathing
Three	Buttocks awareness (ATM lesson 7. This lesson is not in the recorded home program), Pelvic tilting (ATM lesson 4, handout #3)	Constipation, nighttime urination strategies, ‘jic’, breathing, role of sympathetic and parasympathetic nervous system	Talk about digestion, sleeping, self-image, awareness and how one changes
Four	Breathing, Sitting lifting R/L sides of pelvis (ATM lesson 1, 5) Self-mobilization of pelvis (handout #2)	Skeletal system-pelvis, sacrum, hip and spine relationships, Q & A	Role of practice in improvement, reports of improved symptoms, sexual response changes
Five	Breathing, Sitting tilting pelvis (ATM lesson 6) Review of all movements. How to change movement patterns and continue to breathe.	Q & A, review of all course material	How to continue in future, personal changes noticed, awareness

Home Exercise Program

Home exercises provided choice for each student. The resources were (1) six recorded Awareness Through Movement lessons on CD (Bowes 2006), (2) written instructions for an additional lesson exploring the use of the buttocks, (3) written instructions for self-mobilization of the sacrum and pelvis. Students were oriented to these exercises during the program. Students were asked to select a practice daily, either using the CDs, or the handouts or doing what they remembered from the class. They were encouraged to do something that was interesting to them. Instructions included a suggested routine: (1) initial breathing Awareness Through Movement lesson, (2) any other lesson, rotating what they chose each day, and (3) using healthy voiding habits. Novelty is an important characteristic to employ with motor learning (Berthoz 2000; Doidge 2007). The number of repetitions of each variation is determined by each student's comfort level and ability to maintain attention to how they are moving. Generally, the number of repetitions will be less than 15.

Results

Student Characteristics and Demographics

Participant ages ranged from 46-68, with an average age of 52, and all were non–Hispanic White with diverse work histories and occupations. All reported exercising 2-3 hours per week, doing a combination of walking and other forms of exercise including martial arts, ballet, yoga, and gym-based weight training.

Half of the participants (n=6) had discussed UI and sought help from a medical provider. One person had received surgical treatment with a bladder suspension, five were given verbal instructions or a written handout of Kegel type exercises. Eleven participants (91%) had not received therapy or treatment for UI, yet 83% (n=10) had utilized Kegel type exercises independently, however they had discontinued Kegel type exercises when their symptoms did not improve. Participants had symptoms of UI from 2-32 years. A history of sexual trauma was reported by 25% (n=3). Of the group, 58% (n=7) had borne 1-2 children, with 42% (n=5) having had no history of giving birth. One woman reported two C-section births; 6 had vaginal births.

Characteristics of study group participants are summarized in Tables 2 and 3.

Table 2: Duration of UI symptoms

Length of time having UI symptoms	2, 4, 5, 5, 10, 10, 11, 20, 20, 25, 30, 32 years	Average 14.5 years

Table 3: Other Characteristics

Did student ever discuss UI with medical provider	6 yes	6 no
Childbirth history	7 yes	5 no
Birth type	6 vaginal	1 c-section
Prior treatment for UI	1 yes (bladder suspension)	11 no
Kegel exercises experience	10 yes	2 no
Sexual Trauma History	3 yes	9 no
Abdominal surgeries	7 yes	5 no
Total Hip Replacement	1 bilateral	11 no
Other Medical conditions such as BMI>26, Hypertension, cancer history, chronic pain	11 yes	1 no

There were other medical conditions present in 91% (n=11) of the women. These included hypertension (n=2), low blood pressure (n=1), high cholesterol (n=2), chronic low back pain (n=3), migraine (n=2), scoliosis (n=2), gastric reflux (n=3), bipolar disorder (n=1), depression (n=1), diabetes (n=1), arthritis (n=1), low blood sugar (n=1) and cancer treatment for non Hodgkin's lymphoma (n=1).

In terms of surgical history, 58% (n=7) had a history of abdominal surgery including hysterectomy, appendectomy, oophorectomy, bladder prolapse repair, laparoscopic tubal exploration, cholecystectomy, and bladder neck obstruction repair with endometrioma excision and laparoscopic tubal exploration. One woman had posterior approach bilateral total hip replacements.

The 10 self-referred participants had urinary leakage, symptoms consistent with, either stress, urge or mixed incontinence or both. The information about other health conditions showed that each woman had one or more risk factors for developing UI (Seshan et al. 2016).

