

The Feasibility of Ecological Momentary Assessment of Pain Intensity, Affect and Self-Efficacy
Associated with Exercise in Women with Chronic Pain

Elizabeth J. Johnson

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Richard A. Winett
Eileen S. Anderson
George A. Clum
Brenda M. Davy
Jyoti S. Savla

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ABSTRACT

Objective: The purpose of the following study was to test the feasibility of using an ecological momentary assessment strategy during participation in water exercise. This assessment strategy was used to collect ratings of pain intensity level, affective status and self-efficacy for engaging in regular exercise prior to, during and following participation in water exercise for women with chronic pain. **Design:** Participants (N=15) completed six measures assessing physical activity level and reactions to physical activity and exercise participation and participated in elicitation interviews focused on their experiences with chronic pain and physical activity and exercise. Participants reported daily pain intensity levels, affect and self-efficacy each morning by phone and used cellular phones to report momentary ratings immediately following participation in water exercise for 6 weeks. **Results:** Participant profiles were developed to display patterns of pain intensity, affect and self-efficacy over the course of 6 weeks. Profiles indicated a variety of levels of exercise consistency in participants. Pain intensity, affect and self-efficacy varied over the course of an exercise event and revealed varied patterns across participants. Overall, momentary self-efficacy ($M^1= 7.98$, $SD=1.65$; $M^2= 8.29$, $SD=1.62$; $M^3=8.45$, $SD=1.45$) and affect mean ratings ($M^1= 2.05$, $SD=1.42$; $M^2= 2.76$, $SD=1.22$; $M^3=3.02$, $SD=1.06$) increased over the course of the exercise events while pain levels decreased from pre-exercise levels ($M^1= 2.67$, $SD=2.30$; $M^2= 1.85$, $SD=1.86$; $M^3=1.95$, $SD=2.05$). Elicitation interviews indicated themes related to the importance of enjoyment of exercise, social factors, and impact on pain level and overall physical condition. Final interviews provided information about the reactions of participants to the assessment strategy and offered insight into the acceptance of this approach

for future studies of exercise behaviors. **Conclusion:** Overall, this approach to ecological momentary assessment of variables associated with exercise was acceptable to participants and revealed variable patterns of pain intensity, self-efficacy and affective state in relation to water-exercise engagement.

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INTRODUCTION

Chronic Pain

Chronic pain prevalence rates indicate that chronic pain affects approximately 35.5% of the general population, or 105 million people in the United States (Harstall, 2003). Chronic pain is a leading cause of disability and the number of people with chronic pain conditions is only expected to grow as the “baby-boomer” generation enters an age range of greater risk (CDC, 2001; CDC, 2005; USDHHS, 2007). Pain cost the United States approximately \$79 million through its impact on work productivity (Stewart, et al., 2002), and accounts for a staggering 20% of doctors visits each year (Schappert, 1994).

Arthritis includes more than 100 diseases and conditions that impact joints and surrounding tissues of the body and affects approximately 46 million Americans; however, these conditions affect women at a much higher rate than men (Bolen, Helmick, Sacks, & Langmaid, 2002). Chronic pain conditions that are especially prevalent for women include osteoarthritis, fibromyalgia, rheumatoid arthritis, osteoporosis, Sjogren’s syndrome and spinal conditions such as spinal stenosis, a narrowing of the spine. Research indicates that 60% of all people with arthritis are female and that more specific types of arthritis are even more prevalent in women. Osteoarthritis, also referred to as degenerative joint disease, is the most common form of arthritis and affects 16 million women out of the approximate 27 million total population with this condition. Osteoarthritis causes damage to cartilage and bones, causes stiffness, joint pain and swelling and can lead to loss of function. Fibromyalgia is a condition defined by pervasive musculoskeletal pain and is a form of soft tissue or muscular rheumatism. Rheumatoid arthritis is

a condition related to the improper functioning of the immune system which leads to chronic inflammation of the joints. This condition affects approximately 1.3 million Americans and women outnumber men with this condition 2.5 to 1. Osteoporosis causes loss of bone mass and can increase risk of fracture due to brittle bones and 4 of every 5 people with this condition are women (Arthritis Foundation, 2010).

Chronic Pain and Health Behaviors

There are many factors that influence the onset of the chronic pain conditions mentioned thus far. No single risk factor necessarily causes a chronic pain condition to develop; however, certain risk factors are important in terms of knowledge about prevention and treatment. Research studies suggest that the prevalence of chronic pain is highly associated with rates of obesity and overweight (Felson, Zhang, Anthony, Naimark, & Anderson, 1992; Oliveria, Felson, Cirillo, Reed, & Walker, 1999; Sturmer, Gunther, & Brenner, 2000; McCarthy, Bigal, Katz, Derby & Lipton, 2009). McCarthy and colleagues (2009) reported that obese participants were twice as likely to have chronic pain than those of normal weight, while participants who were severely obese were more than four times as likely. Obesity has been established as a risk factor for the development of osteoarthritis, particularly in the knees which receive greater pressure (Anderson & Felson, 1998), and for pain in the hip and lower back (Anderson et al., 2003). Subsequent research has shown that higher BMI levels are associated with increased pain and decreases in measures of self-reported and performance-based functioning in older adults with knee osteoarthritis (Felson et al., 1987).

Chronic Pain and Exercise

Significant and positive effects have been found with treatments that include physical activity for both knee and hip pain (Hernandez-Molina, et al., 2008; Petrella, 2000; Rejeski, et

al., 2002). Exercise is the most effective non-drug treatment for reducing pain and improving movement in osteoarthritis (Roddy & Doherty, 2006). Randomized controlled trials have shown that exercise therapy improves knee pain, physical activity, physical function, and self-reported disability in individuals with knee osteoarthritis compared to sedentary controls (Hughes et al., 2004). These benefits have been observed with strength training and a variety of aerobic exercise modalities, including fitness walking, aerobic exercise, and cycling (Ettinger, Burns, Messier, et al., 1997; Deyle, Henderson, Matekel, et al., 2000; Roddy, Zhang & Doherty, 2005; van Baar et al., 2001). Additionally, physical activity is endorsed by the Arthritis Foundation as an effective means of improving overall health and managing pain (Arthritis Foundation, 2010).

Moderate physical activity on a consistent basis helps decrease fatigue, strengthen muscles and bones, increase flexibility and stamina, and improve a general sense of well-being. Joint flexibility is especially important with certain conditions that cause chronic pain because stiff joints impact the ability to complete daily tasks. However, specific challenges exist for the regular maintenance of activity over time for people with chronic pain. Despite the benefits associated with physical activity for people with certain types of chronic pain, long-term adherence to regular exercise regimens is disappointing and if the activity is not maintained the benefits decline and disappear over time (Marks & Allegrante, 2005; van Baar et al., 2001). When people experience pain while being active, they tend to become more sedentary. Studies have suggested that acute exercise may increase subsequent pain levels which may have a negative impact on subsequent adherence to a physical activity regimen (Rejeski et al., 1997; Focht et al., 2002; Hendry, Williams, Markland, Wilkinson, & Maddison, 2006). Yet, weight loss and exercise can also improve function and reduce the pain from musculoskeletal conditions (Messier et al., 2004).

The American College of Sports Medicine's (2005) recommendations include strengthening, flexibility/range of motion, and aerobic activities for individuals with osteoarthritis. More specifically, aerobic activity should include select low impact activities which reduce the load on the joints such as swimming, biking or rowing. Those with musculoskeletal pain of the hip and/or knee should avoid stair-climbing, jogging, and running. They should use low intensity and low duration initially and, if necessary, perform exercise in various sessions throughout the day and use brisk/rest interval sessions. The ACSM encourages setting time goals rather than distance goals to encourage controlled-pace activities, and the use of various forms of aerobic exercise (weight-bearing, partial weight-bearing and non-weight-bearing). Specific ACSM guidelines for aerobic exercise programming include performing large muscle activities at 60% to 80% of peak heart rate or 40% to 60% of VO₂ max (maximum oxygen uptake); an RPE (rate of perceived exertion) should fall between 11 and 16; exercise sessions should occur three to five days per week for 5-minute sessions, building up to 30-minute sessions. Yet, according to a study using accelerometer data (Farr et al., 2008), 70% of men and women with early knee osteoarthritis did not reach recommended levels of moderate or vigorous physical activity and men spent significantly more time in all levels of physical activity when compared with women.

Water-Based Physical Activity and Chronic Pain

Water-based exercise offers an opportunity for cardiovascular activity that may also attenuate the pain associated with musculoskeletal pain (ACSM, 2005). Aquatic programs are specifically recommended for people who have been diagnosed with chronic pain conditions that are improved through maintained activity level. One particular study noted benefit of water-based exercise for individuals diagnosed with fibromyalgia (Gusi & Tomas-Carus, 2008).

Specifically, participants that engaged in one hour of warm water exercise three times a week reported significant reductions in symptoms and increase in health-related quality of life. The rationale for this recommendation includes the benefits of engaging in a low impact program of activity that enhances overall health, increases use of joints, as well as the psychological benefits of engaging in a regular physical activity regimen.

Studies support the recommendation of exercise for chronic pain management (Bennell & Hinman, 2005), particularly those that use strengthening and aerobic exercises (Pelland et al, 2004; Brosseau, 2004). Previous studies examining physical activity behaviors of individuals with chronic pain have identified the particular challenges that this population faces when attempting to regularly perform physical activity (Keefe et al., 2004). More specifically, self-management interventions for chronic pain have focused on developing strategies for the effective management of chronic pain from a cognitive-behavioral theoretical orientation (Dixon et al., 2007; Barlow, Turner, & Wright, 2000; Lorig & Holman, 2003). Self-management tasks of medical management, role management and emotional management as well as the self-management skills of problem-solving, decision-making, resource utilization, development of patient-provider partnerships, action planning and self-tailoring have been the target of intervention with individuals with OA. Studies suggest that these interventions are successful through the effects of self-efficacy (Lorig & Holman, 2003).

Social-Cognitive Variables

Previous work examining the effect of social-cognitive variables on physical activity has found a significant relationship between self-efficacy and self-regulatory processes and the successful maintenance of physical activity behaviors (Anderson et al., 2006). Self-efficacy beliefs have been shown to be predictive of disability in chronic pain populations (Asghari &

Nicholas, 2001). Additionally, affective processes have been conceptualized as an aspect of self-efficacy. Bandura (1997) describes four sources of information that influence self-efficacy, one of which is “physiological and affective states from which people partly judge their capableness, strength, and vulnerability to dysfunction” (p. 79).

Research also supports the relationship between greater enjoyment of physical activity and the subsequent engagement in physical activity (Salmon, Owen, Crawford, Bauman, & Sallis, 2003). This relationship suggests that the affective processes related to physical activity play a role in how adherent individuals are to their physical activity routine, which is consistent with the aforementioned conceptualization of affect as a component of self-efficacy. Daily measurements of mood have been indicated in subsequent health outcomes including fasting glucose levels in individuals with Type 2 diabetes (Skaff et al., 2009). The pathways between affect and health outcomes may be connected by a combination of both behavioral and biological processes.

Social Cognitive Theory also acknowledges the influence of social and environmental influences on affect and behavior (Bandura, 1997). Research in the area of physical activity has supported the cognitive, social and environmental influences on adherence but has paid less attention to the role of affective processes relating to the behavior.

Current Project Rationale

In this study, physical activity that was self-directed, and took place in a community facility was examined with women who experienced chronic pain due to a variety of diagnosed conditions. Adherence to a regular physical activity program is a primary predictor of positive outcomes for individuals with chronic musculoskeletal pain. Given that physical activity engagement is recommended for individuals with musculoskeletal pain, it is important to focus

on the factors that influence adherence to a long-term physical activity program in this population.

Mixed-Method Approach

This study used both quantitative and interview methods to explore the experiences of women who were participating in water-based activity and experiencing chronic pain using both semi-structured interviews and ecological momentary assessment strategies.

Ecological Momentary Assessment

Retrospective reports may be biased or inaccurate and ecological momentary assessment (EMA) strategies serve to address this weakness. EMA has the potential to increase the ecological validity of data collected about a particular phenomenon. The particular goal of EMA is to move away from retrospective assessments to understand variables of interest within the context of the participant's environment. EMA is characterized by assessments of participants' experiences in real-time in their environment and in the context of the behavior of interest. Since EMA occurs in close proximity to the behavior, it reduces the inaccuracy that is possible when participants report on their experiences retrospectively. EMA techniques also make repeated, frequent assessments possible which provides a set of data representing and allowing for analysis of patterns in the variables of interest (Stone, Shiffman, Atienza, & Nebeling, 2007; Schwartz, 2007). Presumably, this assessment strategy was less cumbersome to participants given the event-based nature of the exercise behavior. In this study, EMA was used to explore the relationships among pain intensity, affective, and cognitive factors and exercise behaviors.

There are a number of studies that have used EMA in physical activity research. The methods used include electronic diaries or paper-and-pencil self-reports prompted by alarms or pagers. However, e-diaries offer the important benefit of the ability to verify the time at which

the data was entered. This allows the researcher to confirm when the response was entered and prevents the participant from completing assessments retrospectively despite instructions to do so in conjunction with the behavior. While few studies have used EMA to record affective responses to physical activity, these techniques have been used in numerous studies to repeatedly assess affective states associated with several other health behaviors such as smoking and alcohol use (Mermelstein, Hedeker, Flay & Shiffman, 2007; Collins & Muraven, 2007). Given the relevance of repeated assessment of pain intensity, affective response and self-efficacy during physical activity, the use of EMA was an appropriate strategy to understand the patterns of these variables and their proposed connection with exercise adherence.

METHODS

Participants

Fifteen women with a self-reported diagnosis of chronic pain and participating in a water-based exercise program were recruited for this study. Participants engaged in a self-directed, community-based exercise program. Recruitment goals focused on the inclusion of participants who engage in a range of physical activity levels, from consistent to inconsistent. Consistent exercisers were considered those that met recommended levels of physical activity including moderate physical activity 30 minutes a day, five days a week or vigorous physical activity 20 minutes a day, 3 days a week (ACSM, 2005) over the prior three months. Inconsistent exercisers will be considered those that do not meet these recommended activity levels over the prior three months.

Design and Procedures

A mixed-method approach was used to gather both interview and quantitative data regarding the experiences of participants with their water exercise program.

Timing of Consent and Clearance

Initial consent and release of information forms were obtained in order to allow the researcher to contact the participant's physician for verification and timing of diagnosis as well providing medical clearance to participate in an exercise program. The verification of diagnosis and clearance for participation documentation obtained for study participants was stored in a locked file cabinet in the Center for Research in Health Behavior, accessible only to the study staff members.

Procedures for attaining medical information (i.e. verification of diagnosis and clearance for exercise participation) was in accordance with HIPAA privacy regulations. More specifically, all protected health information was requested only with individual participant's signed authorization. A valid Privacy Rule Authorization was an individual's signed permission that allows a covered entity (e.g. healthcare provider) to use or disclose the individual's private health information for the specified purposes, and to the recipient or recipients, as stated in the authorization (Appendices A, B and C).

Pilot Phase

A pilot phase included a preliminary test of the EMA strategy to determine the feasibility and acceptability to participants. One participant who met the criteria for entrance into the main study was asked to use the measurement strategy and to provide feedback on the ease of use or lack thereof. Measurement strategies included cellular phone reporting of the three rating scales prior to, during and following water-based exercise. The participant was provided with paper-based rating sheets that would be portable for participants to transport to the pool for recording

prior to, during and following their activity. Based on the feedback from this participant, the investigator determined whether the measurement strategy required adjustment. The final rating sheet was adjusted to include an area to record the time of the beginning and end of the exercise session in order to verify the proximity of the report to each exercise event.

Enrollment and Eligibility

Recruitment: Recruitment for this study consisted of several different strategies. Flyers including a brief description of the study and contact information of the researcher were distributed at local pool facilities and community centers in Blacksburg and Christiansburg, Virginia. In addition, flyers were distributed to local physicians' offices, regional hospitals and physical therapy providers. The researcher also discussed the study with local physicians who considered referring their clients to the study. A local community email listserv reaching retired community members was also used to announce the program to individuals in the Blacksburg, VA area. A presentation of the project was made at a senior program meeting at a town recreation center and the researcher was also present at several recreation centers before and after group aquatic classes to provide information about the project with a poster including basic information about the study.

Enrollment: Participants met with the researcher to review the informed consent form, have an opportunity to ask questions about the study, and decide whether or not they were interested in participating. After offering consent for participation, participants engaged in a semi-structured interview to allow the study researcher to gain a better understanding of the participants' particular experiences with exercise as well as their chronic pain experiences.

Inclusion/Exclusion Criteria: The inclusion and recruitment of participants was aimed at developing a relatively homogeneous participant population to allow for valid comparison of

participants. Toward this goal, the participants recruited were women, free from other health conditions that may interfere with daily functioning, and under a BMI of 40. Participants of various levels of activity were recruited for this study. As physical activity levels had the potential to increase over the course of the study, a medical clearance from a physician was required to confirm that physical activity was recommended for each participant.

Medical Oversight and Procedures for Adverse Events: Participants were engaging in self-directed physical activity within monitored community facilities that had been previously approved by their physicians. Participants were consistently and inconsistently active, were generally healthy, including absence of coronary artery disease, stroke, COPD, emphysema, or any other serious medical conditions that might interfere with daily functioning or make exercise unsafe. Participants who were eligible, following an initial telephone screening, were asked to schedule a meeting with a CRHB researcher where they provided informed consent, participated in the initial elicitation interview and had their height and weight measurements verified.

Measures

Sociodemographics and Health History: Participants reported their age, gender, race, education level, income, and employment status. Participants also reported their health history information including their medical diagnoses related to their chronic pain. Participants also rated the highest level of activity they are able to perform. Height and weight measurement was confirmed prior to the beginning of the study to prevent biased self-report. Body Mass Index (BMI) was calculated based on these measurements.

Physical Activity Questionnaire (IPAQ): A physical activity assessment, the International Physical Activity Questionnaire (IPAQ; Booth, 2000; Craig et al, 2003), was used to assess the physical activity (PA) participation of participants including job-related PA, transportation PA,

housework-related PA, and leisure-time PA over the last seven days and provided an overall METhrs/wk level for each participant. Energy expenditure was calculated by multiplying the duration of participation in the activity, times the number of days per week and the MET (metabolic equivalent) level of the particular activity [(hours/session)*(session/week)*(METs) = MET hours/week] endorsed by the participant. This measure provided information about the PA level of the participants who entered the study and provided a means of analyzing, on a continuous and categorical basis, initial PA levels in comparison with other measured variables of interest.

An adapted version of a measure previously used at the Center for Research for Health Behavior, the Health Beliefs Questionnaire, was used to measure baseline levels of self-efficacy, perceived social support, self-regulation and outcome expectations related to physical activity. The items included have been shown to be valid and reliable with participants of similar demographics (Anderson, et al., 2006).

The self-efficacy items are based on the Self-Efficacy for Exercise Behaviors Scale (Sallis, Pinski, Grossman, Patterson, & Nader, 1988) and measured a participant's belief that they can continue being physically active despite various barriers. This scale included statements such as "Stick to your exercise program when you have excessive demands at work or school" and "Get up earlier to exercise" which were rated on a 5-point scale ranging from (1) I know I cannot to (5) I know I can. A mean score was computed based on participants' responses. Internal consistency (Cronbach alpha = .922) for this sample was high.

