

PSYCHOMETRIC EVALUATION OF COMPUTER-ADMINISTERED TENSION
SCALES FOR WEIGHT MANAGEMENT
IN RURAL TELEHEALTH SETTINGS

By

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ABSTRACT

Background: Currently, measures are lacking to assess the parameters of the multifaceted problem of overweight and obesity. Earlier study suggests that measures are needed to assess overeating tension, exercise tension, and feelings tension as contributing factors to the obesity epidemic in America. *Purpose:* The purpose of this pilot study was to evaluate the computer-administration and psychometric analysis of the three tension scales, Overeating Tension, Exercise Tension and Feelings Tension, in three rural settings served by the University of Kansas Telehealth Program.

Methods: Computer-administration measures were evaluated for readability, content validity, usability, human-computer interface, and performance (Phase 1) and psychometric evaluations of internal consistency reliability and construct validity

were conducted with 61 participants (Phase 2). *Results:* Phase 1 established: readability at a 5th grade level using a linguistics expert; content validity using reversal theory experts, content validity index, and kappa score; usability, human-computer interface, and performance using expert evaluation; and participant evaluation. In Phase 2, internal consistency reliability and construct validity were supported. Participants with higher Body Mass Index (BMI; [kg]/height [m²]) had higher tension scores on the Overeating Tension, Exercise Tension, and Feelings Tension Scales compared to those with lower BMI. *Conclusions:* This study established the computer-administration, internal consistency reliability and content validity of the three scales. Future work will continue to establish convergent validity of these three scales and their ability to assess overeating tension, exercise tension and feelings tension in rural telehealth weight management patients.

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CHAPTER 1

Obesity in the United States (U.S.) has reached epidemic proportions. Two-thirds of all adults and one-fourth (Center for Disease Control [CDC], 2006) of all children are overweight (BMI 25-29.9) or obese (BMI \geq 30) (National Heart Lung and Blood Institute [NHLBI], 2000) despite a decade of national initiatives (Healthy People 2010 goals) to abate the growing problem. Obesity is a complex multidimensional chronic disease that involves social, behavioral, cultural, physiological, metabolic, and genetic factors (NHLBI, 2002), and that has been shown to reduce length of life by 5 to 20 years (Olshansky, Carnes, Hershov, Passaro, Layden, Brody et al., 2005).

This research addressed the obesity epidemic, weight management care within the underserved rural population, and the need for specific weight management outcome instruments for use with patients in rural communities. Individuals in underserved rural areas are more likely to be overweight or obese than their urban counterparts (Kempf, 2004). Rural areas also have received fewer health care dollars and have greater difficulties accessing care than their urban counterparts (Hartley & Gale, 2004; National Advisory Committee on Rural Health, 2002; National Rural Health Association, 2002). Telehealth delivery services have decreased the difficulties of access to care for obese patients seeking weight management interventions (Harvey-Berino, Pintauro, Buzzel & Casey Gold., 2004; Tate, Jackvony, & Wing, 2003; Womble, Wadden, McGuckin, Sargent, Rothman, & Krauthamer-Ewing, 2004).

The Healthy People 2010 goals specifically addressed increasing the proportion of adults who are at a healthy weight to 60 percent and reducing the incidence of obesity by 15 percent (U.S. Department of Health and Human Services, 2001). The NHLBI recommends three components for multifactorial weight loss programs—dietary therapy, increased physical activity, and behavioral therapy (National Heart, Lung, and Blood Institute, 2002). Research literature has not revealed sufficient evidence that multidimensional treatment programs lead to successful weight loss and maintenance in most individuals (American Gastroenterological Association, 2002). Lack of specific outcome instruments may explain the lack of evidence for weight management success. Traditionally weight management outcomes have focused on metabolic intake and output rather than what stimulates unhealthy responses (overeating, skipping exercise, feeling down or low) (Popkess-Vawter, Gajewski, & Yoder, 2005).

Reversal theory research has shown that increased tension is related to overeating (Popkess-Vawter, Gerkovich & Wendel, 2000). Tension is a feeling of discomfort—the difference between the way people feel and want to feel; the greater the difference, the greater the tension (Apter, 1989). Research literature and clinical practice suggest that unhealthy behaviors, such as overeating, skipped exercise, and feeling down, may be responses related to attempts to relieve high tension (Kramer, Luder, & Popkess-Vawter, 2004; Popkess-Vawter, et al., 2005; Rotenberg & Boucsein, 1993). Reliable and valid instruments that can measure what stimulates the unhealthy responses of overeating, skipping exercise and low esteem are needed in

weight management practices. Computerized weight management instruments can serve as baseline and progress assessment instruments for Telehealth programs in rural populations.

Purpose

The purpose of this study was to evaluate the psychometric properties of three computer-administered tension scales, the Overeating Tension Scale (OTS), Exercise Tension Scale (ETS), and Feelings Tension Scale (FTS), in three rural telehealth settings. Rural settings were chosen based on earlier studies of the underserved in rural Kansas where limited access to providers and high treatment costs prohibit adequate health care (Rural Health Association, 2002). Aims of study were to: (a) field test the readability, content validity, usability, human-computer interaction, and performance of three computer-administered tension scales (Phase 1); and (b) evaluate the internal consistency reliability and construct validity (convergent validity and hypothesis testing) of the tension scales (Phase 2).

The long-term goal of this research was to investigate the impact of overeating tension, exercise tension, and feelings tension in rural overweight populations. In Phase 2, a hypothesis testing technique was used to evaluate construct validity. The hypothesis tested was: Participants with higher body mass index (BMI) will have higher tension scores compared to participants with lower BMIs on the Overeating Tension, Exercise Tension, and Feelings Tension Scales (BMI; weight [kg]/height [m²]). Weight group comparisons also were evaluated.

Significance

Traditionally, the nursing discipline has focused on multidimensional, holistic care of individuals, families, groups, and communities (Powers & Knapp, 1995). Nursing knowledge development depends upon reliable and valid instruments to provide objective data for evaluation of patients and clients' responses to interventions (Sigma Theta Tau International, 2006). Instruments designed to assess emotional responses (tension) related to overeating, skipping exercise, and feeling down or low contribute to the evaluation of individuals' responses to multidimensional weight management interventions. Multidimensional, reliable, and valid weight management instruments will: (a) provide a means to collect new information that can contribute to nursing knowledge; (b) provide new holistic views of the obesity problem; (c) provide new suggestions in treating overweight and obese individuals; (d) provide support for improvement in weight management practice guidelines; and provide humanistic, holistic weight management care based on these newly developed guidelines. Knowledge gained from this study provided reliable and valid theoretically-based instruments to be used in future studies.

Future studies could explore other unhealthy behaviors using the tension scale prototype in rural and urban populations. Because obese rural populations are under studied, this study provided greater understanding of motivations for unhealthy behavioral responses among individuals in rural populations. Additionally, it provided a foundation for future obesity studies using the Kansas University Center for Telemedicine and Telehealth in rural areas. None of the reviewed studies targeted

rural-dwelling individuals for computer-administered assessment instruments for weight management. Computer-administered weight management instruments will be used to improve future telehealth weight management research, to individualize telehealth weight management patient care, and to assist in telehealth weight management patient education.

Framework

This study was guided by reversal theory (Apter, 1989), which explains motivations for overeating, skipping exercise, and feeling down or low. Reversal theory, a phenomenological theory of arousal, motivation, and action, posits that individuals' behavior is inherently inconsistent. Motivational states predict behaviors; frequent reversals between opposing motivational states is consistent with health (Apter, 1989). Additionally, reversal theory defines 'tension' as the discrepancy between what individuals are feeling and what they prefer to be feeling. The greater the discrepancy between preferred and felt feeling, the more tension individuals experience. Additional framework information is located in Chapter 2.

Assumptions

The following assumptions, upon which this study was based, reflect humanistic, phenomenological, and multidimensional frameworks: (a) humans are cognitive beings who vary in perceptions and reactions to common situations; (b) humans are multidimensional beings constantly impacted by internal and external biological, psychological, and spiritual factors; (c) humans desire and seek balance in

physical, mental, emotional, and spiritual aspects of their lives; and, (d) humans' perceptions of reality vary according to their beliefs and values.

Definitions

For the purpose of this study, the following terms were defined:

Area Health Education Center (AHEC) is a partner of the Kansas University Center for Telehealth and Telemedicine that provides health care services and education to patients in specified areas in the state of Kansas.

Body Mass Index (BMI) expressed as weight/height² (BMI; kg/m²), is commonly used to classify normal weight (20-24 BMI), overweight (25-29 BMI), and obesity (≥ 30 BMI)(National Heart, Lung, and Blood Institute, 2000).

Content Validity is an evaluation of the representativeness of a cluster of items in relation to the specified content domain (Waltz, Strickland & Lenz, 2005).

Feelings Tension is a feeling of unease or discomfort that occurs just before a time when individuals feel down or low, which is the uncomfortable experience of a discrepancy between what is felt and desired feelings.

Exercise Tension is a feeling of unease or discomfort that occurs just before individuals skip exercise sessions, which is the uncomfortable experience of a discrepancy between what is felt and desired feelings.

Health Information Technology (HIT) includes software, hardware or other technology that is used inside or outside the federal government to deliver, monitor, improve, supply information to, interface with, or use information from a patient care

encounter, including financial, clinical, or other information (U.S. Department of Health and Human Services, 2005).

Human-computer interaction is a discipline concerned with the intellectual frameworks, design, data gathering methods, evaluation and implementation of interactive computing systems for human use and with the study of major phenomena surrounding them (Hewett et al., 1996; Shneiderman & Plaisant, 2005).

Obese adults are 20 years of age or older with a BMI ≥ 30 (U.S. Department of Health and Human Services, 2001).

Overeating Tension is a feeling of unease or discomfort that occurs just before individuals overeat, which is the uncomfortable experience of a discrepancy between what is felt and desired feelings.

Overweight adults are 20 years of age or older with a BMI of 25-29 (U.S. Department of Health and Human Services, 2001).

Performance testing is a usability test that is characterized by having typical users perform a series of tasks where their speed, accuracy and success are closely monitored and measured (U.S. Department of Health and Human Services, 2003)

Readability is an estimation of the difficulty a reader may have in reading and understanding a paragraph, section or entire document on paper or the Web (Bailey, 2002).

Rural counties are those counties without urbanized areas in populations $\geq 50,000$, or with specific public density and commuting patterns (Hartley & Gale, 2004).

Telehealth is the use of electronic information and telecommunications technologies to support long-distance clinical health care, patient and professional health-related education, public health and health administration (Office for the Advancement of Tele-health and Tele-medicine, 2002).