Data Collection

The UDI-6 and the IIQ-7 were administered at the beginning of the first class and at the end of the last class. The journals were for the participants' personal reference and not reviewed by the researcher. The Qualitative Assessment Questions post intervention, Appendix A, were administered at the end of the final session.

Outcomes

The students' scores on the UDI-6, initially ranged from 54-16.6 and post intervention, the range was 33-8.3. Scores from 1-33 were considered mild, 34-66 were moderate and 67-100 as

severe. Initially seven students had moderate UI, and five had mild. After the program, 11 had mild symptoms and 1 had moderate. 66% (n=8) students' scores improved, 16% (n=2) no improvement, 16% (n=2) students worsened. The largest change in score occurred in the group with moderate symptoms.

Pre and Post UDI-6 and the IIQ-7 Scores

The pre-intervention scores on the UDI-6 ranged from 16.6–54 and for the IIQ-7 from 4.7 – 54. On the UDI-6, that translates to 42% (n=5) with mild UI and 58% (n=7) with moderate severity of UI. The impact on the quality of life (QOL), the IIQ-7 showed 92% (n=11) of the women were mildly impacted and 8% (n=1) moderately impacted.

Table 4: Initial Scores on the UDI-6 and the IIQ-7

Student	UDI-6 pre	Severity of UI symptoms	IIQ-7 pre	QOL impact
A	54	moderate	42.8	moderate
L	54	moderate	19	mild
H	54	moderate	19	mild
G	54	moderate	9.5	mild
C	45.8	moderate	28.5	mild
B	37.5	moderate	4.7	mild
I	37.5	moderate	9.5	mild
J	33	mild	19	mild
F	29	mild	33.3	mild
D	25	mild	4.7	mild
E	25	mild	9.5	mild
K	16.6	mild	14.2	mild

That 66% percent of the women showed improvement via a lower score on the UDI-6, is within the range of improvement reported in other pelvic floor training programs (Choi et al. 2007; Koch 2006).

The IIQ-7 scores initially were from 42.8-14.2 and post intervention went from 28.5-0. Initially the QOL of 11 women was mildly impacted and 1 was moderate. Post intervention, 10 were mildly impacted with 75% (n=9) showing improvement and less impact, and 2 showed that their QOL was no longer affected by UI.

The IIQ-7 scores shows that 16% (n=2) worsened and .8% (n=1) showed no improvement. The largest gains were seen in the women whose QOL was more impacted by UI having IIQ-7 scores initially above 19.

Table 5: Pre and post Intervention Scores on the UDI-6 and the IIQ-7 correlated with attendance and completion of homework journal

Student	UDI-6 pre	UDI-6 post		Change: (-) = improvement	IIQ-7 pre	IIQ-7 post		Change: (-) = improvement	Attend-ence	Homework journal
A	54	33		- 21	42.8	23		- 19.8	100%	Yes
L	54	33		- 21	19	0		- 19	100%	Yes
H	54	12.5		- 41.5	19	14.2		- 4.8	100%	Yes
G *	54	54		No change	9.5	23		+13.5	80%	No
C	45.8	16.6		- 29.2	28.5	4.7		- 23.8	100%	Yes
B	37.5	33		- 4.5	4.7	4.7		No change	100%	Yes
I	37.5	20.8		- 16.7	9.5	4.7		- 4.8	100%	Yes
J	33	33		No change	19	4.7		-14.3	100%	Yes
F	29	20.8		- 8.2	33.3	28.5		- 4.8	100%	Yes
D	25	33		+ 8	4.7	0		- 4.7	100%	Yes
E *	25	33		+ 8	9.5	14.2		+ 4.7	80%	No
K	16.6	8.3		- 8.3	14.2	4.7		- 9.5	100%	Yes

*(Student E missed the 5th class and mailed in her post intervention questionnaire. Student G missed the 3rd class)

Qualitative Results

The UDI-6 and the IIQ-7 did not measure some of the benefits and experiences as reported by the students during the course. A qualitative questionnaire was used post intervention to attempt to draw out the non-measurable benefits (Mehling et al. 2005). For example, one student reported her constipation problem was gone. Constipation is another pelvic floor issue that has been addressed by pelvic floor exercises, however neither of the measures were sensitive to measuring constipation (Harrington et al. 2006). Two students reported being able to have sexual intercourse without pain for the first time in several years. One student reported her long-standing plantar fasciitis disappeared during the course. This points to using different assessment tools for this kind of program that would be sensitive to other whole body or pelvic floor improvements (Barber et al. 2005), or quality of life changes.