The social support items are based on the Family and Friend Support for Exercise Habits Scale (Sallis, Grossman, Pinski, Patterson, & Nader, 1987), utilized to assess the amount of social support for physical activity participants experience from both family and friends over the

past three months. This scale has established reliability and internal consistency (Sallis, et al., 1987). Participants rated both family and friends on a scale ranging from (1) Never to (5) Very often, for engaging in behaviors that support their participation in regular physical activity. Statements include “Offered to exercise with me” and “Gave me helpful reminders to exercise”. Interpretation of social support is based on an overall mean score for each participant. Internal consistency (Cronbach alpha = .90) for this sample was high.

The items used to assess self-regulation included questions from the Exercise Goal-Setting Scale (EGS; Rovniak et al., 2002) and the Exercise Planning and Scheduling Scale (EPS; Rovniak, et al., 2002) and were administered to participants to assess their engagement in these self-regulatory behaviors. These scales include items related to goal-setting and attainment strategies, self-monitoring, as well as planning and scheduling strategies. Response options range from (1) Does not describe to (5) Describes completely. Means were computed for each of these scales for comparison. Internal consistency (Cronbach alpha = .747) for this sample was good.

The measure of outcome expectancy was an expanded version of the Benefits of Physical Activity Scale (BPA; Sallis, Hovell, Hofstetter, et al., 1989) which was modified by Rovniak, et al. (2002) and Anderson et al. (2006). This scale assessed both positive and negative outcome expectancies related to physical activity. It asked participants to rate the likelihood of an outcome from (1) Not at all likely to (5) Extremely Likely and the importance of an outcome from (1) Not at all important to (5) Extremely important. A mean score was computed for comparison from the products of likelihood and importance ratings. This modified version has been shown to have good internal consistency and test-retest reliability (Anderson, 2006). An

overall mean score was computed based on participants' responses. Internal consistency (Cronbach alpha = .95) for this sample was high.

Medication Usage

Participants were asked to self-report their use of prescription and over-the-counter medications that are used for pain management including frequency and amount.

Trait Affect

A measurement of trait affect was taken at the baseline assessment point using the trait version of the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988) which has been utilized to measure trait affect in health behavior research (Mustanski, 2007) and widely used in ecologically-based research (Croft & Walker, 2001; Gable, Reis, & Elliot, 2000). Affect items were presented with instructions to provide the response that describes how "you generally feel, that is, how you feel on average" with five response options ranging from *not at all* to *extremely*. Trait affect was measured to ascertain how participants may be different based on their trait affect ratings. For example, will people that report high positive trait affect report higher positive affective responses to exercise participation. Internal consistency (Cronbach alpha = .588) for this sample was acceptable.

Phone Reporting of Daily Ratings and EMA Ratings of Exercise Events

Participants were provided with pre-paid cellular phones to utilize over the course of the study, unless they expressed a preference for using their own personal cellular device.

Participants were given training in how to use the cellular phone device if they were not familiar with its use. To ease the complexity of use, the phone reporting number was programming into the speed dial feature of the phone to make phone reporting as convenient as possible.

Participants were sent a message through the cellular phone each morning at a time of their

choosing to remind them to report their daily morning ratings to the study voicemail. Participants were asked to report whether it was a planned water exercise day, and to report ratings of pain intensity, self-efficacy and affect.

Report of Planned Water-Exercise Engagement: The intention to engage in water-based exercise was recorded on a daily basis. Participants were asked to call into the study-specific voicemail each morning to report whether they planned to engage in water-based exercise that day. Intentions were assessed daily with a single item: “Is today a water exercise day?”

Pain Measure: Participants were asked to rate their pain each morning and at each exercise event on an 11-point pain intensity numerical rating scale (PI-NRS) where 0 = no pain and 10 = the worst possible pain. This unidimensional measurement strategy has been validated for the successful measurement of sensory pain (Huber et al., 2007; Jensen & Karoly, 1992).

Self-Efficacy: Participants were asked to rate their perceived self-efficacy for engaging in exercise each morning and at each exercise event. The self-efficacy measure assessed confidence in their ability to remain active over time despite barriers. Self-efficacy will also be rated with a one-item, 11-point scale ranging from 0 to 10 where 0 = I know I cannot and 10 = I know I can (adapted from Sallis, Grossman, Pinski, Patterson & Nader, 1988).

Affect Measure: Basic affect was measured using the Feeling Scale (Hardy & Rejeski, 1989) each morning and at each exercise event. The Feeling Scale is a bi-polar measure of basic affective valence ranging from -5 (Very bad) to +5 (Very good). It has been used in numerous exercise studies (Ekkekakis & Petruzzello, 1999; Williams et al., 2008) and has been shown to be sensitive to change in basic affect during exercise. Participants rated their affect related to engagement in exercise prior to, during, and immediately following their engagement in the water-based exercise.

Elicitation Interviews

The content of the semi-structured elicitation interview focused on history of physical activity and exercise behaviors, pain history and the effect on physical activity and exercise behaviors, the self-regulation of exercise (i.e. planning, tracking), and environmental and social factors (i.e. social support and features of the physical environment). Although questions were open-ended to allow for the exploration of issues relevant to participants, interview topic areas included chronic pain history, physical activity experiences prior to and since onset of pain, physical activity recommendations received from providers, affective responses to physical activity, self-efficacy for physical activity, self-regulation strategies used, social and environmental aspects of their water-based program, and successes as well as perceived obstacles to consistent exercise participation. Elicitation interviews varied in length but lasted approximately 45-60 minutes. Participant responses were recorded using a hand-held digital recording device which were subsequently transcribed after the conclusion of the interview. All interview topics and questions used were tested in the pilot phase of the study to assure that the questions were understood by participants and that they captured the participants' experiences with physical activity and exercise.

In this study, participants used the determined EMA assessment method to record perceived pain level, affect, and self-efficacy level immediately prior to each water-based exercise event, during the event and immediately following each event. Participants were provided with clipboards and a supply of rating sheets for the course of the six-week assessment period. Rating sheets were created with water-resistant paper that can be marked even when wet (Rite in the Rain All-Weather Writing Paper). Participants were also provided with self-sharpening wax-based writing utensils that were tested to be able to write on the water-resistant

paper when wet. Participants were asked to bring a sheet with them to the pool facility at every water exercise event over the six-week period and record three, one-item measures of pain intensity, affect and self-efficacy prior to, during and following engagement in their exercise routine.

At the end of the six week period, participant were asked to attend a final meeting to complete a sub-set of the paper and pencil measures completed at the first interview and to participate in a brief interview regarding their experiences with the study. The final assessment measures included the International Physical Activity Questionnaire (IPAQ) and measures of social cognitive variables including self-efficacy, self-regulation, social support and outcome expectations.

Compensation

Participants were compensated for the time and effort required with a \$20 gift card at the completion of the study. Participants were provided with water-bottles and clip-boards at the start of the study for their use during the study.

ANALYSES

Analysis of the data acquired used a case study analysis including a comparative quantitative approach to case study analysis that includes cross-case and within-case comparisons. A case study design is characterized by “its reliance on evidence drawn from a single case and its attempt, at the same time, to illuminate features of a broader set of cases. It follows from this that the number of observations (N) employed by a case study may be either small or large, and consequently may be evaluated in a qualitative or quantitative fashion” (Gerring, 2007). A case study approach was used, including a graphic depiction of the data

obtained for participants over the course of the study. The ratings provided by each participant made it possible to analyze the nature of the relationship between affect, pain intensity and self-efficacy for each individual participant. This approach also allowed for the isolation of participants whose profiles were unique or unusual compared with other participants and to collectively provide information regarding the phenomena of interest, the momentary experience of affect, pain and self-efficacy in women with chronic pain who engage in water-based exercise. All statistical analyses were performed using SPSS, version 17.0.

The analysis of the semi-structured, elicitation interviews included a content analysis to identify themes across cases as well as identify individual statements from participants identified by specific characteristics (i.e. level of self-efficacy, exercise consistency).

RESULTS

Participant Characteristics

Demographics: Participants in this study were 15 women recruited from the New River Valley region of southwestern Virginia. 25 individuals expressed initial interest in participating in the study. Eight women decided they were no longer interested in participating prior to consenting to participate in the study, and two discontinued participation after completing at least the first assessment point, with a final enrollment of 15 women. The final participant age range was 26-71 (M = 56.7; SD = 13.7). Participants' racial backgrounds included 86.7% Caucasian, 6.7% African-American, and 6.7% Asian. Participant Body Mass Index BMI ranged from 19.2 to 39.8 (M = 27.2, SD = 6.4). 60% of participants characterized themselves as married, while 20% described themselves as single, 13% as divorced and 6.7% as widowed. Participants' reported educational background ranged from "Some College" to "Post-Masters" and household incomes

(HHI) ranged from \$0-10,000 to \$90,000 or more. The modal HHI reported was \$30-40,000. 40% of participants were employed at the time of study enrollment (See Table 1). Participants endorsed several types of pain-related medical diagnoses including osteoarthritis, fibromyalgia, muscular dystrophy, spinal stenosis, scoliosis and sjogren's syndrome.

The emphasis of the individual participant analysis focuses on six individual participants, selected based on individual features of interest. The six participant profiles include participants characterized by high self-regulation, low social support, low initial self-efficacy, a consistent water exerciser, high social support, and an inconsistent water exerciser. Pain intensity, affect and self-efficacy varied over the course of an exercise event and revealed varied patterns across participants. Overall, momentary self-efficacy ($M^1= 7.98, SD=1.65; M^2= 8.29, SD=1.62; M^3=8.45, SD=1.45$) and affect mean ratings ($M^1= 2.05, SD=1.42; M^2= 2.76, SD=1.22; M^3=3.02, SD=1.06$) increased over the course of the exercise events while pain levels decreased from pre-exercise levels ($M^1= 2.67, SD=2.30; M^2= 1.85, SD=1.86; M^3=1.95, SD=2.05$). See Table 2 for correlations, means and standard deviations of measured variables for all participants.

The responses provided by the participant with high self-regulation indicated that her self-regulation mean was 4.14 (on a 1 to 5 scale), her physical activity level was in the moderate range, as defined by the IPAQ, her frequency of water-exercise over the 6 week period was 18 events, her self-efficacy mean was 95.95 (on a 0 to 100 scale) and her outcome expectation mean was 16.33. Her social support means from her family and friends were 3.25 and 4.38, respectively. Her PANAS Positive scale was 41 and her PANAS Negative scale was 10 indicating high positive trait affect and low negative trait affect. Her mean morning pain level was 3.26 (on a 0-10 scale) with a range of 1 to 7, her mean morning affect rating was 4.07 (on a -5 to +5 scale) with a range of 3 to 5, and her mean morning self-efficacy rating was 8.84 (on a 0-

10 scale) with a range of 1 to 10. The means of her affect ratings prior to, during and after water-exercise were 4.33, 4.78 and 4.67, respectively, indicating a tendency to report an increase in affective state during her exercise engagement. The range of affect ratings was 3 to 5. The means of her pain ratings prior to, during and after water exercise were 2.78, 1.67 and 1.44, respectively, indicating a tendency to experience a decrease in her pain intensity during and after water exercise. The range of her pain ratings was 1 to 6. The means of her self-efficacy ratings prior to, during and after water exercise were 9.39, 9.61 and 9.78, respectively, indicating an upward trend in self-efficacy over the course of her water-exercise engagement. The range of self-efficacy ratings was 9 to 10. A chart of her morning ratings and ecological reporting of pain, affect and self-efficacy indicate that her daily self-efficacy ratings are relatively stable. Slight increases are consistent with co-occurring reductions in pain and increased in affect ratings. Increases in daily pain ratings co-occur with reductions in affect ratings. Participation in water exercise remains consistent over the course of the six week assessment period. Her EMA ratings are consistent in terms of pain increases coinciding with affective decreases. Self-efficacy also increases slightly as pain level decreases (Figures 1 and 2).

The responses provided by the participant with low social support indicated that her self-regulation mean was 2.79 (on a 1 to 5 scale), her physical activity level was in the moderate range, as defined by the IPAQ, her frequency of water exercise over the 6 week period was 12 events, her self-efficacy mean was 72.27 (on a 0 to 100 scale) and her outcome expectation mean was 15.13. Her social support means from her family and friends were 1.63 and 3.00, respectively. Her PANAS Positive scale was 34 and her PANAS Negative scale was 17 indicating high positive trait affect and moderate negative trait affect. Her mean morning pain level was 2.42 (on a 0-10 scale), her mean morning affect rating was 1.58 (on a -5 to +5 scale),

and her mean morning self-efficacy rating was 7.19 (on a 0-10 scale). The means of her affect ratings prior to, during and after water-exercise were 1.67, 3.00 and 3.25, respectively, indicating a tendency to report an increase in affective state over the course of her exercise engagement. The range of affect was 0 to 4. The means of her pain ratings prior to, during and after water-exercise were 2.42, .17 and .67, respectively, indicating a tendency to experience a decrease in her pain intensity during water-exercise which may increase slightly following exercise. The range of pain scores was 0 to 4. The means of her self-efficacy ratings prior to, during and after water-exercise were 7.17, 8.33 and 8.33, respectively, indicating that this participant's self-efficacy increases and is maintained during and after her exercise engagement. The range of her self-efficacy ratings was 5 to 9. A chart of her morning ratings and ecological reporting of pain, affect and self-efficacy indicate that daily decreases in self-efficacy coincide with decreases in affective ratings. Decreases in self-efficacy and affect also seem to follow periods of inconsistency in her water exercise events. Self-efficacy rises during her activity as pain decreases and affect increases (Figures 3 and 4).

The responses provided by the participant with low initial self-efficacy indicated that her self-regulation mean was 2.14 (on a 1 to 5 scale), her physical activity level was in the moderate range, as defined by the IPAQ, her frequency of water-exercise over the 6 week period was 14 events, her self-efficacy mean was 43 (on a 0 to 100 scale) and her outcome expectation mean was 16.97. Her social support means from her family and friends were 5.00 and 2.00, respectively. Her PANAS Positive scale was 37 and her PANAS Negative scale was 20 indicating high positive trait affect and moderate negative trait affect. Her mean morning pain level was .92 (on a 0-10 scale), her mean morning affect rating was 3.23 (on a -5 to +5 scale), and her mean morning self-efficacy rating was 7.5 (on a 0-10 scale). The means of her affect

ratings prior to, during and after water-exercise were 1.57, 2.79 and 2.93, respectively, indicating a tendency to report an increase in affective state over the course of her exercise engagement. The range of affect ratings was -5 to +5. The means of her pain ratings prior to, during and after water exercise were 1.43, 0.36 and .64, respectively, indicating a tendency to experience a decrease in her pain intensity during water exercise and have a slight increase following exercise. The range of pain ratings was 0 to 3. The means of her self-efficacy ratings prior to, during and after water-exercise were 5.93, 6.64 and 6.71, respectively, indicating an upward trend in self-efficacy over the course of her water-exercise engagement. The range of self-efficacy ratings was 0 to 10. A chart of her morning ratings and ecological reporting of pain, affect and self-efficacy indicate that decreased daily ratings of self-efficacy coincided with decreases in affect ratings. Her EMA ratings indicated that when her pain does not change during exercise her affect and self-efficacy ratings still change while at other events, her affect remains stable while her pain decreases and self-efficacy decreases (Figures 5 and 6).

The responses provided by the consistent water exerciser indicated that that her self-regulation mean was 3.14 (on a 1 to 5 scale), her physical activity level was in the high range, as defined by the IPAQ, her frequency of water exercise over the 6 week period was 18 events, her self-efficacy mean was 89.32 (on a 0 to 100 scale) and her outcome expectation mean was 15.43. Her social support means from her family and friends were 3.88 and 4.63, respectively. Her PANAS Positive scale was 39 and her PANAS Negative scale was 10 indicating high positive trait affect and low negative trait affect. Her mean morning pain level was 9.09 (on a 0-10 scale), her mean morning affect rating was 3.95 (on a -5 to +5 scale), and her mean morning self-efficacy rating was 8.70 (on a 0-10 scale). The means of her affect ratings prior to, during and after water-exercise were 4.11, 4.22 and 4.22, respectively, indicating a tendency to report a

slight increase in affective state during her exercise engagement which is maintained afterwards. Her range of affect ratings was 1 to 5. The means of her pain ratings prior to, during and after water-exercise were 9.61, 7.06 and 8.28, respectively, indicating a tendency to experience a decrease in her pain intensity during water-exercise which then increases afterwards. Her range of pain levels was 6 to 10. However, it does not appear her pain immediately returns to pre-exercise levels. The means of her self-efficacy ratings prior to, during and after water exercise were 8.83, 9.22 and 9.17 indicating a slight increase in self-efficacy over the course of her water-exercise engagement, which then drops very slightly following her exercise. Her range of self-efficacy ratings was 7 to 10. A chart of her morning ratings and ecological reporting of pain, affect and self-efficacy indicate that her morning ratings remain relatively stable over time. Her pain, affect and self-efficacy ratings remain quite high over the course of the six week period. Her EMA ratings of self-efficacy and affect increases coincide with decreased EMA pain ratings. However, affect and self-efficacy can remain stable while pain fluctuates (Figures 7 and 8).

The responses provided by the participant with high social support indicated that her self-regulation mean was 2.64 (on a 1 to 5 scale), her physical activity level was in the moderate range, as defined by the IPAQ, her frequency of water-exercise over the 6 week period was 11 events, her self-efficacy mean was 85.95 (on a 0 to 100 scale) and her outcome expectation mean was 5.03. Her social support means from her family and friends were 5.00 and 5.00, respectively. Her PANAS Positive scale was 36 and her PANAS Negative scale was 13 indicating high positive trait affect and low negative trait affect. Her mean morning pain level was 1.64 (on a 0-10 scale), her mean morning affect rating was .02 (on a -5 to +5 scale), and her mean morning self-efficacy rating was 9.00 (on a 0-10 scale). The means of her affect ratings prior to, during and after water-exercise were .55, 1.55 and 2.27, respectively, indicating a tendency to report an

increase in affective state over the course of her exercise engagement. The range of her affect ratings was -2 to 4. The means of her pain ratings prior to, during and after water-exercise were 1.27, 1.00 and 1.27, respectively, indicating a tendency to experience a decrease in her pain intensity during water exercise which return to pre-exercise ratings following exercise. The range of her pain ratings was 0 to 3. The means of her self-efficacy ratings prior to, during and after water-exercise were 9.91, 9.91 and 9.91, respectively, indicating that this participant's self-efficacy does not vary over the course of her exercise engagement. The range of her self-efficacy ratings was 9 to 10. A chart of her morning ratings and ecological reporting of pain, affect and self-efficacy indicate that increases in daily positive affect tend to coincide with decreased pain level. EMA ratings of self-efficacy are highly stable. Her reported pain levels do not consistently change over the course of exercise yet more frequently, her self-efficacy ratings increased (Figures 9 and 10).