Usability testing includes a range of tests and evaluations methods (automated evaluations, inspection evaluation, operational evaluations and human performance testing) that identify issues that inhibit effective use of a website or instrument (U.S. Department of Health and Human Services, 2003).

CHAPTER 2

Review of the Literature

The review of the literature is presented in five sections. The first section summarizes literature on the obesity epidemic in the United States (U.S.). The second section reviews multidimensional weight management strategies and Health Information Technology (HIT) in underserved rural populations. The third section focuses on the lack of weight management outcome instruments that reflect the psychosocial and spiritual dimensions pertinent to holistic weight management. The fourth section describes the framework for the study and the development of the Overeating Tension Scale (OTS), the Exercise Tension Scale (ETS), and the Feelings Tension Scale (FTS). The last section is a summary of recommendations for computer-administered instruments including; literacy levels and usability and human-computer interaction assessments.

The Obesity Epidemic

The scope of the obesity epidemic is expressed in the 1999-2004 National Health and Nutrition Examination Survey (Center for Disease Control, 2006) results that estimate 65 percent of U.S. adults are overweight and obese. The incidence of overweight adults increased from 23 to 30 percent and obese adults increased from 15 to 31 percent despite efforts to reduce the prevalence of obesity among adults to less than 15 percent as set forth in Healthy People 2010 goals. Prevalence of obesity is variable by race and ethnicity; 50 percent of African American adult women are obese, compared with 39 percent of Hispanic women and 31 percent of Caucasian

women (Center for Disease Control, 2005). For African American women this is an increase from 31 percent in 1976-1980, to 50 percent in 1999-2002 (Center for Disease Control, 2005). The obesity epidemic has affected those 18 years of age and below, with the incidence of overweight children rising from 7 to 16 percent and overweight adolescents from 5 to 16 percent (Center for Disease Control, 2005). A contributing factor to the obesity epidemic is lack of physical activity. The Center for Disease Control 2004 National survey reported that leisure-time physical activity had increased in the late 1990s, but then remained at the same level before declining from 32.8 percent in 2003 to 30.2 in 2004. In 2002 the percent of adults, 18 and older, who were inactive was higher for women than men and increased sharply with age. Of adults, 18 to 44 years of age, 30 percent of men and 35 percent of women were not physical activity (Center for Disease Control; National survey 2004).

Obesity is a complex multidimensional chronic disease that involves social, behavioral, cultural, physiological, metabolic, and genetic factors (National Heart, Lung, and Blood Institute, 2002). The ultimate goal of weight management is to prevent obesity and its comorbidities (cardiovascular disease, type 2 diabetes, cancer, respiratory diseases; (Serdula, Khan, & Dietz, 2003), which can be ameliorated through moderate, sustained weight loss (Bevoni, 2003; Center for Disease Control, 2004). Most behavioral weight management programs emphasize stimulus control techniques to decrease intake by dieting and behavior modification. These traditional approaches are usually one-dimensional and focus mainly on calorie reduction.

Few weight management programs take a holistic, multi-dimensional approach to lifestyle changes using strategies to correct any underlying overeating, lack of exercise, and feelings of being down and low (poor self-esteem). Most weight management programs place greater emphasis on eating, exercise, *or* psychosocial aspects, rather than *holistic* emphasis on *all three* dimensions. Many reasons have accounted for ineffective weight management—lack of time, inadequate training, labor intensity, and pessimism that intervention is futile (Bevoni, 2003; Galuska, Will, Serdula, & Ford, 1999). Weight management failures result from lack of *practical, long-term* treatments to address *holistic* influences of weight gain (biological, psychological, sociocultural, and spiritual) (Serdula et al., 2003).

Multidimensional Weight Management Programs

Successful programs are multidimensional, flexible, and more focused on internal motivations for overeating and not exercising regularly (Mellin, 1997; Tribole & Resch, 1995). Investigators emphasized that weight management should include biological, psychological and sociocultural treatments to normalize eating while separating physical from emotional hunger (American Dietetic Association, 2001; Serdula, Khan, & Dietz, 2003; Wolff, Crosby, Roberts, & Wittrock, 2000). Successful weight management programs are beginning to assist people with psychological concerns, in addition to usual strategies that concentrate on modifying behavior by differentiating stimuli before, during, and after eating (i.e., identifying stimuli other than hunger that trigger eating, monitoring amounts and conditions during eating, and rewarding appropriate actions).

Three health-promoting programs are based primarily on behavioral strategies; NHLBI treatment, Weight Watchers, and Brownell's LEARN program—*Lifestyle, Exercise, Attitudes, Relationships, and Nutrition*. One reason why these stimulus control or behavioral techniques have had limited success (Brownell & Rodin, 1994) is because they seek to control the diet and environment without considering eating as a coping mechanism to manage unpleasant feelings (Popkess-Vawter, Brandau, & Straub, 1998; Popkess-Vawter & Turner, 2001). Most programs claim to use cognitive restructuring, but only focus on thinking about food, relationships with others around food, and restructured thinking about hunger and satiation. Few current weight management behavioral approaches, cognitive restructuring, or combinations thereof, directly address how negative beliefs about self and irrational perceptions of the world could trigger negative self-talk with resultant overeating and no exercise responses (Bartlett, et al., 1996; Brownell, 1997; Wadden, et al., 1997).

One reason why stimulus control behavioral techniques have had limited success (Brownell & Rodin, 1994) is because they seek to control diet and environment without considering eating as a way to manage unpleasant feelings and tension (Popkess-Vawter, Brandau, & Straub, 1998; Popkess-Vawter & Turner, 2001). Most programs claim to use cognitive restructuring, but only focus on thinking about food, relationships with others around food, and restructured thinking about hunger and satiation. Cognitive restructuring is defined as reprogramming of negative, derogatory self-talk to positive, constructive self-talk. Self-talk is defined as

automatic thoughts in one's mind, often from parents, authority figures, religious teachings. Few programs directly address how negative beliefs and negative self-talk about one's shortcomings and interactions with others can repeatedly increase tension, distort attitudes, and lead to negative behaviors, such as overeating and skipping exercise.

The Center for Disease Control (2006) listed psychological disorders as one of the health risks associated with obesity, along with the physical comorbidities listed earlier. Examples of psychological disorders were depression, eating disorders, distorted body image, and *low self esteem*. Approximately 20 to 30 percent of obese individuals seeking weight reduction at university clinics suffer from binge eating disorder (National Heart, lung, and Blood Institute, 2000). Depression, anxiety, low esteem and binge eating disorder can be associated with suboptimal weight loss, though findings have been contradictory (National Heart, lung, and Blood Institute, 2000). The greater individuals' distress or depression, the more chaotic their eating pattern, and the more likely they are in need of psychological or nutritional counseling (National Heart, lung, and Blood Institute, 2000). These factors are important for describing and differentiating individuals with histories of anorexia nervosa, bulimia nervosa, or binge eating disorder should be referred for specialized care during weight loss (National Heart, lung, and Blood Institute, 2000).

Several non-dieting weight management programs focus on emotional overeating, including the 12-step Overeaters Anonymous (OA) (2003), the religious-oriented Weigh Down Workshops (Shamblin, 2003), the Solution Method of

developmental skills (Mellin, 1997), and Intuitive Eating (Tribole & Resch, 1995). These non-dieting programs place greater emphasis on psychological, sociocultural, religious, and spiritual aspects of losing and maintaining healthy weight without over-emphasizing dieting and exercise and constant monitoring of both.

Review of clinical literature revealed that advanced practice nurses were advocating holistic strategies (Ammon, 1999; Bollinger, 2001; Dossey, 2001; Keller, Overland & Hudson, 1997). White (2000) presented holistic strategies for nurse practitioners in weight management practices. Integrated medicine combines complementary, alternative, and body-mind-spirit practices with mainstream biomedical practices. In the holistic approach of integrated medicine, attention to the spiritual dimension is as important as other dimensions to promote health and healing. Some of the values of holistic and integrated approaches are: a holistic view of mind, body and spirit; viewing and treating patients as a unique human beings; personal supportive relationships between healers and patients; active roles for patients in the healing process; inherent healing power of the living organism; lifestyle and habit changes as tools to optimize health; acceptance for unconventional interventions and models that appear to work; openness to prayer, meditation, and spiritual practice as tools for healing; integration of physical, psychological, and spiritual practices (Moss, 2002).

One type of holistic weight management is the Holistic Self-care Model for weight management, which is based on a series of empirical studies and clinical applications (Popkess-Vawter, 1993; Popkess-Vawter, Brandau, et al., 1998;

Popkess-Vawter, Gerkovich, & Wendel, 2000; Popkess-Vawter & Turner, 2001; Popkess-Vawter, Wendel, Schmoll, & O'Connell, 1998; Turner, et al.; (Popkess-Vawter, Gajewski, & Yoder, 2005). The holistic self-care strategies, entitled "BIO Intervention" guides reprogramming of lifestyles using a "type" of biofeedback—Balance from the Inside Out. Spiritual BIO strategies are daily meditative practices of inner quieting and reading to connect with a spiritual presence. Self-regulation through cognitive self-talk BIO Strategies are used to encourage listening to physical cues (hunger, satiation), raising awareness of negative self-talk triggers, and promoting positive self-talk to balance mind, body, and spirit. Holistic approaches attend to the spiritual dimension as equally important as other dimensions to promote health and healing.

Health Information Technology (HIT) and the Rural Underserved

Health Information Technology is a "tool which holds much promise for improving the quality of care Americans receive by preventing medical errors, providing clinicians with better clinical decision-making tools, sharing information with other clinicians involved with the treatment of their patients, tracking health outcomes and coordinating public health activities" (Office for the Advancement of Telehealth [OAT], 2002). The widespread adoption of the internet has been the largest change in the way consumers access health information, receive telehealth care and diagnostics, and purchase pharmaceuticals. Key issues that affect telehealth delivery include the lack of reimbursement; legal issues; safety and standards; privacy, security and confidentiality; and telecommunication infrastructure.

Lack of access to care and services has contributed to ineffective weight management in rural settings. Rural counties, about 20% of the U.S. population (Center for Disease Control, 2004), are defined as those without urbanized areas in populations $\geq 50,000$, or with specific public density and commuting patterns (Hartley & Gale, 2004). Rural residents face geographic differences in socio-economic conditions, occupations, environments, and medical resources (Macduff, 2001; Williams, 2002). Rural residents are more likely to engage in risky health behaviors than urbanites; rates of smoking, alcohol consumption, and habitual overeating are higher in rural areas (Eberhardt et al., 2001; Fowler, 2002).