Answering the question, “Was there some experience you are really glad you had?” nine students cited group support and discussion. For example:

Listening to others.

Meeting and being with the other women.

Sharing experiences verbally and hearing others’ experiences.

I learned an enormous amount from other women's experiences. This was an important part of the experience.

The program was different from other group classes I've taken because we were all allowed time during and after the sessions to hear other's comments and observations which was useful because it prompted further comment and info from the instructor.

Being part of a group of articulate and caring women.

It is great to be able to talk to and listen to other women's experiences and improvements.

I like having the support of other women in the group.

This selection of students' qualitative statements represents other non-measurable findings of the program. These statements were made on the qualitative questionnaire administered after the last class.

I'm more aware of the pelvic floor. I feel the interconnectedness of the skeleton and muscles and how they interact and affect one another.

My sexual sensations are now felt physically and emotionally.

The best part was learning that I can control my body once I have the body awareness.

I had become fearful of becoming more debilitated. This fear is now lessened.

I feel increased self-efficacy being proactive and taking care of myself.

It was important to be in a group and hear other people's experiences.

The program helped resolve my back pain.

It made me more receptive to sex, which has been remote and painful and unattractive for years.

I am glad to find out I still have feeling and sensations in the genital area, inside and out.

I learned an enormous amount from other women's experiences. Astonishing actually!

The most dramatic result is not having to get up so many times during the night.

The biggest impact was on my feet. The pain in my heels decreased noticeably.

I feel it is opening my curiosity and I'm more hopeful.

Discussion

Improvement was shown for 66% of the women on both measures, i.e. a lessening of UI symptoms and less impact on their QOL. The percentage of improvement is consistent with other studies which measured improvement in QOL following individual PFM treatment and a group exercise program where 60% of women reported improvement (Janssen et al. 2001).

The two students whose scores worsened on both measures had missed one class and did not complete a homework journal. This could mean that attendance at all of the classes was important either for the exercise, information or motivation, or perhaps that they did not utilize the home program. In future programs having a private individual session with the instructor to review the exercises, discuss any barriers to engage with the content, and answering any individual questions could enhance the outcomes.

There was 100% retention in the program, which is different from the other research studies. For example, in Australia, 25% of women dropped out of a 4-6 visit outpatient UI treatment program (Neumann et al. 2005). In the Netherlands, a group exercise program reported a 7.9% drop out or no start rate (Janssen et al. 2001). The Australian program involved individual treatment and did not include the dynamic of group support. The time frame for the Netherlands was longer, and although a group program, the duration was 3 months of classes and then a follow up 9 months later. Perhaps a shorter time for the intervention was important for retention as well as the component of group support. More research on retention of participants in group exercise programs is warranted.

This style of teaching and learning in this case report was very different from all other methods for pelvic floor muscle training (Choi et al. 2007). The instructions given to the student in an Awareness Through Movement lesson emphasize a non-linear approach that uses multiple strategies such as variability and constraints to accomplish any task (Harbourne and Stergiou 2009; Lafe and Pacheco 2019). Human movement variability includes variations for motor skill and performance (Harbourne and Stergiou 2009). Rather than training the student to ‘do it this way’, the student explores movement variables in different positions that lead to a healthy dynamic state. Variability is an inherent property of movement regulation (Corbetta 2009). The students were trained to use their kinesthetic sense to move and sense in different positions and explore each action with different movement variables. The number of repetitions was determined by the individual based on their sensation of ease, comfort, and the ability to maintain easy breathing while moving, as well as attention to their action. The role of inner and outer focus of attention was important and students were asked to stop a movement when they were tired and could not pay attention any longer. A brief rest refreshed the ability to attend when the student resumed moving.

The length of the course being only five weeks was a limitation even though some successful interventions report a median number of five individual treatment sessions (Neumann et al.

2005). There is literature to suggest 9-12 weeks as being optimal for group pelvic floor muscle training programs (Borello-France et al. 2006; Janssen et al. 2001; Koch 2006).

A limitation of this case report was that the students were self-referred. There may have been a context effect and perhaps the expectation for improvement was high.

Students completed journals with open-ended entries, writing their thoughts, sensations and experiences. The students seemed to like the journals and everyone brought them to each class. One written comment on the qualitative questionnaire:

I think the notebook is a crucial part of the program. Just having the shiny thing on the table as a reminder, and then thinking about what I have done.