The responses provided by the inconsistent water exerciser indicated that her self-regulation mean was 3.36 (on a 1 to 5 scale), her physical activity level was in the moderate range, as defined by the IPAQ, her frequency of water exercise over the 6 week period was 8, her self-efficacy mean was 75.75 (on a 0 to 100 scale) and her outcome expectation mean was 12.87. Her social support means from her family and friends were 5.00 and 2.13, respectively. Her PANAS Positive scale was 33 and her PANAS Negative scale was 10 indicating higher positive trait affect than low negative trait affect. Her mean morning pain level was 4.12 (on a 0-10 scale), her mean morning affect rating was 1.59 (on a -5 to +5 scale), and her mean morning self-efficacy rating was 4.94 (on a 0-10 scale). The means of her affect ratings prior to, during and after water-exercise were 1.29, 3.29 and 3.00, respectively, indicating a tendency to report an increase in affective state during her exercise engagement and a slight decrease following

exercise which does not return to the pre-exercise level. The range of her affect ratings was 0 to 4. The means of her pain ratings prior to, during and after water-exercise were 3.86, 0.43 and 3.00, respectively, indicating a tendency to experience a notable decrease in her pain intensity during water-exercise which returns to nearly pre-exercise ratings. The range of her pain ratings was 0 to 9. The means of her self-efficacy ratings prior to, during and after water-exercise were 5.71, 6.57 and 6.57, respectively, indicating an increase in self-efficacy over the course of her water-exercise engagement that is maintained following exercise. The range of her self-efficacy ratings was 5 to 8. A chart of her morning ratings and ecological reporting of pain, affect and self-efficacy indicate that lower pain levels seem to be associated with higher self-efficacy. Changes in affect did not consistently coincide with changes in pain level. EMA reports suggested significant changes in pain level during water exercise. EMA changes in affect more consistently coincided with changes in pain level (Figures 11 and 12).

Elicitation Interviews

Themes from the topical subsections of the interviews are included based on an analysis of the transcribed interview content for the previous six profile participants. The topic areas covered in all of the participant interviews at the start of the study included previous experiences with exercise, impact of pain on exercise, self-regulation of exercise, social support and perceptions of the physical environment.

Impact of Pain on Functioning

High Self-Regulation: “Walking and carrying something. I can’t do that. It would be painful due to tightening of the back. It is difficult for me to do that and walk at the same time.”

Low Social Support: “Well, you know it keeps me from doing a lot of...well, of course that could be the weight too...but, I don’t do a lot of up and down steps carrying stuff because that will make my knee flare up. What else? I try not to do too much in one day because I know if I do I’ll be hurting the next day. I keep a

moderate physical workload. Not try to do a lot of stuff, too extreme.”

Low Self-Efficacy: “It doesn’t really interfere with my functioning. It is just when it is there I have to kind of pull my right leg along behind me. I have to kind of drag it along. It hurts to walk on it. If it hurts, it won’t hurt the whole day. It will usually hurt at the end of the day after I have been up...It prevents me from walking as quickly as I would like to. No, it doesn’t really prevent me from doing things, it is just uncomfortable.”

Consistent Exerciser: “Well, of course when you have pain, and any movement that you go to perform you get pain, you tend to try to find a way not to repeat that whatever you are doing, that pain. So basically, I use a lot of my knees so sometimes they are sore, because they become the up and down so that I don’t bend at the waist.”

“I have adapted my life around positions that were just more comfortable. I sleep sitting up, with five pillows behind me and my legs straight out. Lying down flat is painful and lying on either side is painful. So, I have adapted my way of sleeping to sitting up with the pillows. That is the most comfortable so that is what I do.”

“I find that I am better moving so that is why I am in motion a lot. The sitting is tough. If we travel somewhere...I do have another disc bulging above where the work was done. So say we are traveling, after about an hour, I have the pain going down the legs. So we stop at a rest area so that I can walk around and that seems to lessen it up so I can get back in the car and we go again. Traveling is also very difficult so I don’t do a lot of that. I have learned to avoid things that have brought on a tremendous amount of pain.”

High Social Support: “When I first developed the pain in ‘98 the pain was acute. The pain was so bad it was like cigarette burns or having barbed wire around my chest...Right now much of what I am dealing with is problems with my ankle because I can fall if I am not careful so that limits my exercise. I would like to be walking more but walking with a cane is very fatiguing and walking on irregular ground is dangerous so I do most of my walking pushing a shopping cart around and it bores me out of my gourd.”

Inconsistent Exerciser: “I came home from the gym the other day and started to make dinner and by the time my husband came home, I needed help. I told him I needed to go lie down and he finished making dinner...A year ago I would have done it all.”

Participants discuss a range of ways their pain has an impact on their functioning from their ability to get a restful night’s sleep, to basic movements that need to be avoided, and experiences such as travel that have been limited due to the impact on pain level.

Activity Level Prior to the Pain

High Self-Regulation: “I was a couch potato. I always enjoyed the water growing up but my husband did not. He liked the mountains and I could not do that kind of walking. So I really was not very active. I was inconsistent.”

Low Social Support: “I didn’t do any actual...I started doing the water aerobics after the pain started and that’s what I liked to do because it didn’t hurt my knees. I don’t think...I was just real active at that time with kids. My kids were little at that time. I just did everything I needed to do then, but didn’t do any planned exercise.”

“I have always been kind of sedentary. I could sit and read all weekend and be perfectly happy. I could sit and read and do a TV marathon or something.”

Low Self-Efficacy: “Um, I swam, I tried to run but never liked it, and I, um, that is probably it...I was probably swimming three days a week for half an hour to an hour, depending on the day and I was running maybe two days and only for 10 minutes at a time.”

Consistent Exerciser: “Well, actually I was working full time and not very active. I have become much more active now because I have made that correlation for the healthy body sort of thing. I am using it more. I was really sedentary. I was working at a desk all day and just doing housework, because I was married, and shopping, that sort of thing, but now I am using my body much more.

High Social Support: “Well, at that point I had young children so my exercise was mostly running around and I was a bit overweight and I could go out walking...actually, right before all this started up I was working at a student center and I was bicycling to work. It was after that that I started to develop symptoms and I was unable to continue bicycling. It was discouraging because there seems to be this connection between healthy exercise and things going wrong. I tell myself it was just a coincidence.”

Inconsistent Exerciser: “Ten years ago, when I turned 60 I wanted to celebrate by doing some physical things so I ran a 5k and participated in the Senior Olympics and won five medals. I guess it had to be after that my knees started to bother me and I went to Dr. H and he gave me some exercises. Now I have a treadmill that I can no longer use...There have been a lot of times before that I did get in the pool, so I have exercised in the water a good bit over time and I was doing strength training all that time.”

While some participants noted a decrease in their level of activity since the onset of their pain, or having to adjust the types of activities they engage in due to their pain, other participants also noted being significantly less active prior to the onset of their pain. Specifically, their

increase in activity has been an adjustment in order to manage their pain and level of functioning more effectively.

Impact of Pain on Exercise

High Self-Regulation: “I started out doing the therapy that was prescribed. It was more walking and moving the shoulders in the water. After a few months, I started taking part in the aerobics class that was going on at the same time.”

Low Social Support: “I have tried the yoga, which I am still trying to get into that. I am not real big on that. I have trouble with that because I don’t have very good flexibility so I just feel like I can only do like 10% of the stuff that they do in the class. I have done some aerobics, like exercise classes here. That is kind of ok, that doesn’t get me too much but I have trouble. I just get so hot, I sweat a lot and I don’t like it. It is hard for me to stay on my feet that long at that level of activity. I run out of steam.”

Low Self-Efficacy: “I think it is hard to say, because the specific pain I have is related to being pregnant, so the types of activity that I do now are also related to being pregnant, not necessarily to the pain. For example, I am much more likely to do an abs class now for vanity reasons. But, I would say I was probably more likely to swim for longer lengths of time when I did it before. And I also was much more routine about swimming before I had this pain in my hip. I was pretty religious about it. But it hard to say whether I am less active now because I have kids or if I am less religious about it because I know that after I do the activity my hip is going to hurt or sometimes it already hurts before I go.”

“Running doesn’t work because it makes my knees hurt. Usually after ten minutes of running my knees are already sore. But swimming doesn’t make them hurt. I do the bicycle but I haven’t noticed any problems with the bicycle...Running definitely affected my knee pain which is why I never enjoyed running.”

“There are probably times when I have said to myself ‘my hip hurts and I don’t want to go’.”

Consistent Exerciser: “I have built activity around things that aggravate me.”

High Social Support: “I retired about a year and a half or two years ago and before I retired I was going to workout with a personal trainer three hours a week. I really wasn’t doing much of anything else. Since I have retired, I am up to five days a week but I have been doing a lot of reading and watching television and I have decided I need to be moving more...it is just tiring [the pain].”

“Maybe a month ago I had a flare-up and I call the doctor and he increases the dose of prednisone and the prednisone works so fast...It is that it is so painful that I know

that the processes are increasing and I know that exercise...I have got to do something and it is not exercise.”

Inconsistent Exerciser: “Well, just recently we have been going to the pool. I wanted to go to the gym to learn how to use the recumbent bike. Right now I do strength training two times a week, starting recently. I haven’t figured out yet if my own exercise bicycle, that it increases the pain. I am not sure if that is it or the medicine is just wearing off...the treadmill no longer works.”

Participants have made adjustments to their physical activity and exercise in order to prevent increases in pain level. Participants were able to acknowledge factors related to their activity that can have an impact on their pain level and have attempted to adjust their behaviors based on this physical feedback. Certain types of activities are preferred over others given some are more likely to lead to more discomfort.

Changes in Exercise due to Pain

High Self-Regulation: “I might not work as hard in the pool, as quickly or with as much force.”

Low Social Support: “I won’t do the exercises as strenuously. Like land aerobics you can do things as strenuously as you want...I won’t put as much effort into it if I am feeling achy or if something is particularly hurting...there were some exercises we did the other day where we were popping up out of the water...I wouldn’t pop out of the water as high, do small jumps instead of big ones.”

Consistent Exerciser: “I am always active. It would be hard...if I am doing something physical, say if my husband and I take the bikes out, I maybe ride at a medium speed, I am not really fast, but maybe for 15 minutes and I might say let’s stop and just catch our breathe. Then rest for a couple of minutes and then get back on the bike and ride again for 10, 15, 20 minutes. I have never really timed it but it seems like that long. Then rest again. So it is broken up. I do not go at something and use my body full speed for an hour at a time. It is broken.”

“Well, basically, I can’t run. I will try to run to catch up with my husband if he is a few feet ahead of me and that hurts.”

High Social Support: “I really put a lot of energy into the aerobics. I get competitive...Right now I am having trouble with my right knee. When I have that kind of a painful thing I try to be careful. I stopped doing, I cut back on squats and the bicycling in the pool.”

Inconsistent Exerciser: “I have told my trainer there are certain exercises that I don’t want to do. I don’t change anything when I am in the water. I wouldn’t know how to.”

Participants reported that when they are experiencing more pain, they may make adjustments to their current exercise routine as a result. For example, they may avoid certain types of exercise or exhibit less exertion during their water exercise.

Managing the Pain Prior to Exercise

High Self-Regulation: “A hot shower. That helps.”

Low Social Support: “Normally a hot shower will help or just sometimes just moving around for a half hour, that will help some.”

High Social Support: “No...I take a baby aspirin once a day but I have been advised not to take Advil or anything like that.”

Inconsistent Exerciser: “I am not having much then. The only way I know to manage it is to lay down for 10 minutes.”

The level of pain participants feel prior to exercising varies. Some experience little pain while others report that they are often stiff and take time to start moving or use warm water to address this stiffness prior to exercising.

Provider Recommendations for Exercise

High Self-Regulation: “What they suggested was walking in the water and movements of the upper arms in the water. There wasn’t a set pace. In the class you strive to keep up with a pace they set.”

Low Social Support: “I think the only thing they ever told me was walk. Usually, when I go they say ‘you need to lose weight.’ Sometimes they say walk, but that is about it. It is not much. I go to my chiropractor for that. He tells me exercises to do and he has core classes. I am a big believer in chiropractic.”

Consistent Exerciser: “They have never given me any because I just do it. It just pleases them. I have a good rapport with my doctor and she says ‘you don’t come in and say ‘heal me’, you try to heal yourself’.”

High Social Support: “No.”

Inconsistent Exerciser: “She gave me some exercise that she thought specifically would help, mainly with the gluts. You know, I don’t think any of them...Oh, she told me don’t walk.”

Most participants received some indication of how to be active or certain activities to avoid. Others reported that providers were pleased with their activity level but did not offer additional advice.

Pain and Water Exercise

High Self-Regulation: “I can tell you that since I have been going to the aquatic center it is not nearly as bad as it used to be and I am able to do so much more now that I could before.”

“Usually when I first get up in the morning I am usually very stiff and I will usually have pain in the lower back or the legs, aching. Then while I am in the pool I don’t feel any pain. Right afterwards I don’t feel any. It helps to alleviate that...I know that I will be better if I go.”

“I know I am experiencing less pain now. It is not like it was when I was not doing any exercise.”

Low Social Support: “Right now it is just a lot of stiffness. Everything just generally is achy. Like my neck and shoulder and back between my shoulder blades. It is all just stiff and achy.”

“I limber up. It gets the stiffness out. Some of the aches will go away. Sometimes if my knee was acting up before the class, it will still be painful during that class, but it does help with the stiffness and some of the aches...After the pool I still feel good. I feel good and energized when I get out.”

“It does help, that more I move and flex. It does help it.”

Low Self-Efficacy: “Before I exercise it is a sharp pain. It feels like a really, really, really tight muscle, which is probably what it is. It is just a knot.”

“When I am actually swimming, I have not noticed it hurting, ever...It might be that it still hurts but I am not noticing it, because I am not thinking about it anymore. The pain returns usually hours later and I definitely notice it then and remember that happening last week specifically.”

“I feel like exercising, especially swimming, should help it [pain level], you know, because of the type of movements that you do in the water.”

“I may start slower. I probably start with kicks if my hip hurts, because I think that if I just move it, it will start feeling better.”

Consistent Exerciser: “I feel stiff, I feel sore. Almost like I need oil put in my joints like the tin man. Sometimes I wish I had an oiling can that could get in there. But then when I get in there and the warm water just wraps itself around you and you start moving, things lessen up.”

“But, on the average, no it doesn’t stop me because I know I am going to make it a little bit better by going.”

“I notice that it lessens up. That water seems to pull the weight off of you and your body feels free. It is almost like you wish you could capture that and walk around with it forever. You know a little capsule.”

High Social Support: “After the water aerobics I feel good. After the backs class I feel less good and more tired.”

“I just don’t think about it [the pain].”

Inconsistent Exerciser: “Simply because of the concrete and the walk, I feel some pain before. When I am in the water, I feel no pain. I am sure I have some pain afterwards too.”

While water exercise does not eliminate pain for all of the participants, most recalled that they do notice a reduction in their pain levels while they are in the water and generally notice improvements in pain level after exercising as well.

Changes in Functioning due to Exercise

High Self-Regulation: “I am more agile than I was before and I am able to get around. I know I do have some muscle weakness but it does not stop me from my daily routine...It energizes me. If I were exercising on equipment I would be exhausted after an hour, but the water energizes you so you are more motivated to do the shopping or the cleaning or the other things you need to do.”

Low Social Support: “Cause it energizes me and perks me up. A lot of days, like today when I am feeling groggy and kind of blah. I could just sit on the couch all day kind of in a fog and that would be ok. When I get up and exercise, it perks me up and I feel like doing things and I actually move around and get stuff accomplished.”

Consistent Exerciser: “I think it plays a role. I have learned...we joke about this because they know this at the pool...I have learned to do things on days when I

know the pool is coming. So, in other words if I wanted to plant the garden I would do it on a Monday, Tuesday, Wednesday because I always had a pool day next. I would never pick a Friday or Saturday or Sunday. Because if I get up with more pain, I want to be able to get rid of that additional pain. So, I am a victim of my scheduling and I have found that even if I am going to be intensively washing floors, I do it a day before the pool day. So, I have adapted my schedule of what I do around my pool. It's helped. It's worked."

High Social Support: "I think that I have better balance and more strength and there are things that I can do in the healthy backs class that I couldn't do before I started the water aerobics so I know that certain muscles are stronger and certain things are more flexible."

Inconsistent Exerciser: "Well, there are things I have to tell my husband, I don't know if I can get this done...errands. I need to space things out. I have learned that I have to...we have been eating cereal for dinner more often because there are evenings that I just don't feel well...that is a big change."

Participants reported that they have experienced changes in functioning due to their water exercise participation. Participants report increases in strength, energy level and agility as a result of their water exercise routine specifically.

Physical Activity throughout Day

Low Self-Efficacy: "I always try to take the stairs when I am in a building. I should walk to places more because I work at a church that is about a six minute walk from my house and rarely walk there usually because I don't leave in time to get there. I try to walk when it is not raining and take the boys there to walk two or three times a week. And I work outside in the garden and mow the lawn. I try to do that for about 20 or 30 minutes a day."

Consistent Exercisers: "Well, there is walking in the grocery store and there is walking to get the mail. Walking down to the garden. I do have a lot of walking incorporated into my day."

High Social Support: "I have some quilting stuff and if I am doing that I will be standing up and moving around. I am also working at cleaning out the house. We have 30 years of accumulated trash so I am trying to organize things and give things away."

Inconsistent Exerciser: "I clean some, fold clothes, pick up. I enjoy decorating the house."

Participants discuss physical activity engagement throughout the day generally focused on walking and standing related to doing errands and performing tasks at home.

Benefits of Exercise

High Self-Regulation: “Lost inches. I am more agile. My balance is better and I am able to...I think I am stronger because I am able to do things for a longer period of time.”

Low Social Support: “Increased energy. More strength. I have gotten some more strength from the strengthening exercises and they have started getting some better water aerobics instructors. Just like Tai Chi there are all kinds of water aerobics instructors and some of them aren’t worth much and some of them are. I feel like I am getting more of a workout...I think it has helped my flexibility. When I am in the water I can move much better and bend better than I can when I am not in the water. I have also noticed a decrease in back pain due to the core exercises.”

Low Self-Efficacy: “I feel better. I feel more energized and refreshed. I tend to be in a better mood, I am a little more patient, I feel I am more efficient.”

Consistent Exerciser: “Relief of the pain, and, um, better breathing. We have breathing exercises that are worked into it, so I have noticed better breathing. Yeah.”

“I think it has made me a better person... I can appreciate what it is like for someone that is hurting, but I try to help someone who is hurting. So, I could say I think you would feel better if you did this and I have had people follow and say ‘yeah, you were right’. It is like I would just like to round up everybody that has pain and bring them to the pool. But, it’s not possible.”

High Social Support: “It is good thing for weight control.”

Inconsistent Exerciser: “I am definitely physically stronger than when I was exercising at home. I don’t know if my cardio is better or not.”

Participants generally discussed the other health benefits associated with exercise such as strength and flexibility as well as mental benefits such as improved mood. They noted the ways these benefits impact other aspects of their lives.

Costs of Exercise

High Self-Regulation: “Yes, the annual fee. I do go on a doctor’s prescription but you still have to pay for it. The annual fee has just gone up.”

Low Social Support: “No, just the cost of the membership.”

Low Self-Efficacy: “Well, it depends on how active you are. I think people who are crazy exercise people sometimes can do some damage by pushing too much but generally, if you are a normal person, I don’t think there are any costs.”