Kempf (2004) reported 74 percent of 4,000 adult patients from 28 Kansas clinics to be overweight or obese, with the highest obesity prevalence among adults ages 50-59 years (men=50%, women=57%). Adjusting for age, overweight prevalence in Kansas family practice clinics paralleled the national average (31.4%); however, obesity prevalence was almost 43 percent compared to 31 percent nationally. Rural areas received 42 percent fewer dollars for health services and 50 percent fewer social service funds for per capita than the U.S. as a whole (Hartley & Gale, 2004; National Advisory Committee on Rural Health, 2002; National Rural Health Association, 2002).

Investigators and policymakers have overlooked unique circumstances relevant to rural areas, resulting in fewer services for health promotion and improvement (Eberhardt et al., 2001). Rural Health Information Technology access has advanced because of decreased prices of technology and services, such as

improved funding and benefits that resulted from passage of the Balance Budget Act of 1997. Health Information Technology innovations pose a possible alternative for access to weight management care.

The University of Kansas Medical Center established the Center for Telemedicine and Telehealth as a pioneering effort to improve health care services for underserved Kansans more than a decade ago. The original Interactive TeleVideo (ITV) connection spanned 300 miles from Kansas City to Hays, Kansas for cardiology consultations with pediatric patients. Services evolved into a telehealth network of 66 interoperable facilities featuring 35 different clinical specialties. This network connects the most clinically underserved and financially underprivileged communities with quality health care services. This study is aligned with the mission of the Telehealth Center, “to improve access to clinical services across the lifespan for rural Kansans and assess quality of care received via interactive televideo” (Office for the Advancement of Telehealth, 2004). In partnership, computer versions of the Tension Scales were tested using established sites, patients, hardware, and nursing personnel of the Telehealth services. Adult medicine subspecialty clinics provide direct services for rural adults who otherwise would need to travel hours to receive care. Rural Kansas parallels national statistics, with the national number of specialists per 1,000,000 population at 54.6 providers as compared to 190 in urban areas (National Rural Health Association, 2002). Access to such specialty care increases patients access to the latest medical advances and decreases long-term morbidity.

Since 2004, a six-month Telehealth Weight Management Program has been offered by a Clinical Nurse Specialist who gives weekly clinical ITV visits for adult patients and monthly ITV group discussions. As part of a faculty practice, Holistic Self-Care Weight Management principles were applied in an ITV modality for patients from rural Horton, Sedan, and Cedar Vale (Kansas) - established Kansas telehealth clinical sites. The ITV model used cognitive restructuring strategies for decreasing overeating, increasing exercise, and increasing self-esteem. Mailing of forms and personal visits for pre- and post- testing were problematic and indicated the need for computer applications of psychometric testing. Pilot work for expanding weight management services through ITV resulted in the need for computer pre- and post- testing of those patients served. Computer-administered psychometric testing was needed to evaluate health care interventions. This study evaluated the readability, content validity, usability, human computer interaction, performance and psychometrics of three tension scales used in healthy weight management interventions .

The Lack of Specific Outcome Instruments

Standard instruments of progress and success used in traditional one-dimensional weight management programs include physical measures of height, weight, BMI, percent body fat (caliper, bioimpedance, dual-energy x-ray), calorie intake, and energy output (VO^{2max} ; Bastarrachea-Sosa, et al.,1999; Mathur & Lee, 2004). Body mass index, or BMI (weight in kilograms divided by the square of the height in meters), is promoted by the World Health Organization (1998) as the most

useful epidemiological measure of obesity. BMI is the standard measure of overweight and obesity used in most national studies (Tolonen, Wolf, Jakovljevic, Kuulasmaa & European Health Risk Monitoring Project, 2002). To calculate BMI, weight and height measurements are required, thus making this standard measure convenient and accurate to perform. A major drawback of the BMI measure is it does not account for the distribution of body fat, resulting in variability in different individuals and populations (Tolonen, et al.).

Waist circumference, however, is a simple and practical measure for identifying central adiposity, and preferred for measuring abdominal obesity associated with increased cardiac risk, in combination with BMI (James, 1996; World Health Organization, 1998). Waist circumference remains the most inexpensive and simplest measure for visceral fat mass (*women >35 inches, men >40 inches*), compared to more expensive and complex estimates using tomography (James, 1996), dualenergy x-ray absorptiometry (DEXA) (Samaras & Campbell, 1997), hydrostatic weighing, and deuterium dilution (Bokermann, 2004; Woodward, Oliphant, Lowe, & Tunstall-Pedoe, 2003). This study will use the convenient and less obtrusive BMI as the descriptive measure to classify participants' overweight and obesity.

Multidimensional instruments of progress and success in psychological and sociocultural aspects of healthy lifestyle changes in weight management are less prevalent compared to physical measures. Most self-esteem, body image, and anxiety instruments are too general to guide weight management research and practice (Popkess-Vawter, Gerkovitch, & Wendell, 2000). Some instruments used in weight

management research have a few items specific for emotional overeating, including the Three-Factor Eating Questionnaire (Stunkard & Messick, 1985) and the Situational Appetite Efficacy and Urge Measures (Stanton, Garcia, & Green, 1990). The limitation of these two, and most instruments used in weight management research, is the lack of specificity to understand explicit stimuli associated with overeating and other unhealthy behavioral coping responses.

There are currently no existing instruments that measure exercise tension before the exercise session is skipped. More than 100 exercise performance instruments were reported in the literature including: Canada's physical activity monitor (Craig, Russell, & Cameron, 2002); the simple index for the European Prospective Investigation into Cancer and Nutrition study (EPIC) (Wareham, Jakes, Rennie, Schuit, Mitchell, Hennings, & Day, 2003); and Minnesota Leisure Time Physical Activity Questionnaire (Slinde, Arvidsson, Sjoberg & Rossander-Hulthen, 2003). These examples all contain a number of questions on physical activity designed to rank participants according to level of physical activity. Most instruments have been created to measure the physical activity situation or the exercise behavior itself. Missing from the weight management measurement repertoire are instruments to assess emotional responses that may trigger unhealthy behavioral responses (skipping exercise, feeling down; Popkess-Vawter, et al. 2000).

Popkess-Vawter used reversal theory (Apter, 1989) as the theoretical basis to explain increased tension as a precipitating factor of overeating. Five instrument development studies were conducted to establish reliability and validity of the

overeating tension scale (Popkess-Vawter, et al., 2000). After two instrument development studies ($N=373$, $N=208$), 48 items were refined and reduced to 32 (four each for eight states). Two more studies ($N=330$, $N=130$) provided internal consistency reliability ($\alpha=.70-.93$) using normal weight and overweight women participants. Construct validity was supported using hypothesis testing that overweight participants reported higher overeating tension than those normal weight [$F(1, 126) = 7.12, p < .009$]. The Overeating Tension Scale (OTS) has sufficient reliability and validity to measure tension *before* overeating (rather than on situations and eating behaviors themselves) and motivation-specific feelings preceding overeating. Currently, there are no reliable or valid instruments of tension related to exercise and feeling down or low, which capture other multidimensional aspects of weight management.

Self-esteem instruments currently used in research include the Rosenberg Self-esteem scale (RSES), the Self-Worth Protection Scale (SWPS), the Visual Analogue Self-Esteem Scale (VASES) and the Body Esteem Scale (BES) (Brumfitt & Sheeran, 1999; Franzoi, 1994; Schmitt & Allik, 2005; Thompson & Dinnel, 2003). The Rosenberg self-esteem scale (RSES), chosen for this study, has 10 items that assess individuals' overall evaluation of worthiness as a human being (Rosenberg, 1979). Other qualities of the RSES include its long-standing reliability and validity, ease of administration, and short completion time (Schmitt & Allik, 2005). Other self-esteem instruments, although reliable and valid, focused on less pertinent views of

esteem or body esteem and did not reflect the RSES view of overall self-esteem needed for testing concurrent validity of the Feelings Tension scale.

Svebak (1993) also used reversal theory as the theoretical basis to explain increased tension and developed the Tension and Effort Stress Inventory (TESI). The TESI is a one page, 24-item survey instrument of individuals' experiences of stressors, moods, and efforts to cope. According to reversal theory, "a stressor is any source that gives rise to the experience of unpleasant emotions and enduring moods referred to as tension-stress, whereas effort-stress is the term, of the actions that are taken to reduce or overcome tension-stress" (Svebak, 1993, p191). The term "tension-stress" refers to "pushing oneself, or the exertion of willing power to reduce the tension that is provoked by a stressor" (p. 195).

The TESI assesses four domains of life stress: work, family, finance, and one's own body. Although there was growing support that the TESI was a reliable and valid instrument of participative experiences related to stressors, it lacks specificity for discrepancies between desired and actual feelings, as operationalized by Apter's theory. Instruments that assess the triggers of skipping exercise and feeling down or low were needed to assess holistic weight management interventions developed by Popkess-Vawter (2001). Apter's reversal theory and the derived theoretical framework that guided this study and the development of the Overeating Tension Scale are reviewed.

Theoretical Framework

This study guided by reversal theory (Apter, 1989) explains motivations for overeating, skipping exercise, and feeling down or low. Reversal theory has guided research studies for 30 years in smoking cessation, sexual risk taking, exercise adherence, and eating-disordered and exercise-dependent triathletes (Blaydon, Lindner, & Kerr, 2004; Keele-Smith & Leon, 2003; O'Connell, et al., 2004; Pain & Kerr, 2004). Reversal theory is a phenomenological theory of arousal, motivation, and action, in which personality is inherently inconsistent and individuals reverse between opposing metamotivational states.

Motivations exist in pairs of serious/playful, compliant/defiant, mastery/sympathy, and other-centered/ self-centered) (Appendix A1). When in the serious state, individuals are serious-minded, goal-oriented, and prefer low levels of arousal (feeling relaxed). In the playful state, individuals are playful, spontaneous, and prefer high levels of arousal (feeling pleasantly excited). When in the compliant state, people prefer to go along with rules and regulations; while in the defiant state, they prefer to break rules and want to be rebellious or noncompliant. When in the mastery state, individuals feel that being tough and being in control are important; while in the sympathy state they feel that being tender and not competing are important. In the other-centered state, individuals think of others before themselves; while in the self-centered state they think of themselves first and put others after themselves.

All motivational states have associated pleasant and unpleasant feelings, including pleasant feelings: calmness (serious), excitement (playful), free (defiant), and hardy (mastery). No/low tension is associated with pleasant feelings because individuals feel the way they want to feel. Examples of unpleasant feelings (medium/high tension) within each state are anxiety (serious), boredom (playful), trapped (defiant), and soft (mastery).