Journal writing was included to encourage the women to take notes during the educational component of class. From years of teaching Feldenkrais Method classes, I have learned that people can have deep personal responses, insights and experiences from Awareness Through Movement classes. From my clinical experience, I have learned that pelvic floor work goes beyond the physical and can stimulate deeply personal experiences for reflection. The journal was also a practical place to keep a record of homework done. I would use the journal again, but separate out the homework records, to allow for easier data collection and analysis and to encourage compliance.

Completion of a homework journal was assumed to demonstrate that the student was compliant with home exercises. Homework was not recorded in an organized form. This was a limitation of the case report. It would be useful to have data regarding what was done for the home program, how often and how much. In analyzing the data, the two students whose scores did not improve, also did not complete homework journals. In a future program, standardized forms for recording homework and one's response to it would be better. It would then be easier to know what was useful and perhaps delineate criteria for student selection for greater success.

Another limitation of the study was that the students had only mild to moderate symptoms. The short form of the UDI-6 and IIQ-7 may not have been sensitive enough for this group. Several students also had problems answering the questionnaires at the last class. Some students appeared rushed, or unable to focus on the questions. In the future, other measures that ask more questions may be useful to detect changes in other pelvic floor functions or quality of life, such as improvement in sexual response, constipation, or sleep. The full Pelvic Floor Distress Inventory PFDI-20) (de Arruda et al. 2022) could be useful for this. Setting aside enough time in the last class for completion of the questions should be considered in the structure of the program.

The UDI-6 and the IIQ-7 did not measure all of the qualitative benefits and experiences of the program as reported verbally by the students during the course. A qualitative questionnaire was developed by the author to use post intervention to attempt to draw out the non-measurable

benefits (Mehling et al. 2005). In the future, the use of systematic data collection process may be useful. Measuring changes in body awareness and the effects that may have on pelvic floor dysfunction would be interesting. There may be different tools for this kind of program that would be sensitive to other whole body or pelvic floor improvements (Barber et al. 2005).

The intervention in this case report was based on an original program developed by the author called Pelvic Health and Awareness. It was multi-faceted including breathing and relaxation, Awareness Through Movement lessons, health education, bladder training, journal writing and group support. Discussion and group support brought out some of the qualitative statements that touched not only on UI, but sexuality, empowerment, hopefulness, and self-image.

This program appealed to women who were proactive in their healthcare, enjoyed the camaraderie of being in a group with other women and could reflect on their experience. It would be useful to know for whom this program does not work. That could be a question for future research.

Other questions suggested for future study include: What are the best measures to use for a sensory-motor based PFM exercise program? How does an increase in pelvic floor and/or body awareness contribute to improvement in quality of life? What changes in self-image are helpful for improving UI? Can Awareness Through Movement lessons affect long-term improvement in UI symptoms? Can a sensory-motor approach help women with moderate-severe UI?

Conclusion

Urinary incontinence can be addressed in group classes for women with mild to moderate symptoms using Feldenkrais Method Awareness Through Movement lessons, combined with health education, group support, and journal writing. This group program had other benefits beyond improvement of UI. For example, the qualitative statements revealed improvement in sexual function and sensitivity to sexual sensations, less pain with intercourse, less fear of losing function in the future, awareness of felt bodily connections, reduced back pain, and value of sharing experiences specific to a woman's identity and life. Discussion time for women to learn from each other's experiences proved to be a valuable addition to a group pelvic floor training program.

This program was successful in mitigating the suffering from mild to moderate urinary incontinence. In this study 66% of the women improved in their symptoms of UI. Most of the participants had improvement in UI related QOL scores, with greater improvement in those who were more impacted by UI.

They felt greater control over this aspect of their function and valued the feeling of support from other women to discuss what is often an embarrassing aspect of many women's lives. The use of the comprehensive Pelvic Floor Distress Inventory PFDI-20) (de Arruda et al. 2022) could be included and useful for future studies, along with a systematic collection of qualitative first

person data. This study points to the value of future research for this approach to relieve the burden of UI.

Thank You

Thank you to Karol Connors, co-editor for this volume of the Feldenkrais Research Journal and to the anonymous reviewers for their valuable assistance and suggestions that contributed to bringing this paper to fruition.