Consistent Exerciser: “No. Well, the long term costs are financial costs but that is not important, it is what you get out of it that is important.”

Inconsistent Exerciser: “Well, it is not too expensive for me. I don’t mind this now, but I exercise alone at home. I can also already see the benefits of having a personal trainer and getting in the car and going.”

Participants generally discussed the monetary costs associated with participation in exercise. For some, this had been a barrier to exercise participation in the past. Most realized the value of the exercise outweighing the financial costs.

Barriers to Regular Exercise and Ways to Manage Barriers

High Self-Regulation: “It is just getting up and coming. I have a lot of friends that walk and I have a lot of barriers there. My hips hurt and the movement causes them to ache.”

Low Social Support: “I guess just commitment and other things going on in my life. I know that for a long time when I couldn’t do it I was working two jobs for three years and there was no way. No time. And then other times it was just lack of commitment probably when I could have gone, but I didn’t make the time....Obstacles in the past have been time, and then commitment and just feeling out of place in the class since I am bigger...I feel uncomfortable sweating so much and getting so red in the face, and recently I haven’t had a friend to go with me....A lot of times it is the fatigue, but that is part of the fibromyalgia.”

“I have more time since my kids are grown and I am not working two jobs, and just making it a commitment and doing more structured things. Like the classes and I met with a personal trainer. I also chat up the people in water aerobics and look forward to seeing them.”

“I have a hard time going to swim laps, making myself swim a certain number of laps. After two or three laps I have trouble making myself. I think I should do at least 9-12 laps and I have a hard time doing that unless I am in something structured. So I am taking the swimming lessons out at the other YMCA. I didn’t know any of the strokes, so I went to the swim classes. That is when I was burning a lot of calories.”

Low Self-Efficacy: “Having kids, work, pretty much that is it. My own inability to get ready and go because I see things around the house that just have to be done. I think that’s it...If I go when my husband goes that will work. He is very supportive and nothing will stand in the way of his fitness routine...nothing. That helps because he encourages me to not worry about anything else and just go.”

“Getting up early helps but because I am often working at night and don’t get home until 10 or 10:30 at night, and then I am hungry and I eat and I haven’t seen him so we talk, it is hard for me to get up as early as I would like to...my window for doing things is very small.”

“I sometimes think to myself I can’t go exercise because I have too many things to do. However, if I would take the time to do it, I think that often I would feel better about the things that I have to do.”

Consistent Exerciser: “On a rainy day I really don’t feel like doing much because I am sore and I find that I have to take more medicine than I would on a normal day. Weather is a real obstacle.”

“Take medicine and keep on going. That is what I have done.”

High Social Support: “The first thing would be caution because I know how important it is not to fall. I also know how easy it is to fall. That is a big one and the other one is fatigue...I wear high-top boots because even barefoot I can turn my ankle so that is the main thing. And I use a cane. The cane makes it a little less stressful.”

Inconsistent Exerciser: “The biggest one now is finding a way to exercise that won’t hurt. I learned today that one won’t work, but there are two others that do.”

Participants frequently mentioned time as a barrier for regular exercise participation.

Commitment level and the impact of the pain on exercise were also noted as significant barriers to regular exercise.

Staying Interested in Exercise

High Self-Regulation: “I stay motivated and interested because I know it is the only option I have. I don’t want to end up in a wheelchair. So this to me is what I am doing to keep myself active. The other thing that keeps me interested is that you get to know the other ladies and men in the group and they become part of your social interaction so that is a good thing.”

Low Social Support: “Yeah, that is a problem. I get really bored. Um, I guess the boring is when you are doing something by yourself and you are just doing the same thing over and over and over again. Um, so the things that I have found

to help is doing varied things, or doing things with music or the TV on, or doing it in a group.”

Low Self-Efficacy: “My husband supports me to be interested. That is probably the main thing...and taking a class. Taking a class is great because there are other people there that if you go regularly they notice when you don’t come and you feel responsible. Feeling accountable helps.”

Consistent Exerciser: “I just enjoy what I have been doing and of course I am a people person so I am friendly with the girls that I am in the pool with, they are all a nice bunch of girls, and then like walking I know different people in town and I might run into them. So, I stop and talk. Social, yeah. I would say adding social components to the exercise has been beneficial.”

High Social Support: “I don’t mind the water aerobics. There is a certain amount of friendliness. And the water aerobics is a kick – little old ladies bumping into each other and giggling and so it is always amusing. The personalities are amusing.”

Inconsistent Exerciser: “I should bring a headset but I haven’t and with certain activities I bring a book. I play scrabble with the words printed in signs in the center. When you do water aerobics your head is out of the water so you can do that.”

Several participants noted the importance of the social aspect of their exercise participation. Others continue to try to think of ways to manage their disinterest. One participant reported that joining a class gave her a sense of accountability as a way to overcome lack of interest.

Motivators

High Self-Regulation: “Health. Staying independent and for my overall health.”

Low Social Support: “I always feel better after I do it and I am trying to lose weight and I know that helps a lot. So, that is what motivates me. I just want to feel better and lose weight. And, some of it I enjoy. Like I enjoy the Tai Chi and the water aerobics and all that.”

Low Self-Efficacy: “I feel better when I do it. Especially swimming is very refreshing and I feel energized and feel I can eat and eat and eat. That feels nice. Vanity motivates me because I don’t want a flabby stomach. My husband motivates me because he doesn’t want me to have a flabby stomach and he is so into exercise. It is also motivating to have the childwatch so that I can have the time, my husband can have the time.”

Consistent Exerciser: “I think it is keeping busy. I like to be busy. I don’t like down time. I don’t want to be like I have nothing to do today.”

High Social Support: “Well, I don’t want to be unable to walk and I really feel that all of the therapy and all of the things I have done has made a tremendous amount of difference. Um, when my leg was first paralyzed, all I could move was my big toe, and I am not going there again. I don’t like a appearing in public with a walker or in a wheelchair, so...”

Inconsistent Exerciser: “Well, I certainly wouldn’t want to gain weight. And we just always have. It is the point of staying active and continue to stay active.”

Participants discussed the health benefits of exercise as a motivator and stated that they find the way they feel as a result of exercise to be another motivation to continue. Others find motivation from the desire to prevent the negative health outcomes related to not being active.

Rewards for Exercise

High Self-Regulation: “I am tempted to say I eat but I also belong to a weight loss group. Oh, buying new clothes in a smaller size. That is a big reward.”

Low Social Support: “Hmmm. My trainer was trying to get me to set some rewards for myself. I always feel like I can’t.”

Low Self-Efficacy: “I don’t give myself rewards for exercising. I don’t think I do. Well, I eat. I guess I eat more.”

Consistent Exerciser: “Now I go for a pedicure once a month...It is painful to cut your toenails because you have to bend...So now, finally my last birthday we decided I would go once a month. My aunt sent me a check and my mom sent me a check and the rest is my reward because it is so painful.”

High Social Support: “Maybe I have something nice for lunch. Go home and watch my favorite reality television.”

Inconsistent Exerciser: “If when they weigh me in at the doctor’s, and my weight is where it should be, I will have an oatmeal fudge bar. I know you are not supposed to reward yourself with food, but they taste so good.”

Several participants noted that they feel they can reward themselves with food when they are able to be active. Others find the outcomes of activity to be inherently rewarding. Others noted that they have not set up a reward system, even when encouraged to do so.

Reasons to Look Forward to Exercise

High Self-Regulation: “Well, in part it is the social group. In part because it energizes me.”

Low Social Support: “Ah, just getting together with other people. Getting out. And then, of course, I just enjoy being in the water. With my weight, you just feel so buoyant and light. When I get out of the water I just feel so heavy. I enjoy it for the social...it is a lot more social than the regular aerobics classes because you have breath to talk.”

Low Self-Efficacy: “The chance to be away from my little boys. When I get to go with my husband I really, I am much more enthusiastic about it.”

Consistent Exerciser: “I look forward to having that feeling. I can’t...there are so many words you could give it. It is a feeling of getting in the water and being free. It is almost like being let out of your cage. The pain is a cage and the water is a free thing.”

High Social Support: “The conviction that it is absolutely necessary. Well, and it is a comfortable place to be. I appreciate it being at the senior center because I don’t like to be in an exercise room with grunting hard bodies.”

Inconsistent Exerciser: “At this point, the very fact that my daughter is going with me, which is important for her and also we have time together. That would really be it. I have done it alone before but it is not as enjoyable.”

Most participants discussed the social aspects of exercise to be a reason they look forward to their activity. Others discussed looking forward to the feelings they expect will result from being active.

Reasons to Dread Exercise

High Self-Regulation: “The only thing is when it storms or when it is icy. What I dread is not going. If I were going to the rec center to do those exercises I would probably dread it. I stopped going is what I did.”

Low Social Support: “Well, the only thing I dread is the process of getting here. Getting myself out of the house and getting here and then I guess, you know, having the extra 15 minutes after class that you have to shower and get ready to leave...so the extra time it takes...but really it is only the before and after.”

Low Self-Efficacy: “No, not really. If I am dreading it, I won’t come. I think half

way through my abs class sometimes I dread what is coming next, but I am always enthusiastic about coming to the class.”

Consistent Exerciser: “No, no.”

High Social Support: “Not this, no.”

Inconsistent Exerciser: “If the water is cold but I have overcome that pretty much.”

Participants reported few aspects of their activity that they dreaded and stated that if they have experienced dread in the past, it would prevent them from participating in the activity. One participant stated she dreaded the process of getting to the pool facility but not aspects of the actual water exercise activity.

Affect During Exercise

High Self-Regulation: “I feel good physically and emotionally.”

Low Social Support: “I just feel relaxed, I guess.”

Low Self-Efficacy: “I usually feel pretty good about myself. I feel so proud of myself that I got there and I am doing it. Sometimes in the pool I feel frustrated because you can see the people in the lane next to you putting you to shame. I can’t do a flip turn the right way so that is frustrating. My husband and I are learning how to do that together. I find that when you have someone you are working on it with, it helps, but I know people at the Y, but I don’t exercise with them.”

Consistent Exerciser: “And then, um, mood is pretty good. I try to keep a pretty good mood about things. I am not one that sits down and sulks. I never did. I try to keep the right frame of mind.”

“I feel free. I feel happy. I feel as though my body is cooperating and I feel very restful. I don’t even know what else is going on around me. Visualization. Everyone else has a different visualization.”

High Social Support: “The water aerobics I find funny. And the other class is more stressful. Some of the things we do are a lot harder for me so it is a reminder of that.”

Inconsistent Exerciser: “Well, mentally you are thinking, ‘ooh, I don’t have any pain’.”

Participants noted positive affective experiences with their water exercise. Other exercise experiences have not always been positive, but most reported positive experiences with water exercise. One participant noted she can experience negative affect if she compares her performance with other swimmers.

Affect After Exercise

High Self-Regulation: “I still feel good, but sometimes I go home and take a nap. Definitely more positive, calm and more relaxed. If I didn’t go exercise, especially in the winter, I would become more downcast. So this is a bright spot.”

Low Social Support: “If it has been a good class then I feel good. I feel happy. I am normally talking to everybody around that is in the class. Sometimes if it hasn’t been a good class where I feel like I got a good workout, then I feel like well ‘what was the point, why did I bother’. Or if nobody was particularly friendly... if I didn’t connect with anyone in the class, I feel a little frustration.”

Low Self-Efficacy: “Usually, I am in a very good mood afterwards and I am much more, everything is just like water over my back a little more. I feel accomplished.”

Consistent Exerciser: “We joke amongst each other. Now after that wonderful time now we have to get dressed. You know what I mean. You almost dread it. You almost dread having to get out of that and come in and then life begins. Then you have to expend energy to get dressed and spend our day doing whatever you are doing. You are off and running.”

“Yes, you don’t want it to end. So what I do is usually come home make myself a cup of hazelnut coffee and enjoy it. Then I face what I have to do after that. I try to give myself a little bit of down time so my muscles have to time to get whatever benefit they got. So I try to start something that I have to do at 11...I try to savor it because it is precious. It is a precious part of my life.”

High Social Support: “Pretty tired. I am back the next class. It is just what I do. The water aerobics I feel relaxed. Changing clothes in the locker room is pretty embarrassing but we are used to each other by now. It is uncomfortable when a bunch of children come through.”

Inconsistent Exerciser: “I am always glad that she and I went. It doesn’t take long for the pain to return. I am not sure how long and not to the point where I have to lay down.”

Participants generally reported that their affective reaction to water exercise tends to remain positive after the activity. One participant noted she can experience frustration if she thinks that her exercise wasn't strenuous enough or if she did not connect socially with a member of the class.

Medication Usage

High Self-Regulation: "I stopped taking pain medication. I felt drugged. It dulled the pain, it dulled everything. I wanted to be able to tell my doctors what I am experiencing and not cover that up."

Low Self-Efficacy: "I don't usually take anything for it, but last week I took ibuprofen because it hurt bad enough to do that...it has to be really bad for me to take anything."

Consistent Exerciser: "I take a time-release morphine in the morning and at night. They are 12 hour. Then I have what is called a break through morphine and that is a short acting one that is good for four hours. So if I have more pain I can take one of those. And then, of course, the muscle relaxants. And those I can take as much as I need. Some days I take more, some days I take a couple less. It depends upon what it going on. The weather, how I am feeling, did I do too much the day before."

"Well, I did go off of one particular muscle relaxant that I had been on for over 20 years and was taking a lot of it. Now we are using two others so that was a real achievement, to get off of that. Initially, my doctors in Connecticut thought I would be on it for the rest of my life. It was addictive, which was the reason for getting off of it. And I don't think that I ever could have gone off of it if I didn't have the pool."

Inconsistent Exerciser: "There are three. I normally take them at breakfast and lunch. The medication stays the same independent of the pain level. My hope is to not have to take them."

Most participants noted that they did not take pain medication to specifically reduce the pain prior to their water exercise. One participant noted that she was able to discontinue use of a particular medication, she believed as a result of her exercise participation. However, not all participants were taking prescribed medications for pain and infrequently used over-the-counter medications for pain management.

Self-Efficacy for Regular Exercise

High Self-Regulation: “I feel like I can do it because I am doing it. Once in a while something will come up and I won’t be able to go when I have planned to go. But most of the time now, I have tried to work my schedule around the fact that I am going to go there in the mornings. Even doctors appointments, I schedule those later in the day.”

Low Social Support: “I feel pretty confident. Cause having the last six months to get it more into my routine, it is more of a habit now than it has ever been and I feel pretty confident that I have time as far as work and other things going on, so I feel confident that I can keep it up.”

Low Self-Efficacy: “I don’t feel very confident about it. If I am going to be honest.”

Consistent Exerciser: “I feel pretty confident. Unless something happens and I need to be home to let someone in.”

High Social Support: “I am very confident.”

Inconsistent Exerciser: “I don’t know how long I am going to be able to. I am so hoping that when I have this new brace that it will give me some relief and I will know that I can continue.”

While several participants noted high levels of self-efficacy for maintaining their exercise regimen, others noted lower levels. Some efficacy was associated with future issues related to the management of their pain.

Causes for Variation in Self-Efficacy

High Self-Regulation: “Well, just the weather. If there is lightening or ice or snow.”

Low Social Support: “I guess when I get worried about all the other things going on in my life and I think ‘I have to do all this other stuff, I don’t have time to go do that’.”

Low Self-Efficacy: “The weather. I am much more likely to exercise if the weather is bad. Because, if the weather is really nice, I don’t want to waste that time being inside. How much I have to do that day. What time I have to be at work and how long.”

Consistent Exerciser: “Again it would have to be pain. If I had a high level of pain. I try not to let it but pain can almost depress you.”

Inconsistent Exerciser: “I wish I knew.”

Participants noted that the factors that impact their self-efficacy include other responsibilities that take time away from going to exercise. Other factors were also the weather and the level of pain that day.

Support from Family

High Self-Regulation: “One of my sons, daughter-in-law and grandson live in the area and they are supportive. In fact my daughter-in-law wants to go to the Thursday evening one.”

Low Social Support: “My daughter thinks it is good. She is like, it is a good thing for me to do and she encourages me. My son doesn’t really say anything one way or the other. He is probably fine with it...my daughter is always, well, you know, when I start eating something I shouldn’t eat, she will say something about that. And then, um, I just know that she supports me and she wants me to exercise and do things that are good for my health.”

“My son actually, sometimes his schedule conflicts with when I want to go out. I feel like it is night and I want to go to water aerobics but he hasn’t eaten much all day and he’ll say ‘let’s go do dinner’ and well, you know, I should go out with him and do dinner but then I won’t get to do my aerobics. That is my boundaries thing.”

Low Self-Efficacy: “He [husband] will sometimes go to the weight room and coach me through, add exercises or weight exercises.”

“My husband is very supportive and doesn’t think that I do nearly enough and he is so thrilled that I am getting back into swimming more regularly...He wants be to buy a new swimsuit, he tells me when the classes are that I could take, he brings home the schedule, he circles them. He says oh, I can go with you to the Y this morning and do some work in the weight room.”

“Pretty much everything outside of exercising that he does makes it harder for me to be regularly active. I would be much more likely to come to the Y first thing in the morning, if I thought he would get up with our boys and get them dressed or feed them breakfast and change their diapers, but he won’t. Maybe he would if I said that I was going to exercise, but so far, maybe that has happened three times in their lives...That, and his insistence on his activities being very important and mine being not so important, sometimes, I think.”

Consistent Exerciser: “They think it is wonderful because they know...in fact my mother she’ll be 88 in August and God bless her she keeps asking me ‘did you go to the pool today’? And I say ‘yes, mother I went to the pool’. Everybody knows that I need to be there because they have seen the outcome.”

“They are happy that I am active. I have never been one to sit on the couch and say ‘why me’ or anything like that. They are happy that I am active and that I have the frame of mind that I have. But I was determined from very early on... Right on from the very beginning I said this was not going to affect my family’s life. I have a son to raise that I love and I have a husband that I love.”

High Social Support: “I think they think it’s fine. My children aren’t really aware but my husband is a runner so he really is very supportive...He thinks it is a good idea and he encourages me to be active and he’ll take me for walks and he’s very good about helping me move around.”

Inconsistent Exerciser: “I have been going with my daughter so she comes to my house and we go together...My husband’s exercise is harder than I do. He swims and goes to the gym. It has always been important to us to exercise. We used to run together.”

Participants generally felt supported by their families for their exercise routine. However, participants also described factors that conflict with their ability to be regularly active, including their children’s schedules and their partner not taking over responsibilities that might make exercise participation easier to schedule.

Support from Friends

High Self-Regulation: “Most of them, if they can, they go and if they can’t they say that they will go. And some don’t like the water.”

Low Social Support: “They like it. I know that the people that I used to work with, they are not in to water aerobics. They are in to these heavy aerobics classes. I don’t know if they think that is the way that you should be exercising to get in shape. Much of the water aerobics people are middle-aged and elderly, so they may not see that as a good work out. A close girlfriend and I have done water aerobics together.”