Tension results when a discrepancy occurs between what individuals are feeling and what they prefer to be feeling; greater discrepancies show more tension. Tension reported in earlier studies includes feeling anxious while grading papers under a deadline, bored while driving long hours to make job calls, and feeling out of control after an argument (Popkess-Vawter, et al., 1998). Reversal theory explains inconsistent behaviors, specifically for this study about why overweight individuals rigidly adhere to weight loss regimens for a while; succumb to overeating and skipping exercise; and regain lost weight (Popkess-Vawter & Owens, 1999; Popkess-Vawter, Wendel, Schmoll, & O'Connell, 1998; Wendel, 1999).

Tension could be one reason why overweight individuals are inconsistent in managing weight as depicted in Figure 1. Beginning at the left of Figure 1, overweight individuals may not be feeling the way they want to feel (cognitions), with a medium to high tension emotional response, and unhealthy behavioral responses of overeating, skipping exercise, and feeling down or low. Conversely, when they feel the way they want to feel, low or no tension emotional responses occur with healthy behavioral responses eating for hunger only, exercising regularly,

and feeling up. For the purpose of this study, tension is the participants' self-reported preferred and actual feelings when responding to specific incidences of overeating, skipped exercise, and feeling down or low.

Figure 1.

Theoretical Framework for Overweight Individuals' Tension, Emotional, and Behavioral Responses

Cognitions	↔	Emotional Responses	↔	Behavioral Responses
Not feeling how want to feel		Med/ high tension		- Overeating - Skipping exercise - Feeling down/low
Feeling how want to feel		Low/ no tension		+ Eating for hunger only + Exercising regularly + Feeling up/high

Development of the Overeating Tension Scale

Descriptive, correlational studies and instrument development studies of the Overeating Tension Scale (OTS) are summarized here to provide empirical psychometric evidence for the tension prototype used in all three tension scales. Popkess-Vawter developed and tested the OTS in the 1990s. The investigator developed and tested the exercise and feelings tension scales in collaboration with research mentor Popkess-Vawter during the early 2000s. Popkess-Vawter studied with Apter, Reversal Theory's co-creator, and O'Connell a Reversal theory expert, to develop an overeating tension scale.

The instrument format used for the Overeating Tension Scale is a semantic differential that reflects motivational states and related pleasant and unpleasant feelings. Semantic differential scales use bipolar terms to provide item ratings that sum to become subscales within the composite scale (Osgood, Suci, & Tannebaum, 1975). The instrument development blueprint for the OTS required six bipolar terms

generated for each of the eight reversal theory motivations to describe pleasant and unpleasant feelings (48 total terms). Terms originally were chosen directly from a list of feeling words and their antonyms found in the 1989 Apter text. Six opposing pairs of feeling words, chosen in collaboration with Apter and other reversal theory experts, most clearly and accurately represented each of the eight motivations. Two content experts attested to content validity that all words in the scale accurately represented the theory and were understood at the eighth grade level.

The unique feature of the Overeating Tension Scale is that it focuses on tension before overeating rather than the situations and eating behaviors themselves. The scale also reveals specific motivation-related feelings that precede overeating. Limitations of the instrument include the specific focus of tension as a psychological influence on unhealthy behavioral outcomes. Other contributing factors of obesity, such as environmental, hereditary, socioeconomic, and physiological factors, are not assessed by the scale.

The first exploratory overeating study conducted by Popkess-Vawter et al., determined how reversal theory (Apter, 1989) explained overeating (Popkess-Vawter, Wendel, Schmoll, & O'Connell, 1998). A qualitative study was conducted with normal weight ($N=15$), overweight ($N=10$), obese ($N=20$) women who were asked to describe motivations and related feelings before overeating (Popkess-Vawter, Brandau, et al., 1998). Overweight and obese women reported having unpleasant feelings (tired, bored, lonely, anxious, tense, stressed, angry, angry, frustrated, disappointed, abandoned, and depressed) that preceded their overeating. Normal

weight participants reported a majority of pleasant overeating situations (holiday celebrations and social occasions with family and friends). Only a few overweight and obese women reported having pleasant or neutral feelings before overeating, compared to over half of the normal weight participants during such pleasant overeating situations (Popkess-Vawter, Brandau, et al., 1998).

Study one focused on item reduction testing and included 201 females and 172 males of Euro-American and African-American descent. The college students self-rated themselves as 43% normal weight, 44% over weight and obese and 13% underweight. The participants recalled “a time during the last month when they overate” (Popkess-Vawter, Brandau, et al., 1998). Overeating defined as “eating more than usual, often accompanied by a feeling of physical discomfort” (Popkess-Vawter, Brandau, et al., 1998). Internal consistency of the eight subscales for the OTS, were estimated by calculating the coefficient alpha for discrepancy scores. An alpha coefficient greater than or equal .70 was considered acceptable evidence of internal consistency (Nunnally & Bernstein, 2005). Two items from each of the eight subscales (16 total) were omitted by using the ‘alpha-if-deleted’ correlations. The resulting 32-item version of the scale had alpha coefficients that ranged from .74 to .88 (Popkess-Vawter, Gerkovich, & Wendel, 2000).

Study two tested the content validity and internal consistency of the OTS. Content validity was assessed in two rounds by four experts knowledgeable in reversal theory for at least 8 years. The experts identified which of the eight motivations each item of bipolar feeling works belonged and whether the feeling

works of each item were theoretically representative, accurate and complete from the instrument blueprint with agreement set by a content validity index of .80 (Waltz, Strickland, & Lenz, 1991). Reversal theory coauthor, Apter, was consulted to help with revising the lowest item-total correlations from each subscale. After two rounds of testing there was 100% agreement. Two hundred and eight college students participated in testing the internal consistency reliability. Demographic were similar to the first study. The revised 32 item scale had alpha coefficients ranging from .69 to .87 on the eight subscales. The range of item-to-total correlations was .33-.83 (Popkess-Vawter, et al., 2000).

The third study evaluated construct validity by testing the tension construct of the OTS in contrasted groups representing pleasant and unpleasant feelings in serious and playful motivations. The scale was tested in three situations (a) at a social gathering for college faculty and staff ($N=110$), (b) at summer and fall enrollment at a college ($N=110$), and (c) at a major examination in a school of nursing ($N=110$). The structure of the scale remained the same except that any reference to overeating was removed and replaced with how they were feeling presently. The internal consistency of eight subscale tension scores was estimated by calculating alpha coefficients for the three individual samples and the combined samples, which ranged from .74 to .93 (Popkess-Vawter, et al., 2000). Item-to-total correlations ranged from .52 to .89.

Study four tested the OTS in tension-specific overeating situations with normal weight and overweight women (contrasted groups). The Hypotheses that overweight participants would have higher tension before an overeating occasion

compared to normal weight participants. The participants completed questionnaires, including demographic, Overeating Tension Scale, Marlowe-Crowne Social Desirability Scale, and the Bulimia Test (BULIT). The Marlowe-Crowne Social Desirability Scale (Crowne & Marlowe, 1960) was used to describe the degree to which participants responded to the Overeating Tension Scale in "culturally sanctioned ways" (versus according to their true feelings) just before an overeating episode.

The Social Desirability Scale is a 33-item, self-report, true and false scale. The scale is a well-established instrument used in many studies to correlate social desirability scores with the scores of the instrument in question. Possible total scores range from 0 to 33 (there are no subscales); higher scores indicate highly socially desirable responses. Internal consistency reliability for the Social Desirability Scale in study IV was satisfactory ($\alpha=.82$).

The Bulimia Test (BULIT) (Smith & Thelen, 1984) was used to test convergent validity of the Overeating Tension Scale. The BULIT is a 32-item, self-report, five-point multiple-choice scale used to distinguish among individuals with bulimia, those at risk for binge eating, and those with no eating problems (Popkess-Vawter & Owens, 1999). Possible total scores range from 32 to 160 (there are no subscales); individuals who score high (102 and above) are classified as having a probable diagnosis of bulimia.

The BULIT was used as a measure of convergent validity because 30 of 32 items are about overeating patterns, binges, feelings, food, weight, and loss of control.

Test retest reliability for the BULIT test was reported to be $r = .87, p < .001$, and validity coefficients in clinical and non-clinical samples were $r = .82, p < .001$ and $r = .54, p < .001$, respectively (Smith & Thelen, 1984). Thelen, McLaughlin-Mann, Pruitt, and Smith (1987) reported the BULIT to have positive predictive value of .74, negative predictive value of .84, specificity of .89, and sensitivity of .64 for identifying individuals with bulimia in college populations. Internal consistency reliability for the BULIT test in study one was satisfactory ($\alpha = .85$).

Participants of study four were 62 normal weight and 68 overweight adult females with a mean age of 35 years. The normal weight group had a mean weight of 131 pounds ($SD = 14.9$) and the overweight group had a mean weight of 164 pounds ($SD = 28.9$). On average, participants had 16 years of education and were employed. Two-thirds of participants were married, while the remaining third had never married or were divorced. Participants mainly were Euro-American (81%) and the remaining were African-American (9%) and Mexican American (6%); a few participants were Asian and Native American. Participants' height, marital status, and years of education were not significantly different between weight groups.

There was evidence that participants were not reporting socially desirable answers on the Overeating Tension Scale and their answers could be interpreted as reflecting their true feelings just before an overeating episode. Participants had a mean score of 16.53 ($SD = 5.8$) on social desirability (range from 3 to 31) (Crowne & Marlowe, 1960). Total social desirability scores were not significantly correlated with total tension scores ($r = -.069$). There was sufficient evidence of the internal

consistency of the Overeating Tension Scale with alpha coefficients ranging between .70 and .93 on subscales. The range of item-to-total correlations was .22 to .99.

There was support for construct validity based on hypothesis testing as participants in the overweight group reported higher levels of total overeating tension ($N = 67, M = 48.84, SD = 29.27$) than normal weight participants ($N = 61, M = 35.54, SD = 26.94$) [$F(1, 126) = 7.12, p < .009$]. There was evidence that specific motivations carried higher overeating tension than others. In the defiant motivation, overweight participants' overeating tension scores ($N = 25, M = 21.28, SD = 9.14$) were significantly higher than normal weight participants ($N = 22, M = 14.41, SD = 12.26$) [$F(1, 45) = 4.82, p < .033$]. In the self, centered sympathy motivation, overweight participants' overeating tension scores ($N = 34, M = 18.88, SD = 9.44$) were significantly higher than normal weight participants ($N = 34, M = 10.82, SD = 12.07$) [$F(1, 66) = 9.40, p < .003$]. Additionally, there was evidence for convergent validity with a significant Pearson's correlation ($r = .327, p < .01$) between scores on the Overeating Tension Scale and the BULIT Bulimia Test.