Biography

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Deborah graduated from Columbia University, NYC, in Physical Therapy and later earned a Doctorate in Physical Therapy from Shenandoah University. She is Guild Certified Trainer of the Feldenkrais Method and has taught in over 35 Feldenkrais Method training programs around the world. She is Adjunct Faculty in the Department of Mind-Body Medicine at Saybrook University. Her mind body practices include Tai Chi Chuan, Qigong, yoga, Vipassana meditation, and several dance forms. She is the creator of the *Pelvic Health and Awareness* audio program and offers online courses through movementandcreativity.com.

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Appendices

Appendix A: Qualitative questions for post intervention

Qualitative assessment questions post intervention
(Mehling, et al., 2005)

1. What was important for you? Please feel free to share in your own words and comments about your experience. I'd like to know some of your thoughts, feelings, responses to the program. Whether you think or feel any differently about your body, your pelvic floor, your discomfort or difficulty, or life in general.
2. Was there some information that was particularly useful?
3. Was there some experience that you're really glad you had?
4. Do you have any suggestions for improving any aspect of the classes or the program?

Appendix B: Brief Descriptions of Feldenkrais Awareness Through Movement Lessons Used in the Program

1. Breathing to relax and balance the nervous system. This lesson is done in supine with knees bent. The lesson explores making three different sounds: sss, shh, haa, sound with exhalation while feeling the movement of the ribs and abdomen. It is designed to relax and calm the sympathetic nervous system. It is done before any of the other exercises as a type of warm-up, not of the muscles, but of the nervous system.

2. Activating the right and left sides of the pelvic floor. This lesson is done in supine with knees bent. The student is asked to move the knees from side to side and allow the movement to travel through the whole spine all the way up to the head, sensing the spine as a kinetic chain. After sensing the full skeletal movement, the lesson progresses using the pelvic floor to help move the legs individually or at the same time. The student is asked to coordinate breathing with the movement pattern. This lesson is designed to help balance the strength and control of each side of the pelvic floor. The main movement strategy is the use of the auxiliary muscles, the adductors of the legs and the abdominal obliques.

3. Engaging the abdominals. This lesson is done in supine with knees bent. It uses the movement pattern learned in lesson #2 with the addition of lifting the head with the help of the hands as the knees are moved. Breathing is coordinated with the legs. Once, the movement is felt as a coherent body pattern, the use of the pelvic floor is added with lifting and lowering the head. This lesson is designed to engage all of the abdominal muscles, and to improve the coordination of the pelvic floor with the respiratory diaphragm.

4. Activating the front and back of the pelvic floor. This lesson is done supine with knees bent. The student is asked to gently tilt the pelvis forward and back and sense the response or connection in the spine and head. After there is the full skeletal movement of gentle flexion and extension, the student explores habits of using the front and back of the pelvic floor. Through the use of simple imagery with different combinations of tilting the pelvis and including the pelvic floor, this lesson is designed to improve the ability to sense and coordinate the pelvic floor with functional movement. The student can sense her habit of use of either front or back triangle of the pelvic floor. The lesson includes differentiating a pelvic floor contraction, with movement of pelvis and without it.

5. Dynamic sitting with the right and left sides of the pelvic floor. This lesson is done in sitting on a flat-bottomed chair. It uses a small folded towel placed under one ischial tuberosity. The student is asked to lift and lower the ischial tuberosity that is not sitting on the towel. Attention is directed to how shifting weight from one side to the other affects the whole spine. After there is full skeletal movement, the student is asked to engage the right and left sides of the pelvic floor with slower and faster movements. This lesson is designed to help learn how to use the pelvic floor dynamically in sitting.

6. Dynamic sitting with the front and back of the pelvic floor. This lesson is done sitting on a flat-bottomed chair. The student is asked to tilt the pelvis slowly forward and back and notice how the posture changes. Gentle, complete spinal flexion and extension is matched to forward and backward tilting of the pelvis. Students explore using the front or back of the pelvic floor with different directions of tilting the pelvis. At the end of the lesson there is directed attention in standing to sense how the pelvic floor is involved in supporting the hips, legs and spine. This lesson is designed to help learn how to use the pelvic floor dynamically in sitting.

7. Buttocks awareness. This lesson is done in supine, prone, side lying and sitting on the floor and in standing. The student is asked to contract the buttocks in different ways and sense the relationship to breathing, external rotation of the legs, decreasing lumbar extension and raising the arches of the feet. This lesson allows students to feel relaxation of the buttocks and the pelvic floor. The lesson is designed to improve buttocks use and decrease extraneous work in the buttocks.