Low Self-Efficacy: “I don’t know that they know much about it. My friend B who doesn’t live in town, but that I happened to talk to on the phone today is very supportive but she is a marathon runner. She is always supportive of it but she doesn’t live in town...in the past she has always said ‘do you want to go running with me?’ I know she goes to the Y in the morning with a friend and she always says you need to find someone to go with you who is going to force you to go.’ You have to go because they will be waiting for you there. Not many of my friends in town are real exercisers.”

Consistent Exerciser: “They think it’s wonderful because my best friend is in the pool with me too. They all know the mornings that I am there and that I am not available on those days. I’ll be happy to help you are talk to you after that but, you know. A lot of acquaintances will go walking with me and things like that. They might be wanting to lose weight, so they will say will you go walking with me. People from church and stuff. Everyone is very supportive.”

High Social Support: “They think it’s fine too. Just saying ‘oh, that’s great.’ Also, a lot of my friends are getting involved in exercise programs and they are very excited about that.”

Inconsistent Exerciser: “They don’t really know my exercise routine. I have asked what they do to exercise, but we don’t talk about it very often.”

Participants reported varying levels of social support from friends. Some noted significant support and had friends that attended class with them. Others noted that it was not a topic generally discussed with their friends.

Expectations for Exercise

High Self-Regulation: “There are two individuals who are in their 90s that still go to the pool and that is my expectation, to keep on going there. To me this is an exercise you can do for your whole life.”

Low Social Support: “I think my expectations are that I will feel better and have more energy and lose weight, but I have found that I don’t lose weight just with the water aerobics unless I do also manage my diet or do a little other exercise too.”

Low Self-Efficacy: “A toned body. But I expect it to miraculously happen by not exercising all the time. An overall general sense of well-being and a more relaxed state of mind.”

Consistent Exerciser: “I expect to get pain relief. That is what I am expecting. And I am getting it in small doses.”

High Social Support: “Mobility, strength, balance.”

Inconsistent Exerciser: “I think it will pay off in the long run. I think that if I stay active I will be able to stay active longer in my lifespan. I told my trainer I want to be able to carry in my groceries.”

Participants expressed a range of expectations related to their exercise participation. Several participants discussed the expectation that being active regularly will help them to remain active and more capable later in life.

Planning When to Go

High Self-Regulation: “The reason that I don’t go on Wednesday is because I have other activities that I do that day. But generally, I plan to go based on when the classes are offered.”

Low Social Support: “I plan it by when they are going to have classes that I will enjoy. Like I prefer the deep water aerobics, so I plan when they are going to have that. Usually I go the 6:00 at night. I would like to go to some of the morning ones but I have been tired recently so I haven’t been going to those. It changes depending on the week, or the schedule or how I feel that day.”

Low Self-Efficacy: “I try to go when I know my husband is going to go and I go before he goes. So that he can come early and we can maybe swim a little together. I can maybe watch him a little bit afterwards and then when he is done, maybe we can take my boys swimming together. So that helps. That would be one or two days. The weather influences it and whether I am going crazy at home influences it. But there is nothing regular about those things.”

Consistent Exerciser: “You have your choice. You can have 8:00, 9:00 or 4:00. When I initially started I was in the 8:00 class because there were no openings in 9. Then when there was an opening, I was able to move into 9. I like it much better because I get up with my husband. I am able to see him and then at my leisure put my makeup on, put my bathing suit on and get dressed and go and be there. I leave at 8:30. Also in the winter, you hope by then that they have sanded the roads. It is a much better time. It could be at 11 and really cut into your day. This way you have the whole rest of the day.”

High Social Support: “The schedule from the recreation department.”

Inconsistent Exerciser: “The pool is only open from 12-5 so that limits us right away. My daughter and I have decided 2:30 approximately.”

Generally, decisions about when to attend water exercise were dictated by external factors. Participants mentioned the schedule of classes at a given facility was often how they determine when they will attend. Others attended when they knew they would be provided with social support to do so.

Making Sure You Get to Exercise

High Self-Regulation: “I put it on my calendar. It is a priority. I make it a priority.”

Low Social Support: “That is a toughy. That is always hard for me. A lot of times I say, ‘I will do this later’ and then I don’t do it. It is like having, keeping my gym bag together is the best that I can think of and also telling my family, or whoever, ahead of time, like ‘I am going to be doing this at such and such a time, so if we need to do anything together we need to work it around that schedule’. Those are the two things. Having my swimsuit and towel packed and ready to go because a lot of times I am bad about misplacing stuff. I get overwhelmed if there are a lot of little steps. I think, ‘well, I will have to do this and then have to do this. If I have it all together I am good to go.’”

Low Self-Efficacy: “No. I could be better about that. I don’t have any ways to make it happen. On Mondays I force it to happen because I have my abs class...I guess I just turn a blind eye to everything else and just get up and go.”

Consistent Exerciser: “Oh, I just set that time. I schedule everything around that. The pool is first.”

High Social Support: “It’s just you want to do something. We eat breakfast a little bit earlier and that is all that is to it.”

Inconsistent Exerciser: “If my daughter is going. I don’t need any other motivation. She needs the exercise more that I do.”

Several participants struggled with making time for exercise and structuring their day in a way that made it more convenient. Others reported that they have been able to negotiate their schedules such that attendance at water exercise was given priority.

Preference for Exercise Format

High Self-Regulation: “Group. The reason I chose the group is because the exercise is more like they prescribed. I could swim but I have not swum like that since I was really young. The interaction with other people, mostly before and after.”

Low Social Support: “The group, yeah. It keeps boredom at bay. After I get through the initial ten, fifteen minutes when I start to get tired, something to keep me at it because I don’t have a lot of willpower as far as saying ‘alright, I have got to keep going.’ A motivator.

Low Self-Efficacy: “I really like the group exercise but not in the pool. If I am in the pool I prefer not to be in a class.”

Consistent Exerciser: “Group...Because I am a social person. That makes it my preference. I like to have buddies.”

High Social Support: “Group right now. It is less expensive and it is just nice to be with other people.”

Inconsistent Exerciser: “I like water aerobics but I do it in my own lane while my daughter swims laps. I think that I would like exercising with a group but then I have watched and they weren’t exercising as aggressively I was. So, I thought I would get more out of it if I had a trainer or did it in my own.”

The majority of participants indicated a preference for the group format exercise. Others expressed preference for independent exercise but also reported they prefer to be accompanied by a family member.

Interpersonal Interactions

High Self-Regulation: “It depends on the day who is there. There are some people that prefer the outdoor pool in the summer. There is close to ten people or more that are very consistent in coming and we interact almost on a daily basis.”

Low Social Support: “I talk to people. I talk to people in the locker room if there are people in there chatting. I will talk to people in the pool. I will go around and look around and see if there is anyone I know and chat with them.”

“Real friendly. We exchange names and talk about different things, because there are always different conversations going on. So I always talk to different people and plan to go when other people I know will be there.”

“If there is an instructor who hasn’t seen me before they will usually come up and we will talk. They are very friendly.”

Low Self-Efficacy: “A lot of the people that I know, that I would exercise with belong to another gym or they have quit the Y or say they don’t have the money to come.”

“I typically see several people who go the church where I work. I can see my husband. I know the instructors...We usually just chat for a few minutes. When you are in the pool it is hard to identify people.”

Consistent Exerciser: “I ride with my best friend. We ride together. She comes to my house and one week I drive and the next week she drives. So it is fun because we ride together.”

“I see all the same people. The people that are in the class and the people that work in the rehab department. They are all very sweet. I like them all.” The staff is wonderful. I like each one... Yes, I think that if you had nasty people there it would cast a while different light. Yeah.”

High Social Support: “I am not quite as chatty. I am sort of more focused on what I am doing. I don’t mind all the chit chat but I feel for the instructor sometimes. Incidentally, I have developed friendships with people but we are more interested in the exercise than talking at great length.”

Inconsistent Exerciser: “When I interact, I always feel better. At the pool I only interact with my daughter.”

Interpersonal interactions were generally described as either positive or relatively neutral.

Participants did not describe negative interpersonal experiences and most often expressed appreciation for the social aspects of involvement in water exercise.

Goals

High Self-Regulation: “That is my goal, to be independent as long as possible...and to stay healthy, so that is what motivates me to go. I started to exercise three days a week and now I exercise four days a week and I am looking to increase that to five days a week or twice on one day.”

Low Social Support: “Well, I am making it a goal that I have to get in some kind of exercise three times a week, and I like to do that two of those swim, one of them the machines or something else.”

Low Self-Efficacy: “My only goal is that I try to never miss my abs class and I try to make sure I take them on a walk in the woods at least once a week and I try now to swim once a week. I do much better at those during the summer when I am not working.”

Consistent Exerciser: “Well, my goals are just to stay in the class...Yeah, I do, in the pool. When we do our master moves, I try to get at least ten in on each side. Sometimes I am doing 15, but you are supposed to be doing it slowly.”

High Social Support: “I don’t think about it in terms of goals. I just want to get through the class and I’d like to see a little bit of progress. I have been pleased with the water aerobics because I have seen progress in the healthy backs class.”

Inconsistent Exerciser: “I guess the biggest one is getting in my target heart zone and I only do that now by perceiving. And, I was always wanted to do my strength training twice a week.”

Some participants reported setting specific behavioral goals while others reported more general health status goals. Other did not think about their exercise in terms of setting goals but could describe wanting to see progress over time.

Tracking

High Self-Regulation: “I do keep a record because in this weight loss group that I am in, they support that...we keep a food journal and we record our exercise because that is a part of it.”

Low Social Support: ‘No, I hate to keep track of stuff. That is a thing of mine. Like my trainer said ‘write down every bite that you eat and bring it in to me’ and I was thinking ‘oh, no, I don’t like to do that. They have the fit links here and I am signed up for that. You can keep track of your exercise on that so every time you do a workout you are supposed to punch it into there and it tells you what your settings are on each machine and at the end it tells you how many pounds you lifted. Every time I do water aerobics I am supposed to punch that in there, but I don’t do it.’”

Low Self-Efficacy: “No.”

Consistent Exerciser: “No.”

High Social Support: “No.”

Inconsistent Exerciser: “I think I have tried before. I have been doing it so long that it is built in. I think back and remember what I did. I don’t really want to do it. It doesn’t really work for me as well.”

Few participants reported keeping track of their exercise activity. One participant reported that she had been asked to track her exercise participation but did not find the task appealing.

Location

High Self-Regulation: “It is ten miles from my home, so if it were any further I probably would be looking for something different.”

Low Social Support: “Well, it could be more convenient for me. It used to be more convenient for me. But it is still not outrageous. I used to live five minutes from the other Y and used to go all the time, now I am 15 minutes from either one. So that is a factor. If

it was back in the five minute range, that would be better. The location is a little inconvenient.”

Low Self-Efficacy: “It is convenient.”

Consistent Exerciser: “Oh, it is perfect. It’s five miles.”

High Social Support: “It is fine.”

Inconsistent Exerciser: “It is so close to my house.”

Participants generally reported that the location they chose to participate in water exercise was convenient to their home. One participant noted that the distance from her home posed another barrier to her regular attendance.

Parking

High Self-Regulation: “It’s good. I watch the parking. At the new pool they are building the parking is at the bottom of the hill so unless there is closer parking I won’t be able to walk up that hill.”

Low Social Support: “Parking is fine...if they didn’t have parking that was convenient or I felt was safe, that would influence me, but they do.”

Consistent Exerciser: “Well, it’s convenient and the parking is nice. The parking lot is right there and I have a handicapped pass that I use. The parking is superior, it is a beautiful location. It’s all perfect. Our fear is that someday they might close it down.”

High Social Support: “The parking is fine.”

Inconsistent Exerciser: “There is always parking, but I have to go get this special pass for a week at a time. But, it is out of my control. If I had to park further away, maybe I would rethink.”

Generally, participants noted adequate parking; however, most recognized that this was an important factor in the convenience of exercise, especially with participants who have difficulty walking.

Hours

High Self-Regulation: “The morning classes are good.”

Low Social Support: “Those are good. As long as they are open in the evenings, which most places are, then it is fine.”

Low Self-Efficacy: “There hours are nice. The childwatch hours have recently changed to closing in the middle of the day. That is a little frustrating.”

High Social Support: “The hours are fine.”

Inconsistent Exerciser: “These are summer hours. I prefer to exercise in the morning so that you know that you have the rest of the day. Not enough to keep me from going.”

Participants reported that they did not have any issues with the hours of the facility, except one participant who noted a preference for exercising in the morning when the pool was not available.

Crowds

High Self-Regulation: “It works out fine. There are other people there doing their own routine and we are all in the same pool, but it works out.”

Low Social Support: “It depends on the time of day. Sometimes it is very busy...If I can’t get a lane in the pool or if you have to wait for a machine...I try to come when it is not too busy.”

Low Self-Efficacy: “It depends on the time and I don’t go at a regular time. I have not gone regularly enough to remember when it was busy. In the past, I have tried to avoid the 12-1 hour and the 9-10 hour. I also prefer to go when I know I won’t be the only person there. Because then it is just you and the lifeguard.”

Consistent Exerciser: “There is only our class in it. There are seven of us.”

High Social Support: “One day when it was more crowded we just moved into the deeper end and did our own thing.”

Inconsistent Exerciser: “It is never crowded. I don’t like to be splashed in the face. I probably wouldn’t want to exercise in a pool with a lot of kids.”

Most participants were exercising in the pool when the pool is not very crowded; however some indicated that this would be an issue for them if it were the case. Participants also reported avoiding the pool at certain times if they did not attend a specific class.

Maintenance of Facility

High Self-Regulation: “It is good. If it weren’t it would probably make me uncomfortable.”

Low Social Support: “They do a very good job...They are maintained very well.”

Low Self-Efficacy: “It is fine. It is good. At another aquatic center they were not well-maintained and it was a deterrent.”

Consistent Exerciser: “It is maintained very well. I think he does an excellent job. It is very tricky to get the heat right...I think my most important thing about the pool is the temperature. That’s it in a nutshell. I know I cannot be in 87 degree water. It sends my muscles into spasm and I think that even if it went up to \$50 or \$60 I still would do it.”

High Social Support: “The biggest problem with the pool is that in the winter the water is a little colder. The locker rooms are not spic and span and I am uncomfortable with the lack of privacy...I am in and out of there.”

Inconsistent Exerciser: “That is important. If it wasn’t clean, I wouldn’t be there.”

While participants often noted that the maintenance of the facility was important to them, they did not cite any issues that prevent them from utilizing the facility. Several noted the particular importance of the temperature of the water for their activity and pain relief.

Affordability

High Self-Regulation: “Parking is a bigger issue for me. Probably the cost, unless it were really high, probably wouldn’t prevent me from going.”

Low Social Support: “That I am not happy with. It is very expensive now and I don’t like the way they have done it. Because it used to be, when I first started going, it was the YWCA you could just sign up for water aerobics and it was inexpensive. That was fine because that was all I wanted to do. Then when it became the YMCA it was you had to join the whole thing and it is pretty expensive. It is \$48 a month for a single. The affordability...I think they are high. Those are some of the gaps that I have had in the past, because I couldn’t afford it.”

Low Self-Efficacy: “It is pretty affordable. Actually I have no idea what we pay but I think it is pretty affordable. I know that is why some of my friends don’t go anywhere, because of the expense.”

Consistent Exerciser: “It is affordable. You don’t have to pay for parking. And they guarantee you 10 classes a month for the \$40. So in other words, if the pool were broken

they would add extra days to make up those ten. That is pretty good, \$4 a class. That is reasonable.”

High Social Support: “Yes, very.”

Inconsistent Exerciser: “Yes. Let’s put it this way. I would make it affordable. I would do without the frills so that I could go.”

Several participants noted that the affordability of the facility was very important to them and in a particular case was a barrier to attendance. Most participants were comfortable with the cost.

Adherence to Ecological Momentary Assessments

Adherence to the momentary assessment procedures were measured by dividing the number of reports of daily ratings provided divided by the total number of assessments possible over the course of the six-week assessment period. The adherence rate for participants for their morning reporting reached 90.9%. Water exercise EMA reporting was completed 87.5% of the possible occasions to report based on endorsed number of water exercise days.

DISCUSSION

The goals of this study were to test the feasibility of a momentary assessment strategy for measuring reactions to exercise in women with chronic pain as well as to understand in more detail, the patterns that might exist between the variables of chronic pain, affect and self-efficacy over time that may subsequently have an impact on the maintenance and regularity of exercise behaviors.

Interviews

The focus of this study on women with musculoskeletal pain identifies a group that is at particular risk for a sedentary lifestyle. Given the prevalence and impact of musculoskeletal

conditions it is important to understand how pain relates to people's decisions to be active and in what manner to be active. In addition to the information provided through momentary assessment, the interview responses of participants provided insight into how these women with chronic pain adjust their activity based on the physical feedback provided through pain sensations and how they manage to stay active or fail to stay regularly active. Interviews with participants indicated that participants attend to their pain levels when they are choosing ways to be physically active. Participants confirmed the importance of positive social interactions and support for maintaining behaviors over time. Participants indicated that pain can be a barrier to regular exercise but also noted that weather, time management and lack of support have been influential barriers as well. Based on the feedback obtained from participants during final exit interviews, this assessment strategy would generally be acceptable, specifically when used as a part of a physical activity and exercise intervention. Participants reported that they would be willing, if involved in an intervention focused on exercise behaviors, to report their ecological ratings using cellular phone technology. The assessment strategy seemed to work, in most cases, although there may have been unique challenges for applying this to a water-based activity. It may ultimately be easier to apply to a land-based activity given the additional challenges associated with immersion in water and having access to the side of the pool where the assessment form was located.

The Ecological Momentary Assessment of Exercise

Another appealing aspect of this measurement strategy is the potential for relatively easy automated applications where text messages would be sent automatically at a specified time to participants to indicate the timing of their assessment call. If this strategy were automated it

would make it possible to apply this strategy to a larger sample of people in the context of a physical activity intervention.

The application of this approach in the context of an intervention would allow for the tailoring of feedback or suggestions in response to changes in certain variables. For example, if self-efficacy were to decrease, understanding more about the factors that may be related to self-efficacy (i.e. affect, pain) may allow for the provision of feedback to assist the participant in remaining consistent with their exercise (i.e. ways to enhance affective response to exercise; altering activity to prevent increase in pain level).

Future Directions

It will be important in future studies to include women with pain reports that reach a higher level. The women chosen for profiles in this analysis reported varying levels of pain over time, but generally reported a milder level of pain overall. This may relate to the timing of the assessment (i.e. morning versus evening) or relate to the fluctuations in pain that can occur with musculoskeletal conditions.

The strengths of this study include the exploration of the experiences of a unique and important group of participants. Participants have successfully engaged in water exercise and offer important insights into the successful maintenance of this behavior over time. Participants generally experienced reductions in pain level during and following exercise. They also generally experienced increases in affective state and self-efficacy for exercise participation which may be supportive of their maintenance of this behavior over time. While results cannot be generalized beyond women similar to those in the study, this is an important step toward understanding how variables related to the maintenance of physical activity and exercise relate to each other on a momentary basis. This study revealed that use of cellular phones for reporting

was acceptable to an older adult population. Generally, when cellular phones have been used in previous research, there is an underlying assumption that this sort of technology would be more acceptable to a young adult population. In contrast, participants in this study were interested in learning how to use this technology, if they were not already familiar with it.