To generate further support for construct validity, the 32 items from the Overeating Tension Scale were factor analyzed using unweighted least squares. Three criteria were used to determine the number of factors to rotate: the a priori hypothesis that the instrument had eight dimensions, the Scree test, and the interpretability of the factor solution. The Scree plot indicated that the initial hypothesis was incorrect and seven dimensions were apparent. Using the "10 participants per variable rule," two

Varimax rotation procedures were used (half of the total items (16) multiplied by 10 would require about 160 participants).

The first Varimax rotation procedure used the 16 discrepancy items from the serious, playful, compliant, and defiant motivational states. The second rotation procedure used the 12 discrepancy items from the self-centered mastery, self-centered sympathy, and other-centered sympathy. The eighth motivational state, other-centered mastery, had insufficient numbers to include in the analysis. The rotated solutions yielded seven interpretable factors with factor loadings ranging from .72 to .95. There were no items that cross-loaded on other factors. These four studies produced preliminary evidence of the reliability and validity of the Overeating Tension Scale. The findings support use of the scale to distinguish between motivations and feelings before overeating in overweight and normal weight women.

Clinical and pilot work led Popkess-Vawter to view tension not only as a precipitating factor for overeating, but also for decreased exercise and poor self-esteem (Kramer, Luder, & Popkess-Vawter, 2004; Popkess-Vawter, et al., 2005; Rotenberg & Boucsein, 1993). Reliable and valid instruments related to antecedents of unhealthy responses of skipping exercise and feeling bad about self were not found in an extensive literature review; thus, the investigator developed the Exercise Tension Scale and Feelings Tension Scale under the supervision of her mentor Popkess-Vawter.

Development of the Exercise and Feelings Tension Scale

Development of Exercise and Feelings Tension Scales took place during the Measurement Strategies in Nursing Research (NRS 955) course of the investigator's doctoral nursing program. Although these scales focused on different healthy lifestyle behaviors, the same tension scale format, patterned after the established Overeating Tension Scale (OTS), and development process were used. Common developmental processes are presented for both scales; any different processes used for separate scales are detailed. Four steps taken to develop the norm-referenced Exercise-Tension: 1) selection of a theoretical model; 2) explication of objectives for the instrument; 3) development of the blueprint; and 4) scoring and procedures of the instruments (Waltz, Strickland & Lenz, 2005). The scales were then reviewed for content validity and revisions were made.

Selection of a theoretical framework began with an extensive literature search for a framework that explained the relationships among tension and skipping planned exercise and feeling bad about self. The search revealed no instruments that focused on antecedents of skipping exercise and feeling bad about self. The decision was made to adapt the reversal theoretical framework that guided development of the OTS as it explained tension as the discrepancy between feelings felt and desired. Using the time frame of within the last month, the Exercise Tension Scale focused on how individuals felt "just before skipping a planned exercise session" and the Feelings Tension scale focused on "just before feeling bad about self". Instructions were adapted to have participants identify how they felt just before skipping a planned

exercise session and feeling bad about self to capture the antecedent feelings that preceded the behavior.

The original format of the OTS remained the same for the blueprint of the two Tension scales, which included the eight motivational states, each with six bipolar terms that measures the amount of tension. Scale title and instruction stem for the overeating tension scale were changed from, “Just before overeating...” to the exercise tension scale and stem “before choosing not to exercise ...”, and the feelings tension scale and stem “before I felt down or low I was”. Scoring procedures remained the same as the original instrument. Content and expert validity were explored by having the tension scales reviewed by one lay individual and one reversal theory expert. Both individuals found the instruments to be clear, representative of the test blueprint and guidelines, and appropriate for overweight and obese populations. Wording revisions on the Exercise Tension scale were made in response to the expert’s suggestion that the stem be changed from “before choosing not to exercise” to “before choosing to skip a planned exercise session.

A pilot test determined the feasibility of administering the three tension scales in paper and pencil format and generated exploratory descriptive data for refinement of the computer versions planned for future instrument development studies. Participants in the pilot study were 17 normal weight and overweight female volunteers at a nursing educational program focused on weight management. Participants verbally related that the three tension scales were relevant for recalling incidents within the past month when they overate, skipped exercise, and felt down or

low. They related that completing the scales helped them realize how emotions often triggered unhealthy responses. Some were confused about marking both how they felt and how they wanted to feel on the paper and pencil versions, which confirmed that the computerized version could avoid such confusion using electronic routing.

Pilot study findings were: (a) before overeating, participants' tension was significantly associated with feeling anxious and uneasy (serious state), isolated and uncomfortable (compliant state), resentful (sympathy-self-centered), and guilty (sympathy-other-centered), similar to findings in earlier overeating tension studies; (b) before skipping planned exercise, participants' tension was significantly associated with feeling anxious and uneasy (serious), isolated and uncomfortable (compliant), trapped and restricted (defiant), resentful (sympathy-self-centered,) and guilty (sympathy-other-centered); and (c) before feeling down, participants' tension was significantly associated with feeling isolated and uncomfortable (compliant) and guilty (sympathy-other-centered). Findings suggested that a different set of unpleasant feelings (tension) was associated with overeating, skipping exercise, and feeling down or low. The three scales were used in an electronic format in this study.

Computer Adaptation of Scales

Electronic formatting for all three scales was expected to improve several complicated administration issues presented in the paper and pencil format. Additionally, computer-administered scales was expected to better meet the needs of evaluating baseline and progress assessments of rural participants in weight management programs. One advantages of the computer-administered version of

tension scales over the paper and pencil version is the automated routing, which routes respondents to the next part of the questionnaire once they have chosen only one response. The routing feature omits the problem with the paper and pencil version that resulted in duplicated or skipped responses.

According to the theory, only one motivational state of a subscale is engaged at a time (serious/playful, compliant/defiant, mastery/sympathy, other/self). Although instructions ask them to respond to only one state, participants in preliminary studies sometimes responded to both, resulting in lost data. Another advantage is that data were processed directly and quickly from analysis files created directly in Access, downloaded into Excel and then to Statistical Program for the Social Sciences (SPSS).

Limitations of computerized instruments include a potential threat for some participants who lack computer skills and physical skills using the computer. A safeguard used in this study that provided for any skill limitations among participants was having the investigator seated adjacent to each participant to answer questions or to help them “step back” should they change their minds about a routed choice. Another limitation of computerized instruments is added cost. Costs for developing and administering computer applications were reduced through partnership with the established KU Telehealth program; the investigator was provided with potential participants, professional and technological assistance, and sites for this study, which helped to minimize financial constraints. Adaptation of the three tension scales to computer format is described as follows.

A computer programmer with an Information technology background was consulted in transforming the paper and pencil versions of the three scales to electronic versions. Three steps were used in this process. First, the paper and pencil pages of the scales were formatted according to electronic style and then linked (routed) to the next appropriate electronic page so participants could answer question seamlessly. For example if a respondent choose a paratelic metamotivational state over a telic metamotivational state, the computer would take the respondent to the electronic paratelic questions page instead of the unselected telic page. This routing feature of the computer eliminates confusion that the paper and pencil version respondents had in past administrations.

The second step involved changes in the presentation of the instructions of the scale and the color of the electronic pages so that they were aesthetically pleasing. The third step involved the investigator, mentor, and programmer testing the password-protected website to verify that they were routed to the appropriate electronic page. During this test, it was established that there was no link to return to the main page of the site; the programmer resolved the problem by adding a link to the main page at the end of each scale. The three scales were then ready to be pilot tested.

Readability, Usability and Human-computer Interaction

The ideal reading level of instrument used in the healthcare field has decreased from an eight grade level to a fifth grade reading level (D'Alessandro, Kingsley & Johnson, 2001; Gottlieb & Rogers, 2004; Waltz et al., 2005). And

according to Waltz, et al., (2005), instruments or forms administered by computer or internet “ideally should not be above a fifth grade reading level and should consider the health and capabilities of the target population” (p. 352). In this study, the goal of a fifth grade reading level was founded on studies and patient promotional materials ranging from the fifth to seventh grade, which is suited for diverse cultural populations (D'Alessandro, Kingsley & Johnson, 2001; Gottlieb & Rogers, 2004).

The Research-Based Web Design and Usability Guidelines were developed by the Communication Technologies Branch (CTB) of the National Cancer Institute (NCI) in the U.S. Department of Health and Human Services (U.S. Department of Health and Human Services, 2004). These Guidelines were developed to provide the best available evidence to website designers, managers, and others involved in the creation or maintenance of websites. The Guideline created to provide information in an efficient and effective manner to patients, health professionals, investigators and the public, were developed as quantified, peer-reviewed design guidelines using a seven-step process: (a) the initial set of guidelines was developed from existing web guidelines, published research, test reports and lessons learned, resulting in over 500 guidelines; (b) the set of guidelines was reviewed by expert consultants to reduce the guidelines to 398; (c) the relative importance of each guideline was then established by 16 web designers and usability specialists in the field using a Likert-type scale of ‘Extremely important’ to ‘Not Important’; (d) the guidelines were reduced to 287 by eliminating those who scored as having little importance and clarification was given to those that needed it based on suggestions from the reviewers; (e) the “Strength of

Evidence' for each guideline was established by eight researchers from a variety of fields that have influence in web design. A five-point scale was established from 'Strong Research Support' (5) to 'Weak Expert Opinion Support' (1) was established and the guidelines were rated using what currently existed from the research literature or expert opinion; (f) graphic examples were found for each of the guidelines to ensure clarity of the user; and (g) 20 website designers grouped the guidelines into categories to help users with clarity. Usability and human computer interaction needs to be established when administering instruments by computer, along with evaluating the instruments reliability and validity (Brooke, 1996; Jordon, Thomas, Weerdmeester, and McClelland, 1996; Waltz, Strickland & Lenz, 2005).

When developing or adapting current instruments to the computer, interaction principles should be used. Shneidermans' rules (1989) of human-computer interaction design are incorporated in the Guidelines Rules: (a) strive for consistency; (b) offer informative feedback; (c) design dialogs to yield closure; (d) offer error prevention and simple error handling; (e) permit easy reversal of actions; (f) support internal locus of control; and (g) reduce short-term memory load (Schneiderman, 1989).

The Expert Usability and Human-Computer Interaction Checklist (Appendix A6) used in this study was adapted from the NCI Guidelines and Schneiderman's rules. The example below shows how the Expert Usability and Human-Computer Interaction Checklist's item one and two under 'Optimizing the user experience' is taken directly from the guidelines chapter titled "Optimizing the user experience" items five and thirteen. The phrase "Consistency" and "Reduce short term memory load" show how item one and two

also represent principles from Shneidermans' principles of human-computer interaction design.