This study examined a measurement strategy not previously applied to this population while performing water-based exercise. This assessment strategy allowed for daily reporting of pain intensity, affect and self-efficacy to further our understanding of how these variables change over the course of an exercise event, how they tend to vary in relationship with each other and offer potential insights into the relationship with subsequent exercise participation.

The weaknesses of this study include a small N size which limits the statistical analysis that may be performed to examine causal relationships. In future studies, it will be important to examine larger groups of participants to allow for these types of analyses. Another weakness includes the specificity of the population included in the study which leads to an inability to generalize the results.

This study is a step in the process of developing interventions that may be more likely to retain participants who may not be able to maintain behavior change over time. With a more developed understanding of the processes involved in changing and maintaining a behavior we may be able to develop interventions that can specifically address changes in the variables that may impact adherence to recommended levels of physical activity and exercise over time. Studies of physical activity and exercise, to date, often include well-spaced assessment points that may neglect to understand important variation over the course of the study. This study revealed that there is individual variation in affect, pain intensity and self-efficacy over time

which may provide important markers of when participants need additional support and tailored advice for continuing to remain active.

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TABLE 1
Summary of Sociodemographic Characteristics

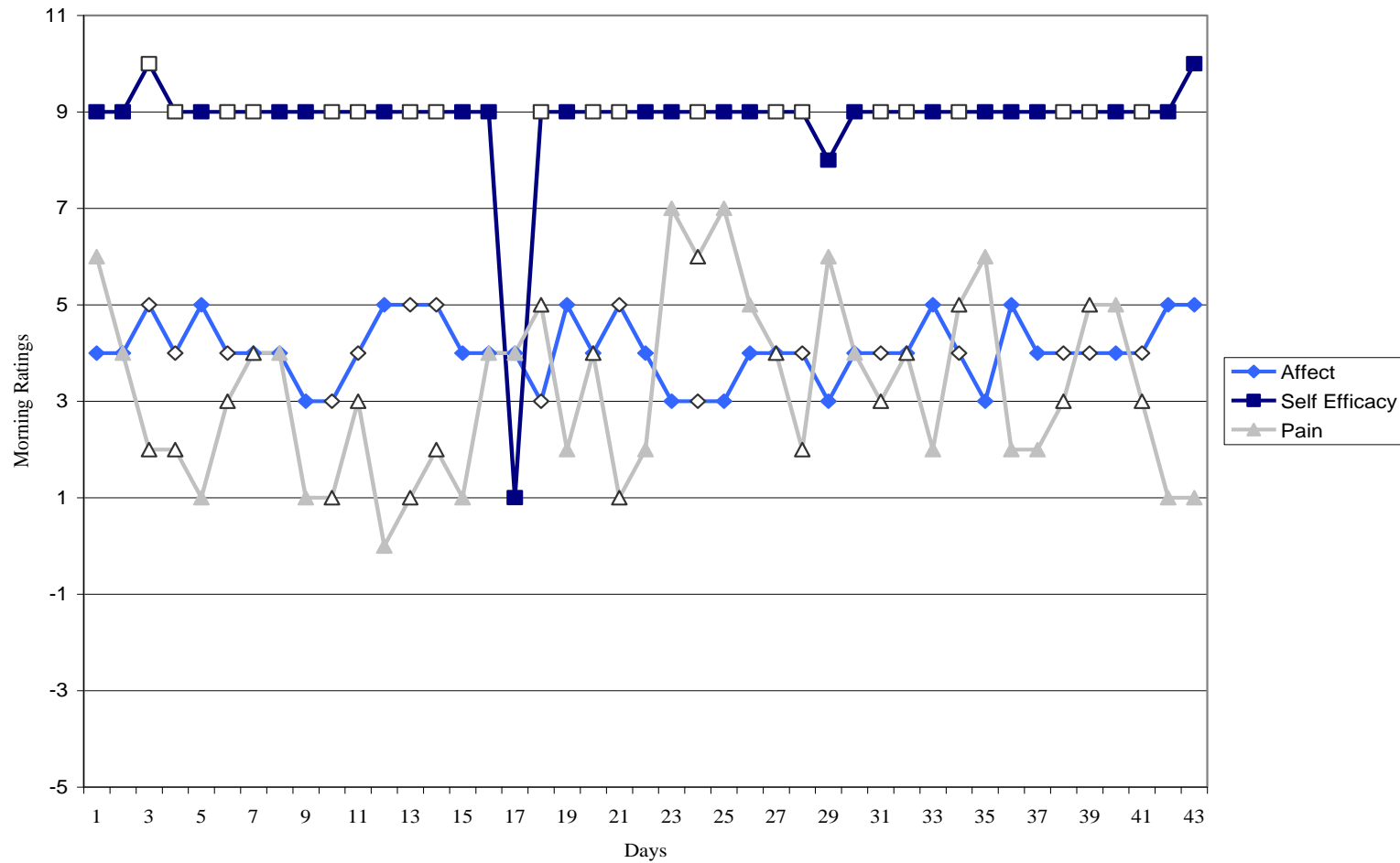
Sociodemographic Characteristic	% based on N = 15	Mean	Standard Deviation
Age		56.7	13.7
Weight (lbs.)		164.7	46.2
Height (in.)		64.9	3.4
BMI		27.2	6.4
Racial Background			
Caucasian	86.6		
African-American	6.7		
Asian	6.7		
Hispanic	0		
Marital Status			
Single	20		
Married	60		
Separated	0		
Divorced	13		
Widowed or Other	6.7		
Education Level			
12 Years	0		
Some College	26.6		
4 Year College	46.7		
Masters Degree	20		
Post Masters/Doctoral	6.7		
Household Size			
1	26.7		
2	66.6		
3	6.7		
4	0		
5 or more	0		
Household Income			
Less than \$30,000	13.3		
\$30,000-\$49,999	33.3		
\$50,000-\$69,999	13.3		
\$70,000-\$89,999	20.0		
Greater than \$90,000	13.3		
Rather Not Say	6.7		

TABLE 2
Correlations, Means and Standard Deviations of Measured Variables

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1. Age	1																						
2. BMI	-.166	1																					
3. SR Mean	.269	-.004	1																				
4. SE Mean	-.073	.190	.312	1																			
5. SS Mean	.489	-.434	.152	.189	1																		
6. OE Mean	-.111	.013	.174	-.163	.221	1																	
7. Water Exer. Freq.	-.094	-.242	-.148	.374	.272	.207	1																
8. MET Level	-.479	.146	.231	.235	-.298	-.141	.166	1															
9. PA Level Cat	-.429	.119	-.023	.056	-.406	-.165	.081	.683**	1														
10. PANAS Positive	.090	-.190	.269	.168	.391	.204	.348	.148	.235	1													
11. PANAS Negative	-.464	.117	-.524*	-.639*	-.335	.093	-.110	-.194	.062	-.287	1												
12. Daily SE Mean	-.177	-.034	-.072	.251	.221	.087	.239	.282	.409	.429	.013	1											
13. Daily Pain Mean	.328	-.182	.188	.265	.289	.133	.435	.053	.137	.103	-.549*	-.205	1										
14. Daily Affect Mean	-.110	-.058	.331	.298	.356	.744**	.429	.159	.084	.621*	-.222	.314	.304	1									
15. Pre-SE Mean	.047	.056	.153	.310	.200	-.069	.042	.251	.465	.382	-.218	.908**	.145	.134	1								
16. Pre-Pain Mean	.166	-.102	.095	.306	.234	.148	.501	.073	.094	.006	-.491	-.292	.962**	.283	-.274	1							
17. Pre-Affect Mean	.061	.042	.642*	.407	.430	.645*	.329	.034	.102	.663**	-.426	.304	.380	.889**	.286	.328	1						
18. Dur-SE Mean	.041	.001	.023	.231	.129	-.053	.160	.175	.434	.375	-.157	.889**	-.127	.061	.952**	-.253	.179	1					
19. Dur-Pain Mean	.064	.011	.134	.241	.133	.041	.253	.370	.369	.002	-.439	-.131	.780**	.227	-.077	.810**	.313	-.181	1				
20. Dur-Affect Mean	.156	-.173	.421	.287	.466	.679**	.511	-.215	-.084	.644**	-.377	.341	.331	.756**	.281	.268	.799**	.346	-.030	1			
21. Post-SE Mean	.024	.052	.087	.276	.134	-.030	.120	.154	.412	.303	-.164	.901**	-.158	.061	.973**	-.274	.203	.985**	-.146	.307	1		
22. Post-Pain Mean	.161	-.233	.031	.278	.243	.024	.417	.306	.312	.139	-.553*	-.183	.917**	.240	-.157	.920**	.273	-.153	.870**	.167	-.188	1	
23. Post-Affect Mean	.113	-.037	.552*	.365	.570*	.772**	.408	-.276	-.199	.526*	-.354	.266	.293	.763**	.221	.277	.882**	.197	.088	.906**	.218	.143	1
Means	56.67	27.21	3.06	71.09	3.38	12.91	10.80	4041	2.27	35.80	13.47	7.74	2.79	2.22	7.98	2.67	2.05	8.29	1.85	2.76	8.45	1.95	3.02
SD	13.70	6.41	0.58	17.72	0.96	3.86	4.13	2559	0.46	5.21	2.75	1.57	2.07	1.39	1.65	2.30	1.42	1.62	1.86	1.22	1.45	2.05	1.06

FIGURE 1

Morning Ratings of High Self-Regulation Participant



Note: Blank data points indicate planned water exercise days. Participant age = 69, BMI = 24.9.

FIGURE 2

EMA Ratings of High Self-Regulation Participant

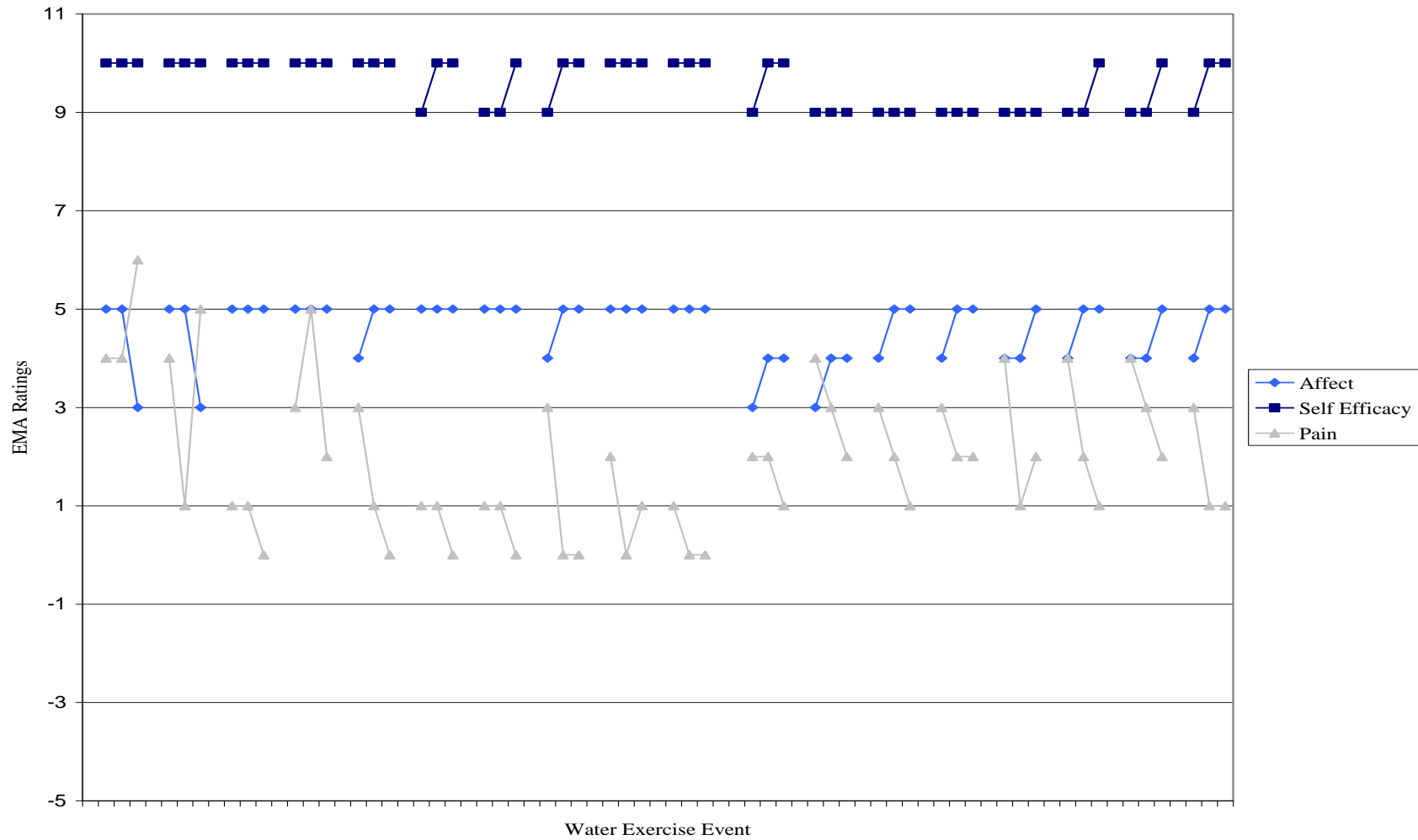
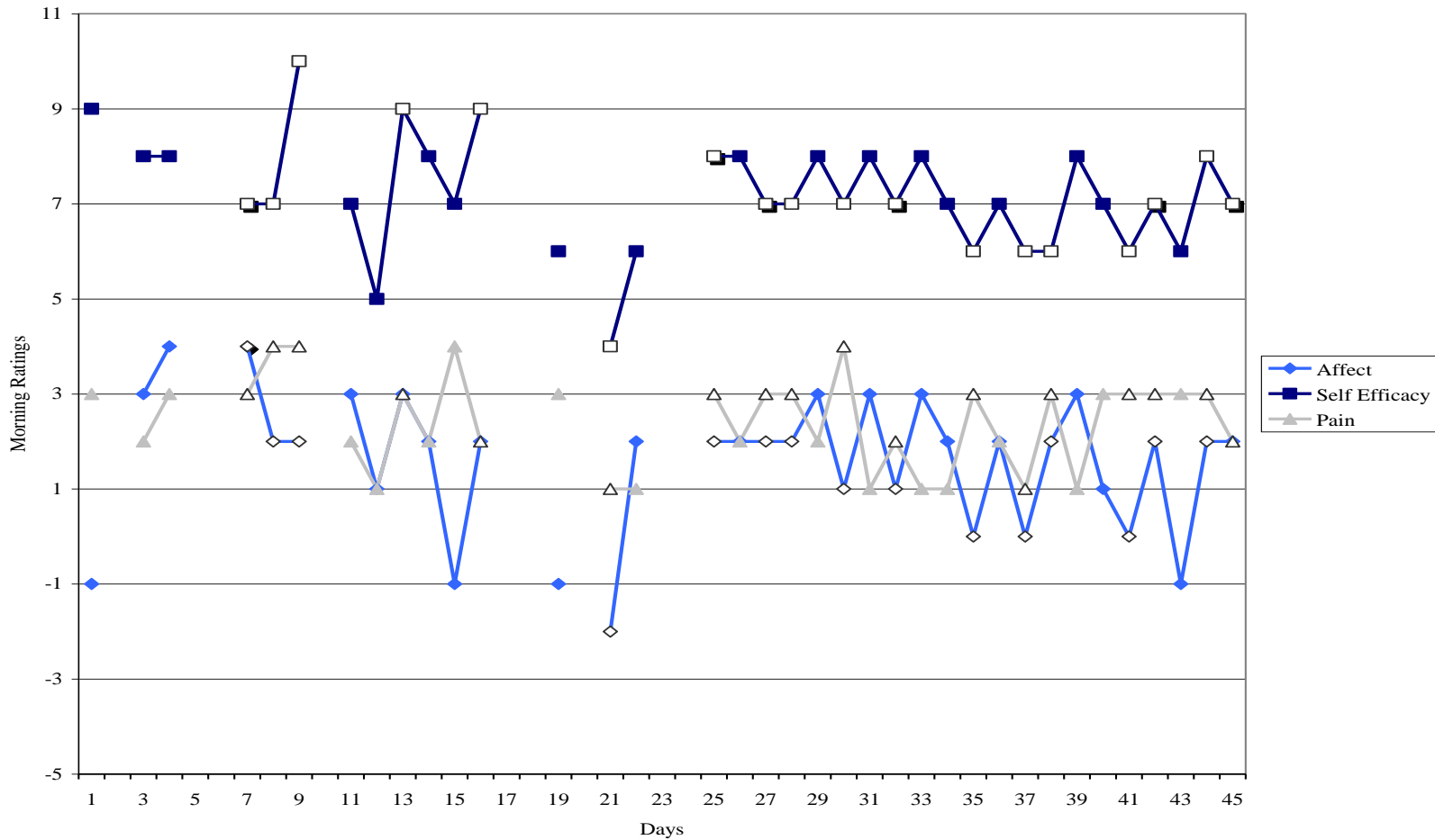


FIGURE 3

Morning Ratings of Low Social Support Participant



Note: Blank data points indicate planned water exercise days. Shadowed points indicate participant did not engage in planned exercise. Participant age = 52, BMI = 39.8.

FIGURE 4

EMA Ratings of Low Social Support Participant

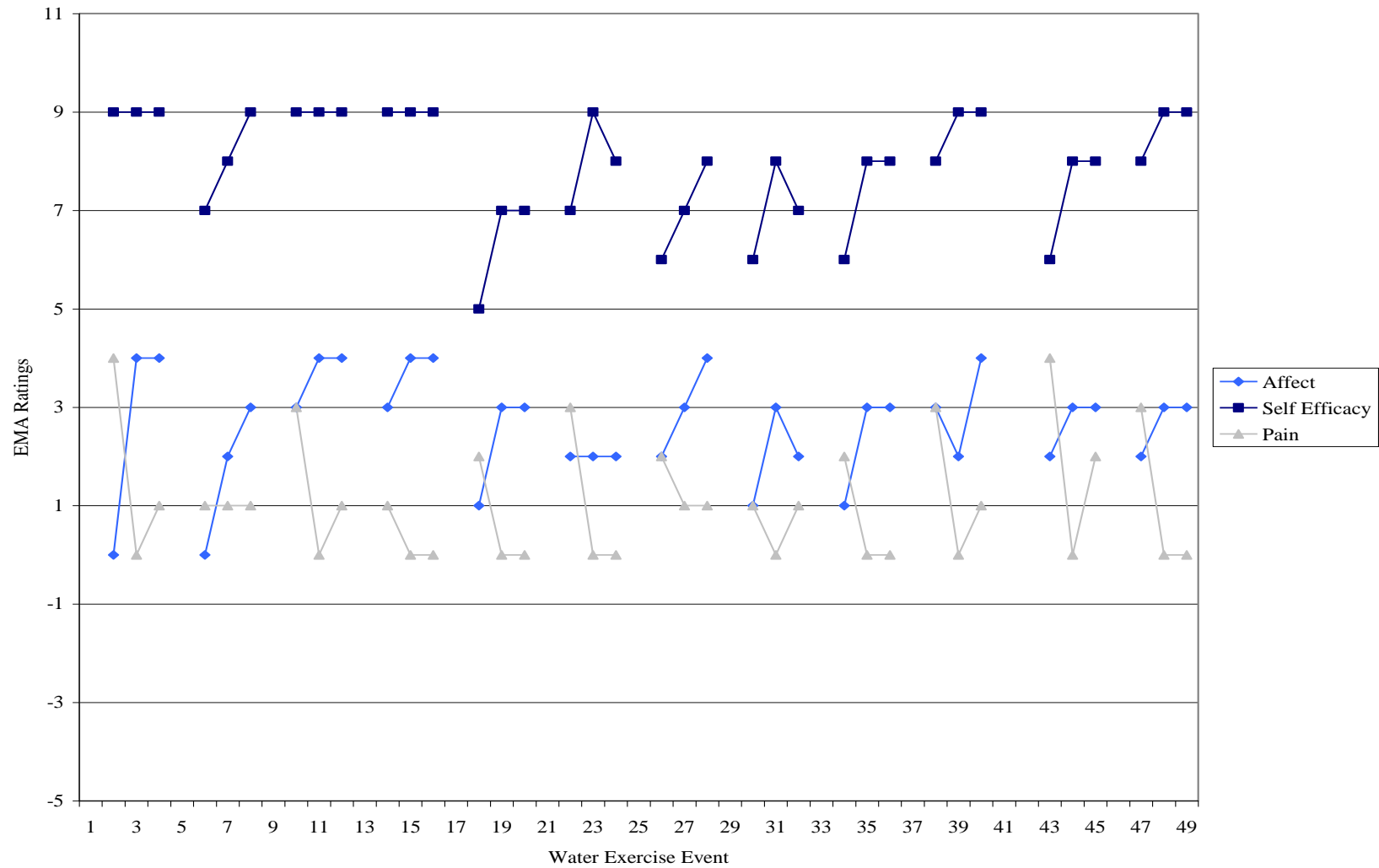
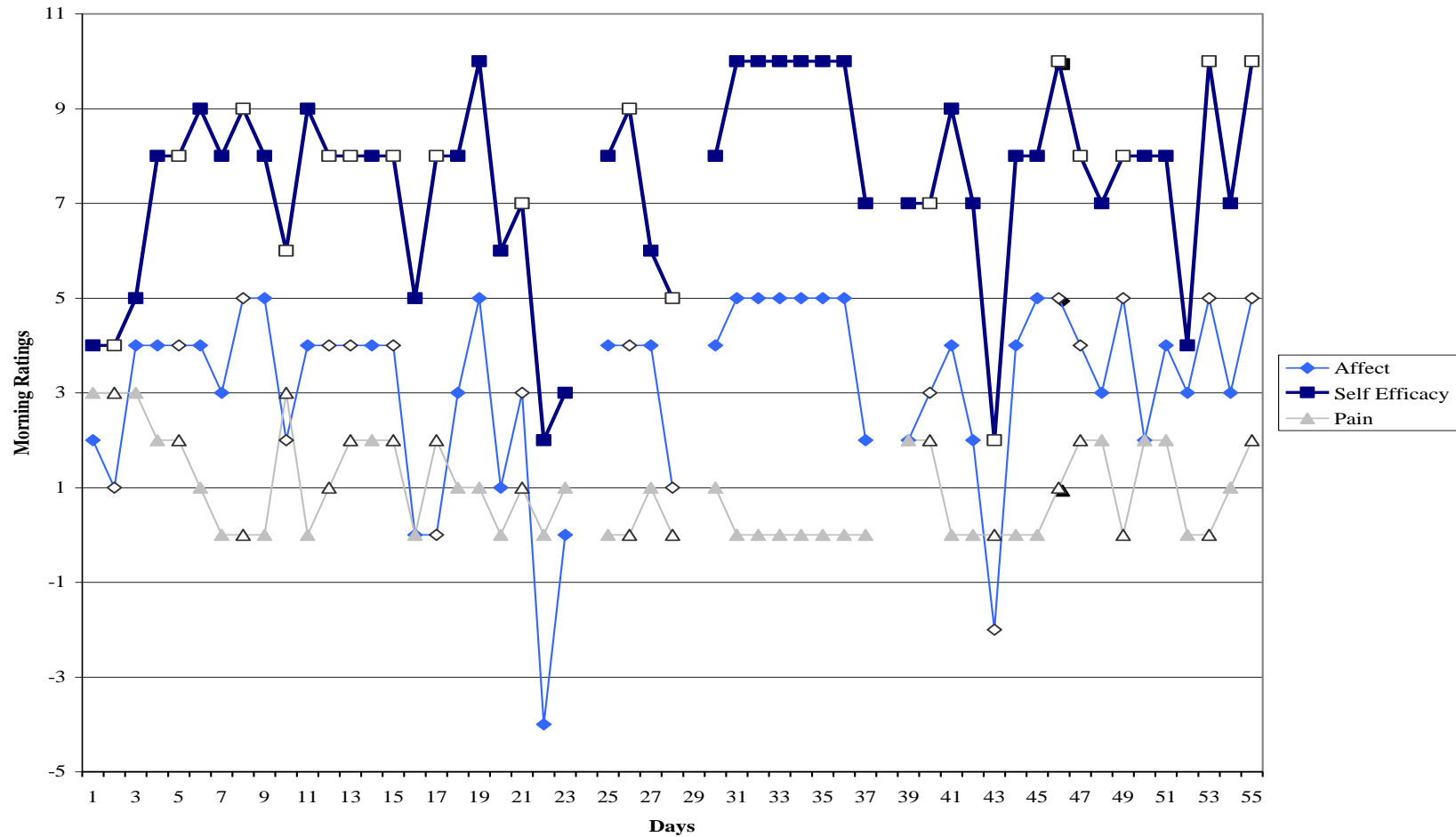


FIGURE 5

Morning Ratings of Low Self-Efficacy Participant



Note: Blank data points indicate planned water exercise days. Shadowed points indicate participant did not engage in planned exercise. Participant age = 33. BMI = 19.9.

FIGURE 6

EMA Ratings of Low Self-Efficacy Participant

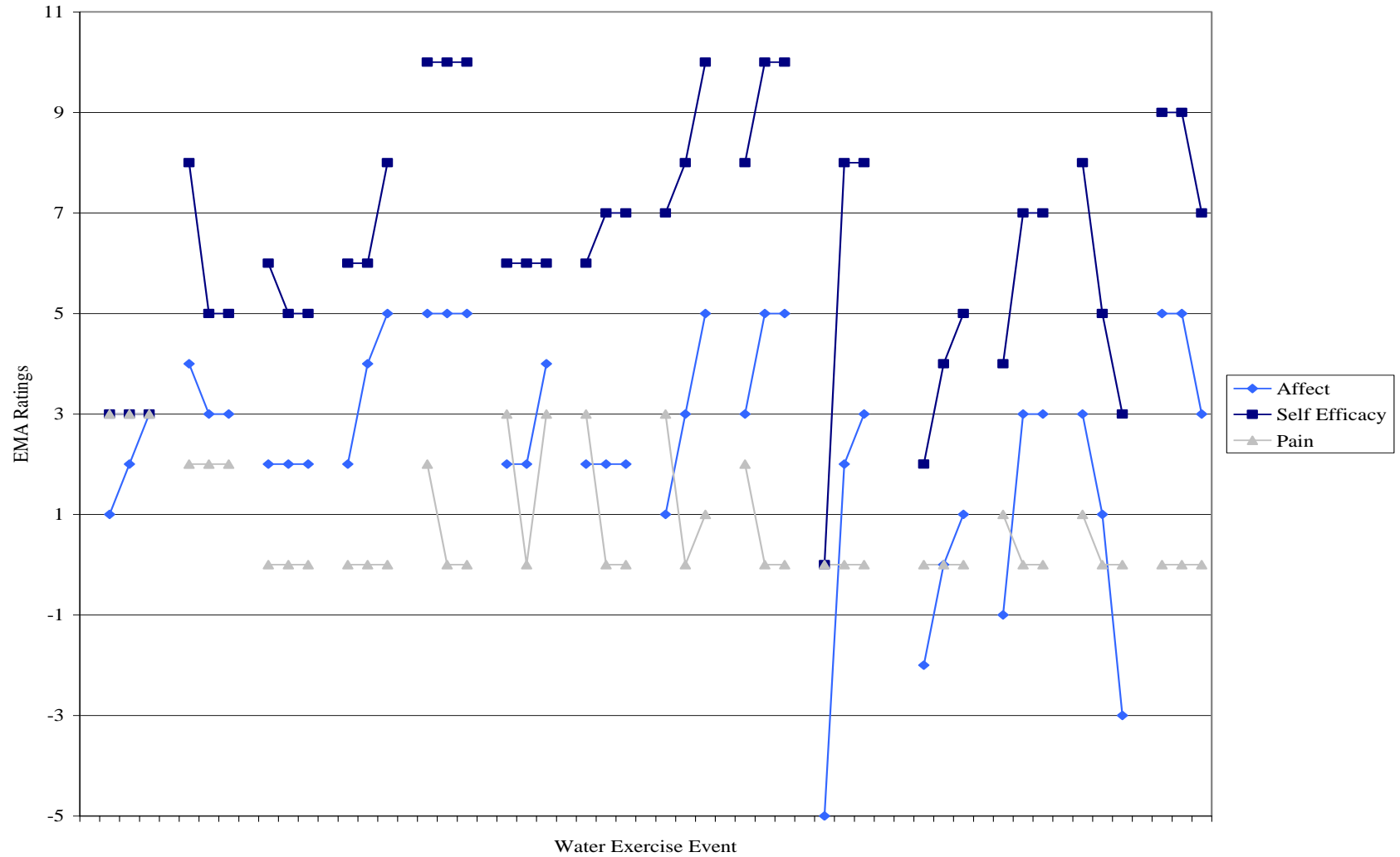
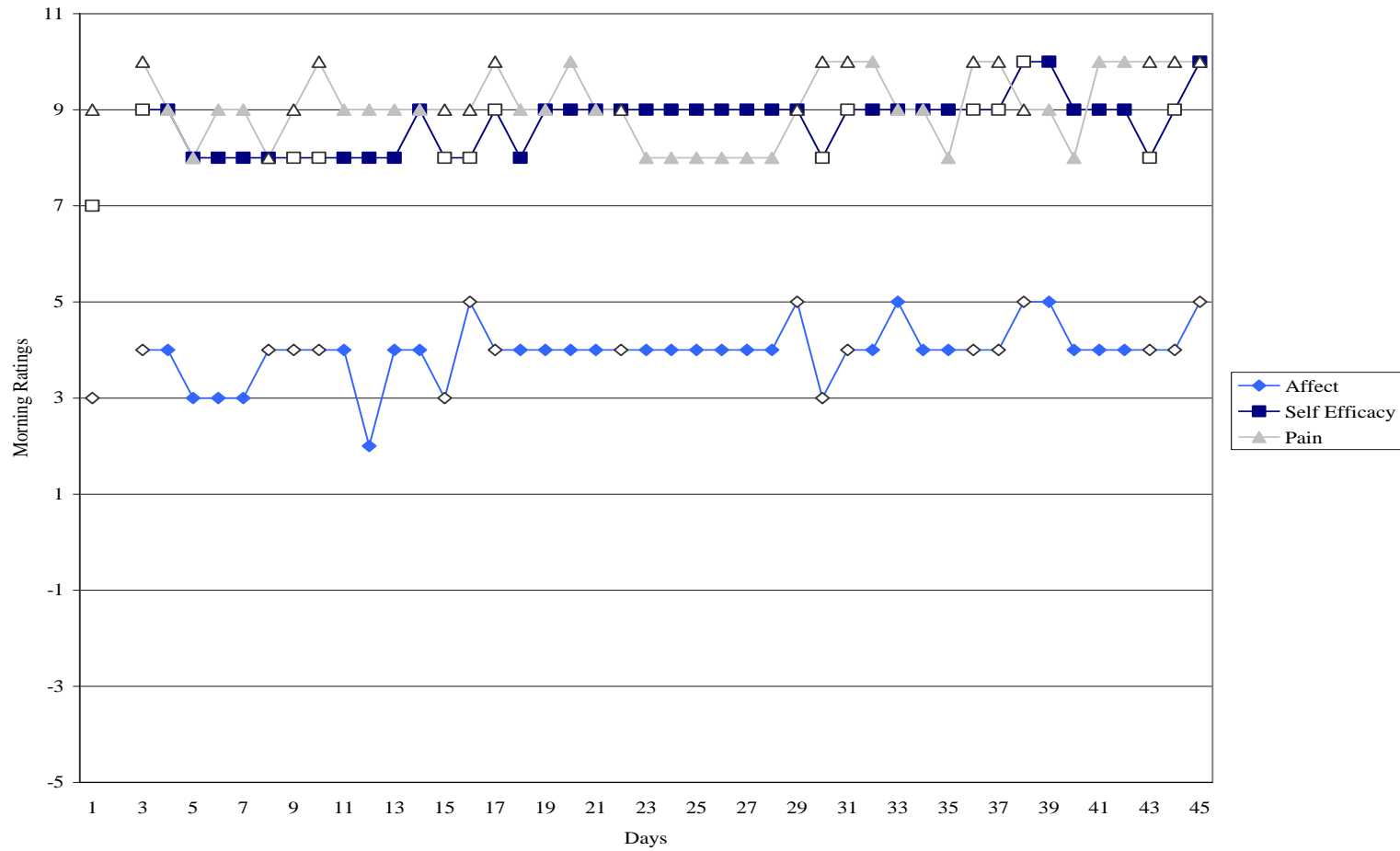


FIGURE 7

Morning Ratings of Consistent Water Exerciser Participant



Note: Blank data points indicate planned water exercise days. Participant age = 53, BMI = 22.7.

FIGURE 8

EMA Ratings of Consistent Water Exerciser Participant

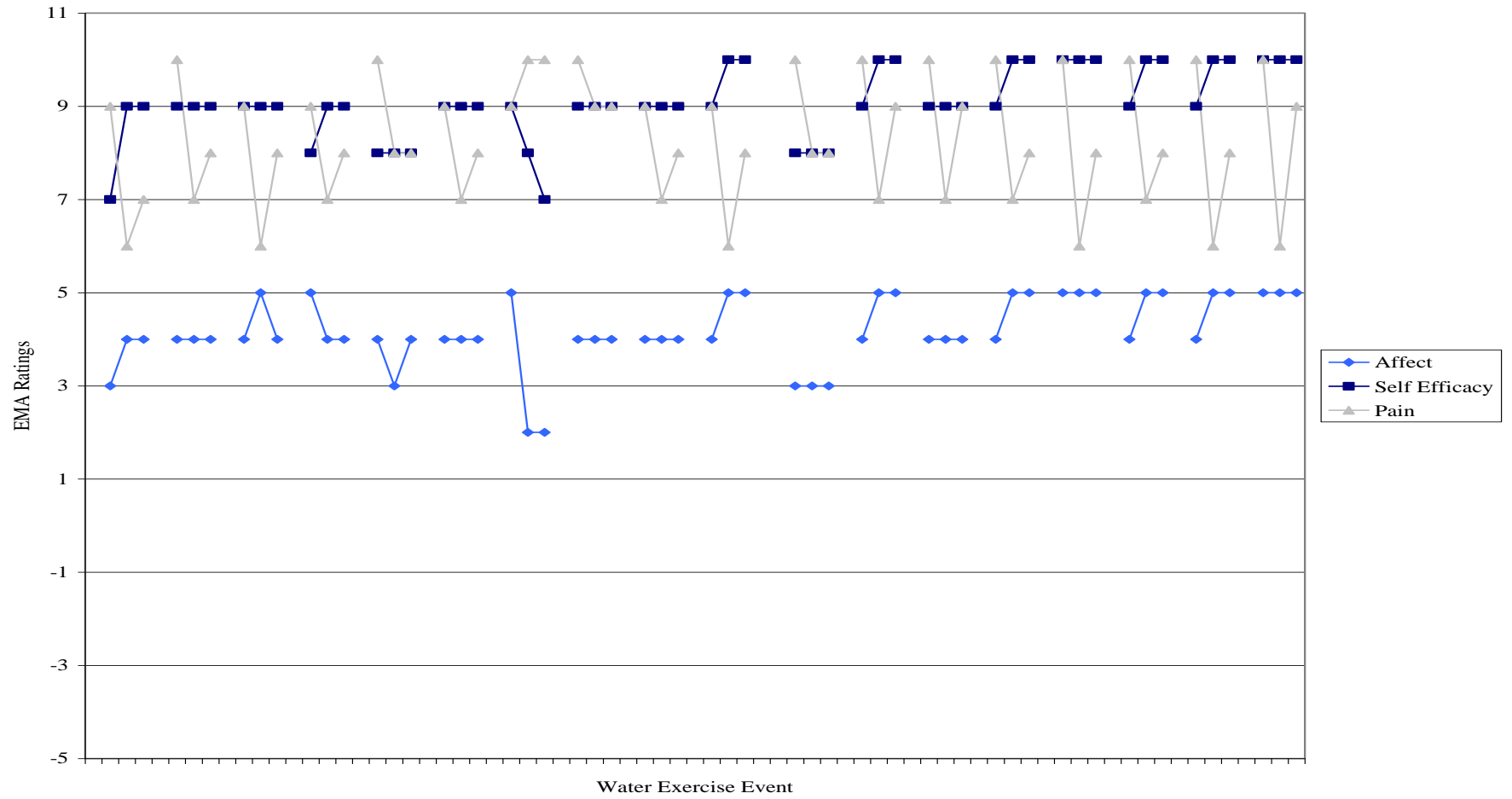
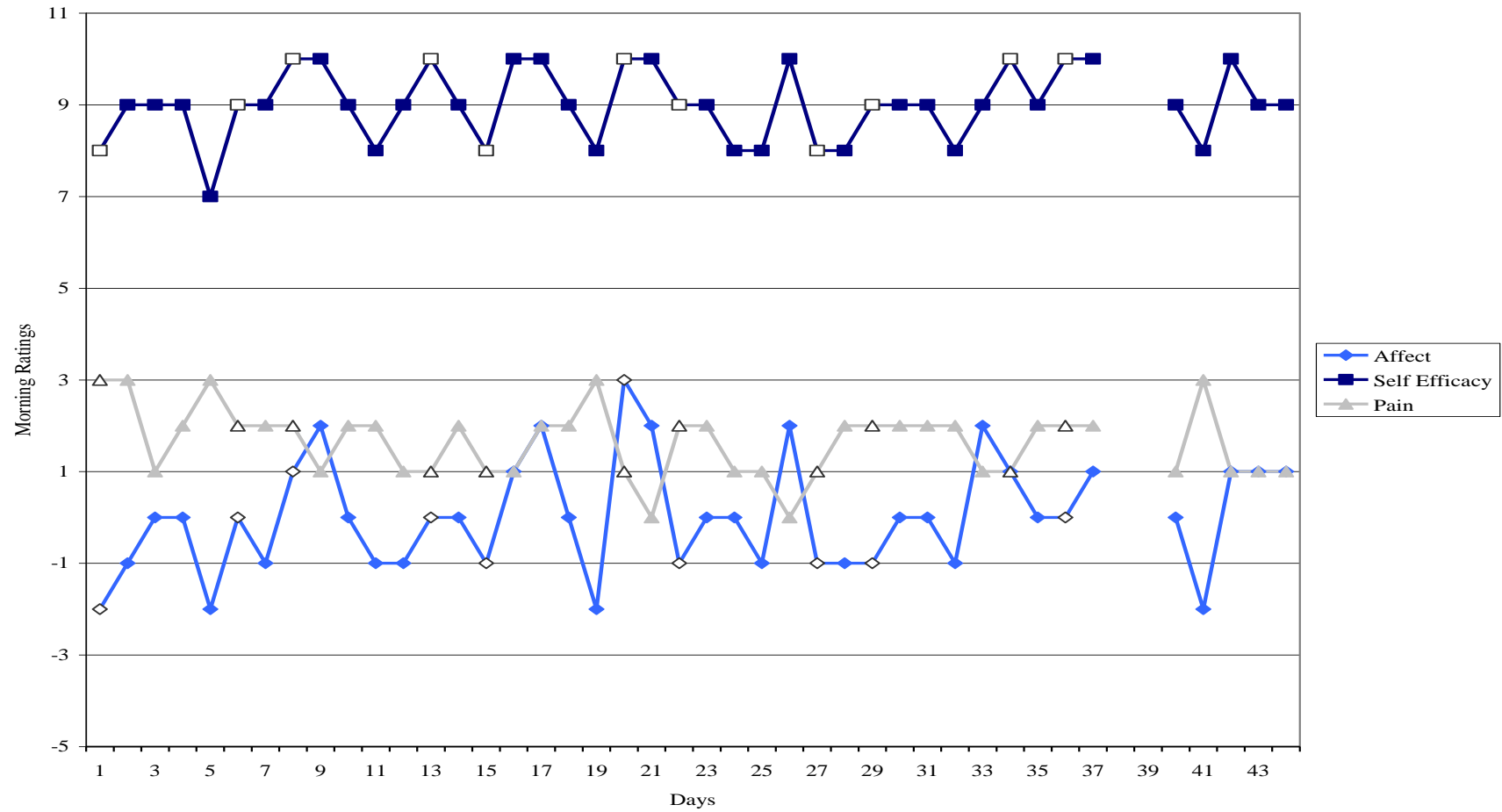


FIGURE 9

Morning Ratings of High Social Support Participant



Note: Blank data points indicate planned water exercise days. Participant age = 68, BMI = 24.0.