Participant usability and human-computer interaction was assessed using the System Usability Scale (SUS) and the Participant Opinion Survey. The System Usability Scale (participant) measures effectiveness, efficiency and satisfaction of a system and covers content of: (a) the need for support, (b) the need for training (c) and complexity of the system (Brooke, 1996). The higher the score on the SUS the more user friendly and thus greater usability. The Participant Opinion Survey measures the clarity, completeness, significance, ease of completion and amount of time to complete the each of the scales.

Performance testing, as discussed by Shneiderman and the Guidelines, was assessed in this study. Performance testing is a usability test that is characterized by having typical users perform a series of tasks where their speed, accuracy and success are closely monitored and measured (U.S. Department of Health and Human Services, 2003). The goal is to identify issues that inhibit completion of the instruments. The Performance Record used in this study posed questions about length of completion time for each instrument, general procedures, and observed difficulty, as assessed by the investigator (Appendix A3). Participant's length of completion time for each instrument, comments and questions about each instrument and procedure and any observed difficulties, were noted by the investigator.

CHAPTER 3

Methodology

The purpose of this study was to evaluate the psychometric properties of three computer-administered tension scales, Overeating Tension, Exercise Tension, and Feelings Tension, in three rural Telehealth settings. The study was divided into two Phases: (a) Phase 1 was a field test of the readability, content validity, usability, human-computer interaction, performance, and participant evaluations of three computer-administered tension scales; and (b) Phase 2 was an evaluation of internal consistency reliability and construct validity (convergent validity and hypothesis testing) of the tension scales. Community-wide recruitment using local media (newspaper, flyers, e-mails) was used in both Phases. Additional recruitment was from established Interactive Television (ITV) rural health programs offered through the Kansas University Telemedicine (funded grant HRSA #H2A TH 01061). Sufficient numbers of participants were recruited based on estimates by the Directors of Telehealth and Area Health Education Center (AHEC) Telehealth nurses for both Phases of study.

Participants and Settings

Phase 1 was a convenience sample of six volunteers who lived in rural Horton, Kansas (Brown County). Ten participants were originally estimated to be adequate for a field test of the three computer-administered tension scales (Lancaster, 2004; VanTeijlingen & Hundley, 2001) however, saturation (no new results coming forth) was obtained with six participants. Phase 2 of study was conducted with a

convenience sample of 61 volunteers who lived in rural Pittsburg, Kansas (Crawford County) and Sedan, Kansas (Chautauqua County). The power analysis elaborated on in the Phase two section. Since the majority of adults are overweight (65%), they were targeted for the study to provide preliminary feasibility data for future studies in weight management. Children were not studied since the Instruments focus on adult responses. Recruitment of participants, in cooperation with the AHEC Telehealth Nurses, was targeted at ethnic/racial distributions of each geographic area.

Horton has a population of 11,020 with 2,446 (22%) over the age of 65 and 2,960 (27%) under the age of 18. The median household income is \$20,964; 16% of the population has an income below 100% poverty and 43% below 200% poverty. Residents of Brown county are Caucasian (89%), American Indian (9%), and African American (2%) (U.S. Census Bureau, 2002). Most residents have a high school education (85%); 19% have Bachelor's degree or higher (U.S. Census Bureau, 2002). There are currently 10 physicians in the county, with a patient/physician ratio of 1102:1. Pittsburg has a population of 35,986 with 7,057 (20%) over the age of 65 and 8,203 (23%) under the age of 18. The median household income is \$19,620; 18% have income below 100% poverty and 44% below 200% poverty. Residents of Crawford county are Caucasian (97%), American Indian (1%), and African American (2%). Most have a high school education (85%); 24% have Bachelor's degree or higher (U.S. Census Bureau, 2002). There are currently 41 physicians in the county, with a patient/physician ratio of 877:1. Chautauqua county (Sedan) has a population of 4,109 with 986 (24%) over the age of 65 and 821 (20%) under the age of 18. The

median household income is \$33,468; 38% of individuals below 100% poverty.

Residents of Chatuaqau county are Caucasian (95%), high school education (81%);

12% have Bachelor's degree or higher (U.S. Census Bureau, 2002).

Participant Recruitment and Procedures

Recruitment and procedures for Phases 1 and 2 were conducted in cooperation with the Area Health Education Center (AHEC) Telehealth Nurses. Potential participants called their local Telehealth Nurse in response to local media advertisements, giving their names, phone numbers, and a time they could be reached. The Telehealth Nurse emailed or called potential participants information to the investigator. Rural residents are accustomed to scheduling appointments with Telehealth Nurses; this procedure avoided long distance telephone calls for participants to inquire about the study.

Recruitment screening forms included the Telephone Script for Recruitment and the Procedural Checklist (Appendix A2). The Telephone Script for Recruitment was used by the investigator to standardize the screening procedures when returning the participants' calls. The Investigator explained the study in detail to participants, answered questions, established that participants met study criteria, and scheduled appointment times at local clinics. Entry criteria for both Phases included (a) women and men, (b) ages 21 or older, and (c) English-speaking, reading, and writing at a 5th grade level or above. Exclusion criteria for both Phases included those who self-reported being pregnant, having any illness/health process that could influence weight loss/gain (anorexia, bulimia, psychosis), or those taking medications that might affect

psychological perceptions measured in the study (steroids; anti-psychotic medications, e.g., tricyclic antidepressant medications for psychological disorders; insulin for diabetes mellitus).

At the appointed time, potential participants arrived at the clinic and were escorted by the investigator to a private room. Entry and exclusion criteria were verified in person and recorded on the Procedural Checklist. Participants' questions were answered and consents were signed and copied for those who were qualified and consented. Fifth grade reading levels were confirmed for all participants using the Slosson reading list. All participants correctly read aloud 20 of 40, 46-font words listed on four pages. The investigator informed participants that similar words are used in study questionnaires, thus requiring them to read the list (Appendix A3).

The investigator measured participants' height and weight (no shoes or excess clothing) to calculate BMI, and recorded results on the Procedural Checklist. The same digital scale rated with an accuracy of .05 +/- of a pound was used in Horton and Pittsburg. To test the scales' calibration, it was used three consecutive times to see that it got the same result to the nearest hundredth of the pound. Height was measured for Horton and Pittsburg participants by placing and measuring tape with the zero end touching the floor, taped flat against the wall, and secured above (82 inches). Participants stood with their backs to the tape measure and height was read at the closest inch.

In Sedan participants were all weighed on a electronic hospital scale with a capacity of over 500 lbs and accuracy rating of .01 +/- of a pound. Three weight

measurements were taken in a row to determine weight to the nearest hundredth of a pound. Height was measured on the same hospital scale using the traditional attached measurement bar. All participants' Body Mass Index (BMI) were assessed using measured height and weight plotted on the NIH/NIH BMI chart and recorded on the Procedural Checklist.

After completing physical instruments, participants were asked to sit along side the investigator at a computer; the investigator was seated adjacent to participants at all times. The investigator determined if participants were comfortable using the computer mouse; two individuals opted to be shown a demonstration; the investigator entered responses for one participant. Participants were assigned confidential identification numbers in the same order as their arrival for data collection. The investigator used three alternate orders of the questionnaires (using a randomized table) to control for response set. The eight computer-administered measures included: the three Tension Scales, BULIT bulimia scale, International Physical Activity Questionnaire, Rosenberg Self-Esteem scale, Tension and Effort Stress Inventory, and the Marlowe-Crowne Social Desirability scale (Appendix B8). The procedural checklist (demographics) was placed last in all three orders; none of the three tension scales were administered sequentially or next to their counterpart TESI instrument (OTS with Overeating TESI, ETS with skipping exercise TESI, or FTS with low esteem TESI). No instrument was in the same order position in two administration versions.

In Phase 1 (Horton), participants concluded testing sessions by completing two additional pencil-and-paper forms (System Usability Scale; Appendix A7 and Participant Opinion Survey; Appendix A8). The investigator double-checked the Procedural Checklist, on which all procedures are listed, to assure completion of all measures. Participants were thanked for their participation and given a ten-dollar gift certificate to a local store. Participants were reminded that they could withdraw at anytime and that withdrawal would not influence their care in the Telehealth Program.

Access to the laptop computer required an access code to activate the computer, which was known only by the investigator. Data from the program were stored directly into the KUMC data base via the internet in order to reduce entry errors. Data were backed up on a flash drive. Computers, flash drives, and participant forms kept in the investigator's locked cabinet.

Phase 1: Readability, Content Validity, Usability, Human-Computer Interaction, Performance, and Participant Evaluations

Phase1 included six evaluation steps to establish: (a) readability, (b) content validity, (c) usability, (d) human-computer interaction, (e) performance, and (f) participant opinion. Instruments for Phase 1 included the Expert Readability Checklist (literacy level; Appendix A4), Expert Content Validity Checklist (reversal theory content; Appendix A5), Expert Usability and Human-Computer Interaction Checklist (usability and interaction; Appendix A6), and Performance Record (completed by the investigator; Appendix A9). Participants in Phase 1 also completed

the System Usability Scale (SUS; Appendix A7) and the Participants' Opinion Survey (clarity, importance, ease, timing, logistics; Appendix A8).

Literacy level

The literacy goal was to establish readability of the three computer-administered Tension scales at the fifth grade reading level. The fifth grade level was chosen based on similar studies, patient promotional materials, computer-administered instrument suggestions and psychometric guidelines that suggest a fifth grade level is suited for diverse cultural populations (Gottlieb & Rogers, 2004; Waltz, Strickland & Lenz, 2005).

The Literacy expert, Massengill, assessed each word of the scales and recommended changes to assure the fifth grade level; she used the Expert Readability Checklist that has yes or no ratings (Appendix A4). Among all three instruments, the directions, 47 descriptive words and phrases and 64 feeling words were examined for reading level and clarity. "No" ratings were revised in consultation with the expert until she rated all items "Yes" and subsequently were revised in an iterative process between the content experts and investigator.

Content Validity

Content validity is defined as the extent to which an instrument adequately samples the research domain of interest when attempting to measure phenomena (Carmines & Zeller, 1979; Waltz, Strickland, & Lenz 1991; Wynd, Schmidt & Schaefer, 2003). Various numbers of content experts are recommended for this process, from three (Lynn, 1986) to twenty (Gable & Wolfe, 1993; Tilden, Nelson, &

May, 1990; Waltz et al., 2004). However, the experts' experience, history of publication in refereed journals, scholarly presentations, and research on the phenomenon should provide the ultimate guide on the number of experts necessary for content validation (Grant & Kinney, 1992; Grant & Davis, 1997; Waltz, Strickland & Lenz, 2004).

Of the four reversal theory experts who evaluated the content validity of the tension scales, three had evaluated the original Overeating Tension Scale (OTS). Experts included Dr. Apter, author of reversal theory, and three scholars who had conducted research based on reversal theory. Experts came from England, Canada, and the United States, thus increasing chances of identifying colloquial terms that would be inappropriate for the scales (Grant, Kinney & Guzzetta, 1990; Grant & Davis, 1997).

The content experts judged 47 descriptive phrases and 64 feeling words on the tension scales for representation of the content domain, reversal theory accuracy, relevance, sufficiency, and clarity (Berk, 1990; Lynn, 1986; Grant & Davis, 1997; Waltz, Strickland & Lenz, 2005). They used a 4-point rating scale, including choices of: (1) not accurate, (2) somewhat accuracy, (3) quite accurate, and (4) very accurate (Polit & Beck, 2006); responses were recorded on the Expert Content Validity Checklist (Appendix A5). The 111 items needed ratings of a 3 or 4 from all experts to be considered a representative item (Lynn, 1987). Items rated a 1 or 2 were revised according to experts suggestions and then re-evaluated as needed. Reversal theory experts also rated the overall theoretical relevance and completeness of each tension scale (Grant & Davis, 1997).

Scale Content Validity Index Averaged (S-CVI/Ave), is the proportion of items rated relevant (3 or 4) across experts (Polit & Beck, 2006). Ideally, if all items are given ratings of 3 or 4 by all raters, interrater agreement would be perfect and the value of the S-CVI/Ave would be 1.00. A S-CVI/Ave of .90 was used as acceptable agreement between experts (Polit & Beck, 2006, Waltz et al., 2005).

The limitations of CVI proportion agreement includes chance inflation of agreement (Cohen, 1960) and overestimates true agreement dependent upon the number of raters and number of categories (Garvin, Kennedy, & Cissna, 1988; Suen Ary, 1989; Topf, 1986; Waltz et al., 1991; Wynd, Schmidt & Schaefer, 2003). For these reasons, the multi-rater kappa coefficient of agreement was calculated also to further evaluate the content validity and random effects of the scales (Wynd, Schmidt, & Schaefer, 2003).

The kappa statistic [$k = (P_o - P_e) / (1 - P_e)$] was used to calculate percent agreement remaining after chance agreement is removed ($k \geq .60$ acceptable). Rather than comparing the total proportion of agreements (P_o) to a maximum value of 100%, the total is compared to a maximum possible value that accounts for agreements occurring by chance alone ($1 - P_e$), given the marginal distribution of item ratings assigned by each expert panelist (Musch, Landis, Higgins, Gilson, & Jones, 1984). P_e is the proportion of agreements expected to occur by change alone, and $(P_o - P_e)$ represents the observations for which there are “real” agreements versus chance agreements. (Wynd, Schmidt & Schaefer, 2003).

Computer Adaptation of Scales

The goal of standardizing procedures for computer-administered measures is fraught with challenges, including the degree of help needed by participants, the order of questions answered, the subscales chosen by participants, and the amount of environmental distraction (Dillman, 2000; Waltz et al., 2005). Electronic formatting for the three scales improved several complicated administration issues inherent in the paper and pencil format. Additionally, computer-administered instruments can better meet the needs of evaluating baseline and progress assessments of rural participants in weight management programs.

Two advantages of the computer-administered version of tension scales over the paper and pencil version included automated routing and automatic data entry. The automated routing feature routes respondents to the next part of the questionnaire once they have chosen only one response. This feature omits the issue with the paper and pencil version that resulted in duplicated or skipped responses. According to reversal theory, only one motivational state is engaged at each point in time (serious/playful, compliant/defiant, mastery/sympathy, other/self). Although instructions ask them to respond to only one state of a subscale, participants in preliminary studies sometimes responded to both or all, resulting in lost data. Another advantage is that data are processed directly and immediately from the keyboard strokes of participants to create data files in the Access program (Microsoft, 2007) and stored in online servers. Later, data are transferred into the Statistical Package for Social Sciences version 15 (SPSS, 2005).

Limitations of computerized instruments include a potential threat for some participants who lack computer and physical skills to use a computer. A safeguard used in the study to provide for any skill limitations among participants was to have the investigator seated adjacent to participants to answer questions or to help them “step back” to make change, which only occurred with four participants. Another limitation of computerized instruments is the added cost. Costs for developing and administering computer applications were reduced through partnership with the established KU Telehealth program; the investigator was provided with potential participants, professional and technological assistance, and study sites, which all minimized financial constraints. Adaptation of the three tension scales to a computer format is described as follows.

Internet Technology Development

Internet technology personal support is critical during and after development: programming, linking, and multiple revisions and refinement will be necessary during this process. A computer programmer was consulted in transforming the paper and pencil versions of the three scales to the electronic versions. A “mock up” was created for each page of the website for the technology designer to format using programming code. Participant options were linked (routed) to the next appropriate electronic page so the participant could continue answering question on the scales. For example, if participants choose a paratelic metamotivational state over a telic metamotivational state, the computer routed a link to the electronic paratelic questions page instead of the unselected telic page. This routing feature of the

computer eliminates confusion that the paper and pencil version respondents had in past administrations.

The second step involved changes in instructions presentation using font sizes and colors that were easily read and aesthetically pleasing. The third step involved the investigator, mentor, and programmer testing the password-protected website to verify appropriate routing of electronic pages. During testing, adjustments were made to assure contiguous linkages for all scales to be pilot tested. One helpful feature of computer administration, incomplete data fields not allowing participants to advance until all items are completed, was not achieved due to financial and time restraints. This feature helps to avoid missing data and will be installed post-study for future use of the Tension scales. The presence of the investigator throughout participants data entry prevented missing data for this study.

Usability and Human Computer-interaction

Usability includes a wide range of evaluation methods (automated evaluations, inspection evaluation, operational evaluations and human performance testing) to identify issues that inhibit effective use of a website or instrument (U.S. Department of Health and Human Services, 2003). Human-computer interaction is a discipline concerned with the design, evaluation, and implementation of interactive computing systems for human use and with the study of major phenomena surrounding them (Hewett et al., 1996). Usability and human computer interaction (UHCI) principles for computer-administered instruments should be established before administering instruments with participants, including expert evaluation,

participant evaluation, and performance evaluation (U.S. Department of Health and Human Services, 2003). There are no gold-standard usability and human computer-interaction guidelines because instruments vary in need and function, making it difficult to compare across different instruments (Jordon, Thomas, Weerdmeester & McClelland, 1996). However, the International Organization for Standardization (ISO 9241-11) and the American National Standards Institute suggest the following usability standards: effectiveness (ability of users to complete tasks using the system and quality of output of those tasks); efficiency (level of resource consumed in performing tasks); satisfaction (users' participative reactions to using the system); cost-effectiveness; practicality; simplicity; and speed (Brooke, 1996; Reed et al. 1999).

Expert heuristic evaluations involve having usability specialists individually examine the human-computer interaction and judge its compliance with recognized usability principles. Usability principles used in this study were adapted from the *Research-Based Web Design and Usability Guidelines* developed by the U.S. Department of Health and Human Services (2003). Expert Usability and Human Computer Interaction Checklist (Appendix A6) has ten categories of usability and human computer interaction assessment: optimizing user experience, accessibility, page layout, navigation, scrolling and paging, headings, titles and labels, text appearance, lists, screen-based controls, and content organization.

A heuristic evaluation by expert review, a common practice, resolves obvious and potential problems before conducting performance tests. In this study the expert

responded to each of the three computer-administered instruments by completing the Expert Usability and Human Computer Interaction Checklist. The expert marked a “Yes” if the item is met and a “No” if the item is not met. The investigator collaborated with the expert to resolve problematic issues in the procedure, including reducing extraneous verbiage in the measures to streamline computerized versions.

Participant Opinion

In Phase 1 of study, after participants completed all computerized questionnaires, they were asked to complete two paper and pencil questionnaires, the System Usability Scale (Appendix A7) and Participant Opinion Survey (Appendix A8). The System Usability Scale measures effectiveness, efficiency, and satisfaction (Brooke, 1996). The Usability scale is a ten-item Likert scale based on five-point scale forced-choice questions, with agreement (5) to disagreement (1) range of choices. Ten questions, positively and negatively worded, covers system usability aspects including the need for support, training, and complexity, thus containing face validity for measuring system usability (Brooke, 1996).

The System Usability Scale items score contribution ranges from zero to four. For odd numbered questions, the score contribution is the scale position minus one. For even numbered question, the contribution is five minus the scale position. The sum of the scores is then multiplied by 2.5 for the total score that ranges from zero to one hundred. The higher the score on the SUS the more user friendly. The scale is robust and reliable with item correlations of 0.7 to 0.9 (Brooke, 1996). Participants who rated low usability scores were asked to suggest revisions, which were then altered during revision process before Phase 2. Items rated less than a 3.0 average were also evaluated and revised before starting Phase 2.

The Participant Opinion Survey has nine 4-point Likert questions about the clarity, completeness, significance, ease of completion and amount of time to complete each of the scales. The Survey has one open-ended question and two ten-point Likert-type items. Items with ratings less than a 3.0 average (4-point Likert) were evaluated and revised before Phase 2. The open-ended question was transcribed verbatim and content analyzed for possible changes. Items on a 10-point Likert scale with ratings less than a 7.0 average (10 point Likert) were evaluated and revised. The investigator collaborated with technology experts to resolve all issues raised by participants to improve procedures before Phase 2.

Performance Evaluation.

Performance evaluation is a usability test that is characterized by having typical users perform a series of tasks where their speed, accuracy and success are closely monitored and measured (U.S. Department of Health and Human Services, 2003). The goal of performance evaluation is to identify issues that inhibit completion of the measures. Once the navigation, basic content, and display features are in place, performance evaluation (measuring time, wrong pathways, failure to find content, etc.) was conducted by the investigator to ensure that usability objectives were being met.

Use of ten participants was suggested to identify problems with the information architecture (navigation) and overall design issues (U.S. Department of Health and Human Services, 2003). The investigator monitored participant completion time for each measure; comments and questions about scales and procedure; and observed difficulty, all of which were recorded on the performance

record (Appendix A9). The investigator collaborated with the technology expert to resolve performance issues and improve procedures for Phase 2.