FIGURE 10

EMA Ratings of High Social Support Participant

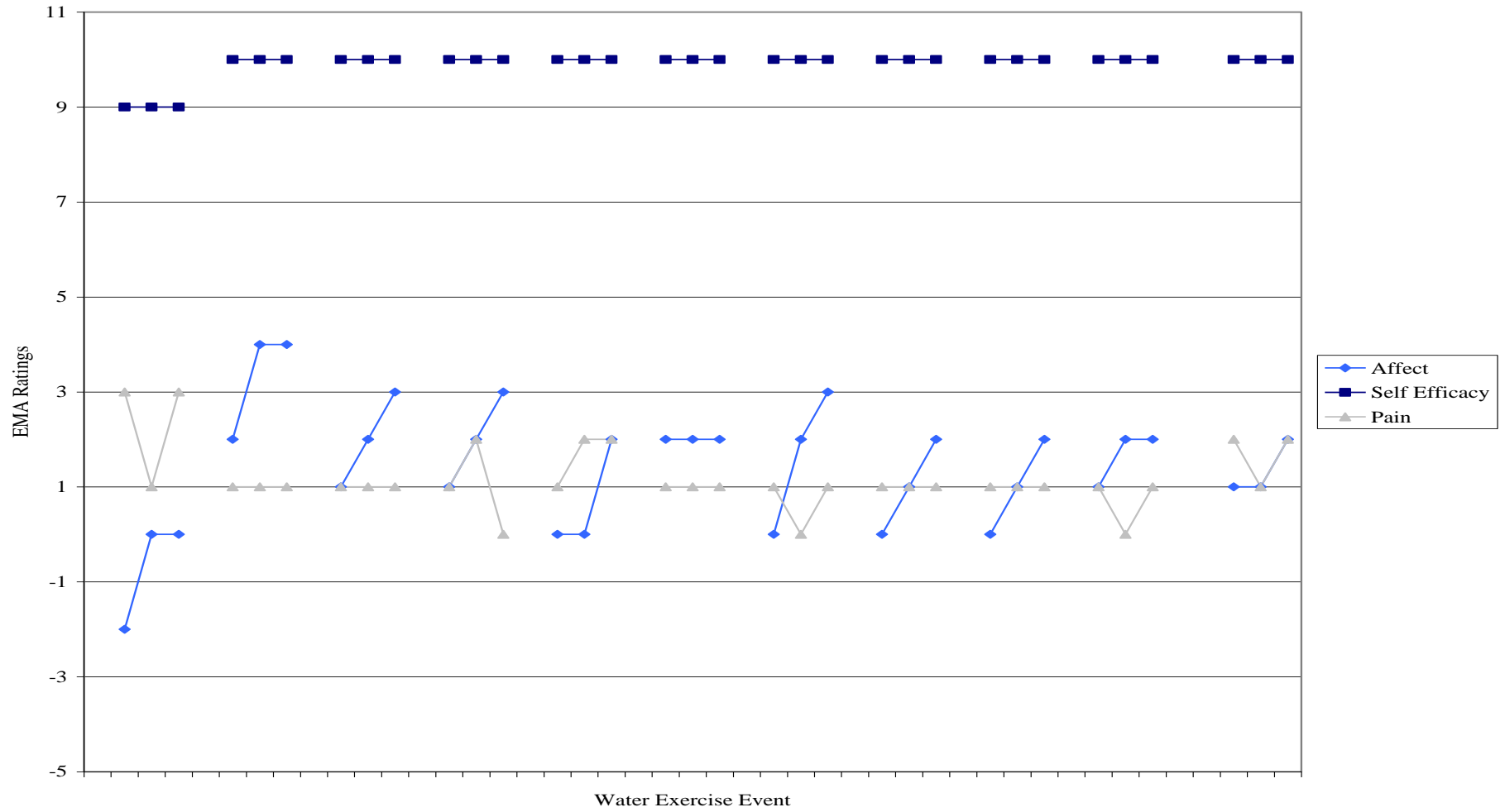
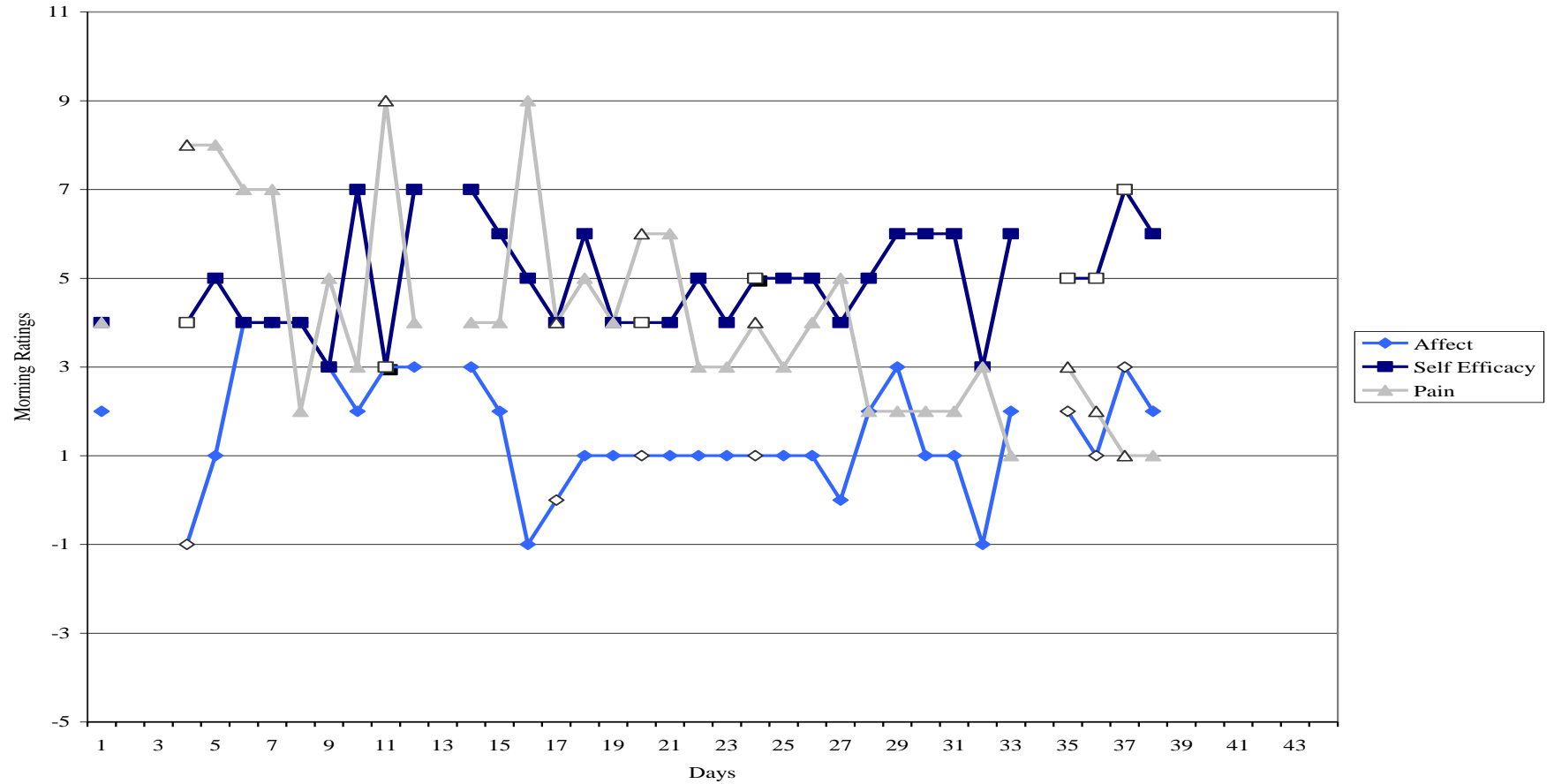


FIGURE 11

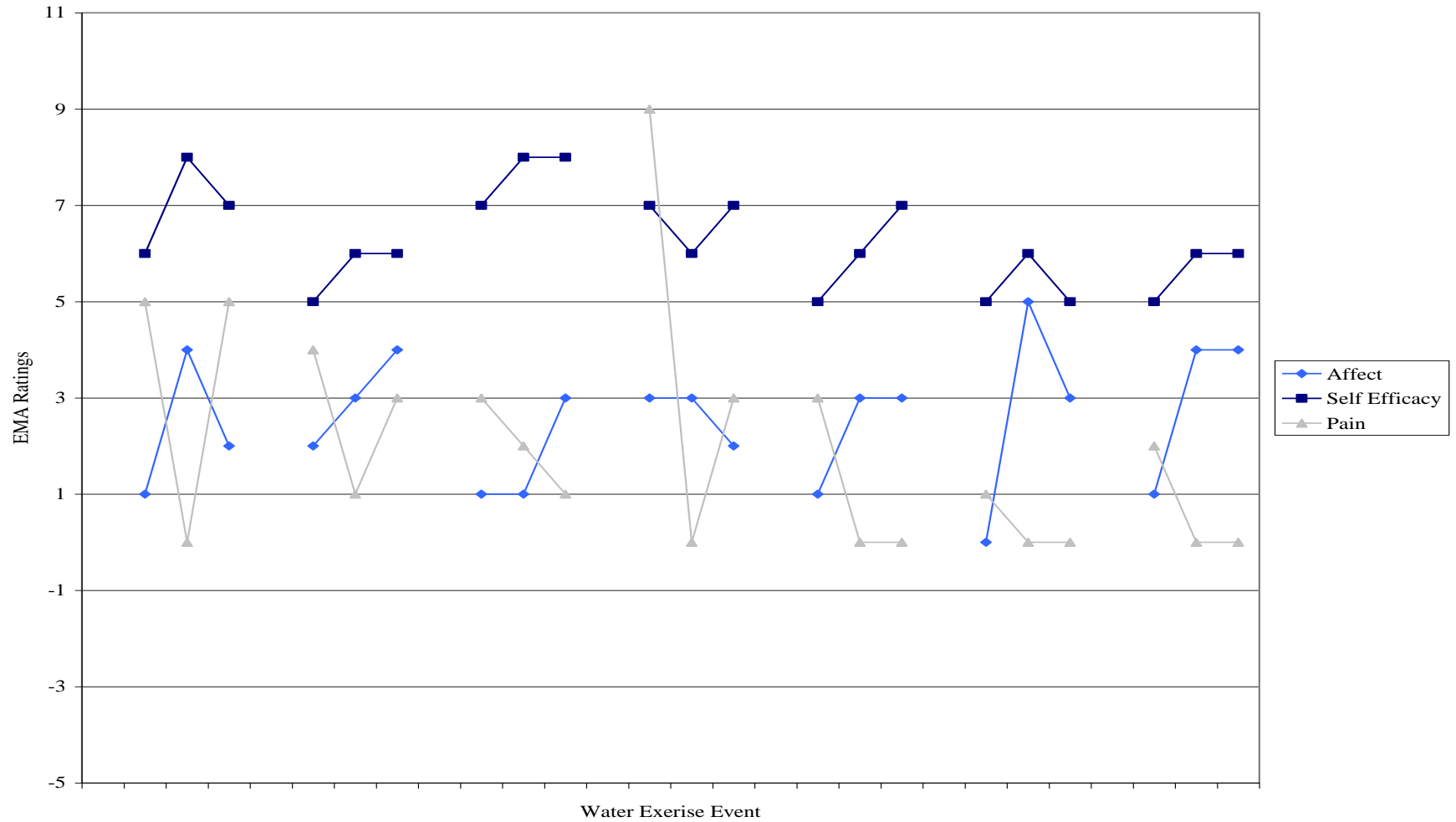
Morning Ratings of Inconsistent Water Exerciser Participant



Note: Blank data points indicate planned water exercise days. Shadowed points indicate participant did not engage in planned exercise. Participant age = 69, BMI = 19.2.

FIGURE 12

EMA Ratings of Inconsistent Water Exerciser Participant



APPENDIX A

Informed Consent Form

Virginia Tech Water Exercise Study
Center for Research in Health Behavior
Informed Consent

Introduction

This study is part of a research project at Virginia Tech. The information obtained will provide us with information regarding individuals' experiences with chronic pain conditions and exercise, reactions to physical activity, and other social-cognitive variables associated with physical activity (i.e. self-efficacy, self-regulation). In turn, this will help us to understand how to construct and facilitate tailored programs that will increase health behavior knowledge as well as improve overall health. This research project is developed by the Center for Research in Health Behavior at Virginia Tech. To participate in this study you must be at least 18 years of age and must have physician approval to participate in water-based exercise.

We are interested in learning more about the ongoing experiences of women with chronic pain who are currently involved in a water-based exercise routine. We will not be asking you to do or participate in any physical activity or exercise that you are not currently doing. We are interesting in learning about what you are currently experiencing.

What is involved?

At the start of the study, after verifying eligibility criteria for enrollment with your doctor, you will be asked to complete a set of forms at the Center for Research in Health Behavior at Virginia Tech. At this time, you will complete questionnaires about your health history, thoughts relating to physical activity as well as your current physical activity participation. This procedure is used to screen for pre-existing disease or other reasons you should not participate in this study. Your height and weight will also be measured at this time. Your body weight will be measured on a standard balance scale and will include the weight of light indoor clothing or hospital gown without your shoes.

Another meeting will be arranged to participate in an interview about your past experiences with physical activity, challenges to regular physical activity, your ideas about how having pain influences your physical activity level and how social support and your environment play a role in your activity level.

After the interview we will ask you answer three questions daily by phone and nine questions about your pain level, emotional reaction, and confidence level each time you engage in water-based physical activity. You will then report these answers to the researcher by phone at the end

of your exercise session. We will be asking you to make these ratings for 2 months when you do a water-based activity.

At the end of the two months, you will be asked to meet with the researcher at the Center for Research in Health Behavior to complete a final interview about the experiences with the study as well as questions about your thoughts relating to physical activity and your physical activity participation. Your height and weight will be measured again at this time.

Compensation for your participation will include a \$20 gift card provided at the end of the two month assessment period.

SUMMARY OF PARTICIPANT RESPONSIBILITIES

The participant should:

- Provide an accurate history of any health problems or medications you use before the study begins.
- Attend all of the scheduled on-site sessions.
- Maintain weekly contact with and reporting to project director.
- Follow all participant instructions for each session.
- Record and report your experiences with physical activity as instructed by the study investigators.

Is it confidential?

The information you provide to us will be kept entirely confidential and private. We will guard your privacy in this way: Your name or any contact information you provide will be held confidential and independent of your responses to any questions. A participant number will be assigned to your information. Only your participant number will be identified with your responses. After the completion of a taped interview, our staff will record your answers in writing and at that time we will destroy the audio recordings. We will keep all data in a password protected computer data base until it is analyzed and subsequently destroyed.

Is this voluntary?

Your participation is voluntary. You may decide at any time to discontinue participation. There is no penalty for deciding not to complete the study or for not answering any question. Simply inform the researcher of your desire to exit the study. Circumstances may arise causing the researcher to determine that you should not continue as a subject in the study. For example, lack of compliance to instructions, failure to attend on-site sessions and illness could be reasons for the researchers to stop your participation in the study.

Potential Risks/Benefits

Potential Risks:

There are no more than minimal risks involved in this study. We will not be asking you to do or participate in any physical activity or exercise that you are not currently doing. It is not possible to identify all potential risks in an experiential study; however the study staff will take all possible safeguards to minimize any known and potential risks to your well-being. We believe the overall risks of participation are minimal.

Potential Benefits:

Your responses could help us develop a program to improve exercise of people living in our area and across the country. For your time today, we would like to extend to you the opportunity to access the results of this study at your convenience through contact information that will be provided to you at the completion of this form. For your time you will be given items such as Virginia Tech water bottles or coffee mugs.

What will my responses be used for?

The information from this research may be used for scientific or educational purposes. It may be presented at meetings, published in books, or professional journals, or used for other purposes Virginia Tech's Department of Psychology considers proper in the interest of education, knowledge, or research. However, your name will not be used or associated with any aspect of this research.

Study Contact Information

This research has been approved, as required, by the Institutional Review Board for Research Involving Human Subjects at Virginia Polytechnic and State University and by the Human Subjects Committee of the Department of Psychology at Virginia Polytechnic and State University. You will receive a copy of this form to take with you. You may also call any of the following people at Virginia Tech if you have any questions:

Dr. Richard A. Winett, Dr. Eileen S. Anderson, or Elizabeth J. Johnson, CRHB Researchers	540.231.8747
Dr. David W. Harrison, Chair of Human Subjects Committee	540.231.4422
Dr. Robert S. Stephens, Chair of Psychology Department	540.231.6304
Dr. David M. Moore, Chair of Institutional Review Board	540.231.4991

Participant Permission

I have read the informed consent and fully understand the procedures and conditions of the project. I have had all my questions answered, and I hereby give my voluntary consent to be a participant in this research study. I understand that I may withdraw from the study at any time.

Name of Participant (please print) _____

Signature of Participant _____ Date _____