Phase 2 : Internal Consistency Reliability and Construct Validity Evaluation of the Tension Scales

Phase 2 of this study consisted of three reliability and validity evaluation steps: (a) internal consistency reliability, (b) convergent validity (TESI; construct validity), and (c) hypothesis testing (BULIT, IPAQ, Rosenberg; tension scores & body mass index correlations; construct validity). Two power analyses were calculated on the most complicated analysis in the study which involved correlations with four variables (Tension scale, BMI, TESI, hypothesis comparison measure). Bonferoni corrections that decrease the significance value and minimize the chances of making a type-I error will not be conducted because of the exploratory nature of this pilot study. Both power analyses were conducted using G-Power program (Erdfelder, Faul & Buchner, 1996). First, a conservative power analysis was conducted for a medium effect size of .03, an alpha of .05 and power of 0.80, which resulted in a sample size of 82 participants (two-tailed). A second less stringent power analysis was conducted for large effect size of .05, an alpha of .05 and power of 0.80, resulting in a sample size of 26 participants (two-tailed). These two power analysis establish a range between 26 - 82 participants for the study.

Scales

The eight computer-administered instruments in Phase 2 are described below (Appendix B). The Bulimia Test (BULIT), International Physical Activity Questionnaire (IPAQ), and Rosenberg Self-Esteem Scale (RSES) instruments were chosen for their extensive use in health-related research and robust reliability and validity. The BULIT (Appendix B4) has been established as useful for describing overeating behaviors and bulimia. The IPAQ (Appendix B5) is recommended as a viable method of monitoring population levels of physical activity globally for populations 18-69 years of age (IPAQ, 2002). Rosenberg's self-esteem scale (Appendix B6) was chosen for its short length and global sense of self-worth, self-acceptance, and self-respect. The Tension and Effort Stress Inventory (TESI; Appendix B8) is a one-page, 24-item survey instrument of individuals' experiences of stressors, moods, and efforts to cope that was compared with the tension scales for convergent validity analysis. The Marlow-Crowne scale (Appendix B9) was used to detect participants' use of socially desirable answers that could negatively influence construct validity.

The Overeating Tension Scale (OTS; Appendix B1) is comprised of 32 items (4 bipolar terms for 8 motivational states) derived directly from reversal theory (Popkess-Vawter, et al., 2000). Content experts attested to the scale's content validity, accuracy in representing the theory (Apter, 1989) and understanding at the eighth grade level. In this study, the investigator sought to lower reading level to fifth grade as suggested by current psychometric experts (Gottlieb & Rogers, 2004) to more

appropriately target rural populations. The Overeating Tension Scale is unique in focus on measuring tension before overeating (rather than focusing on situations and eating behaviors themselves) and motivation-specific feelings preceding overeating.

Validity and reliability studies for development of the overeating tension scale were reported in the Theoretical Framework section. Convergent validity was tested for the computer-administered version of the Overeating Tension Scale comparing the TESI specific to an overeating situation. Since both are state measures of tension it was anticipated that their total score correlations would be moderately correlated, between .30 to .60, but not highly correlated as two instruments for the exact same variable would be (Waltz et al., 2005).

The Exercise Tension Scale (ETS; Appendix B2) measures the discrepancy between the way individuals felt and the way they wanted to feel before skipping planned exercise. Exercise is self-defined by participants as regular, repeated bodily exertion to maintain physical fitness. Convergent validity was tested for the computer-administered version of the Exercise Tension Scale using the TESI specific to the situation of skipping exercise. Since both are state instruments of tension it is anticipated that their total score correlations would be moderately correlated, between .30 and .60 (Waltz et al., 2005).

The Feelings Tension Scale (Appendix B3) measures the discrepancy between the way individuals felt and the way they wanted to feel before recognizing they were down or low. Convergent validity was tested for the computer-administered version of the Feelings Tension Scale using the TESI specific to feeling down and

low. Since both are state instruments of tension it is anticipated that their total score correlations would be moderately correlated, between .30 to .60 (Waltz et al., 2005).

Scoring of the three Tension Scales is explained here as performed on paper and pencil scales; computerized scoring is automatically programmed in the same manner (Appendix B1, B2, B3). On the 10-point continuum, participants mark an “X” for “how they were feeling just before overeating, skipping exercise, and feeling down or low; they mark an “O” for “how they wanted to feel”; this format was adapted from the Sherwood Inventory of the Self-concept (Robinson & Shaver, 1970). Unpleasant feeling words are on the left, lower end of the 10-point continuum (unsettled, uneasy, anxious, nervous) and pleasant feeling words are at the upper end (e.g., settled, at ease, calm, composed). The highest value of 10 corresponds with the strongest of pleasant feelings (no/low tension) and the lowest value of 1 corresponds with the strongest of unpleasant feelings (medium/high tension). The difference between the values marked for actual feelings (X) and desired feelings (O) provides a discrepancy score (D) that matches the operational definition of tension ($O-X=D$). Total overeating tension scores were summed for the three subscales to provide an overall tension score ranging from 0-108 (highest discrepancy scores of 9×4 items $\times 3$ subscales = 108). Motivation-specific tension subscale scores ranging from 0-36 (highest discrepancy scores of 9×4 items = 36) were compared to detect which motivation carries the most tension (highest discrepancy score). A thorough scoring section is located in Appendix B for all instruments.

The Tension and Effort Stress Inventory (TESI; Appendix B7) as previous discussed is a one page, 24-item survey measure of individuals' experiences of stressors, moods, and efforts to cope. The term "tension-stress" refers to "pushing oneself, or the exertion of willing power to reduce the tension that is provoked by a stressor" (p. 195). The state TESI estimates the degree of pressure, stress, challenge or demand that you have been exposed to in everyday life over that last thirty days as do to: (1) work, (2) family, (3) finance, and (4) one's own body. The first four items on stressors are on a 7-point scale rated from "No pressure" to "Very much". The same labeling format is given for the next 4 items that examine efforts invested to cope. The last 16 items on moods are presented with a 7-point scale rate from "Not at all" to "Very much". Svebak (1993) reported correlations of (a) stressor and effort-scores were postively correlated ($r = .57, p < .0001$), and (b) versus effort discrepancy scores were positively correlated to overall scores on tension-stress ($r = .65, p < .0001$) confirming basic assumptions about relations between amount of stressors and related efforts to cope. Results from a intervention study validated support of the TESI through hypothesis testing and hierarchical regression analysis (content validity; Svebak, 1993).

The Bulimia Test (BULIT; Appendix B4), a 32-item, self report, five-point multiple choice scale, is used to distinguish among individuals with bulimia, those at risk for binge eating, and those with no eating problems. Possible scores range from 32 to 160; individuals who score high (102 and above) are classified as having a probable diagnosis of bulimia. Thelen, McLaughlin-Mann Pruitt, and Smith (1987)

reported the BULIT to have positive predictive value of .74, negative predictive value of .84, specificity of .89, and sensitivity of .64 for identifying individuals with bulimia in college populations (Popkess-Vawter, et al., 2000; Popkess-Vawter & Owens, 1999).

The International Physical Activity Questionnaire (IPAQ; appendix A5), is a seven-item short-answer instrument of physical activity, with established reliability and validity in 12 countries. Test-retest reliability was established with Spearman's Rho clustering around 0.8. Criterion validity was established with a median Rho of .30 against accelerometer minutes of moderate, vigorous, walking, and sedentary behaviors. The IPAQ instrument has acceptable measurement properties comparable to other established instruments (IPAQ, 2002).

Rosenberg self-esteem scale (RSES; Appendix B6), a 10-item, four-point Likert-type general measure of self-esteem, has been widely used in self-esteem research over the past 30 years ($\alpha = .77-.88$). Self-esteem refers to self-worth, self-acceptance, and self-respect, as well as evaluations of self appearance, academics and athletic abilities (Rosenberg, 1965; Rosenberg, Scholler, Schoenbach, & Rosenberg, 1995). Repeated application of Rosenberg to measure short-term changes has been shown in intervention studies, contrary to past belief that self-esteem is a stable trait (Crocker & Wolfe, 2001).

The revised Marlowe-Crowne 2 (10) Social Desirability Scale (Appendix B8) contains 10 true-false items that discriminate between respondents who are and are not willing to report socially undesirable information (Reynolds, 1982). The revised

short form was found to have improved psychometric characteristics ($\alpha = .80$), no gender differences, and less administration time than the full 33-item scale (Loo & Thorpe, 2000).

Data Management

Participants who met study entry criteria and agreed to participate were assigned a confidential number under which their individual data were entered. As participants completed the demographic form and instruments, their data were entered automatically in an ACCESS database and later saved in Excel and SPSS. Data cleaning was minimal. Data were examined for distributional properties and appropriate transformations were made when necessary. Quantitative data quality assurance procedures included internal consistency reliability tests for each instrument and statistical assumption testing (scatterplot) in conjunction with all analyses using SPSS software. Descriptive statistics for tension scales included central tendency (mean, median), dispersion (standard deviation, range, minimum and maximum score), distribution (skewness and kurtosis), and normality (histograms and distribution analysis) for all items, all subscales and all total scale scores.

Internal Consistency Reliability

Internal consistency reliability examines the consistency of performance of one group of individuals across the items on a single instrument (Waltz et al., 2005). The alpha coefficient is the preferred index of internal consistency reliability and “represents the extent to which performance on any one item on an instrument is a good indicator of performance on any other item in the same instrument” (Waltz et

al., 2005, p. 140). Internal consistency reliability of the three Tension scales and the three convergent validity measures was estimated using Cronbach's alpha coefficients, and considered acceptable at $\geq .70$ (Waltz et al., 2005). A moderate to high alpha value is usually taken as evidence that the test as a whole is measuring just one attribute. Inter-item correlations were considered acceptable at 0.3-0.7 (Nunnally & Bernstein, 1994). Items that correlate < 0.30 were considered to not be sufficiently related and therefore do not contribute to the measurement of the core factor; items with correlations > 0.95 were evaluated for redundancy (Ferketich, 1991). Future revision of the scales by item deletion were considered based on alpha-if-deleted-coefficients (if dropped items increase the overall alpha for the scale) and theoretical appropriateness.

Unique Statistical and Theoretical Issue

Factor analysis is considered the gold standard in establishing dimensionality of a research instrument; however, its use with the three tension scales is theoretically and statistically inappropriate for the following reason. The Overeating Tension, Exercise Tension, and Feelings Tension Scales theoretical framework is based on reversal theory. Reversal theory involves identifying the structures of experience that center on specific domains, called metamotivational or reversal theory states, between which individuals reverse often through the day. The four domains include: means-and-ends (characterised by the metamotivational states of telic and paratelic states), rules (characterised by the conformist and negativistic states), transactions (characterised by the mastery and sympathy states), and relationships (characterised

by the autic and alloic states). A metamotivational state is referred to as metamotivational because it leads to other motivational variables (such as arousal) or biological motives (e.g. hunger) being interpreted in a particular way (Reversal Theory Society, 2007).

Metamotivational states exist in pairs of opposites, such that *only* one or the other state of each pair is active at a particular moment. Since there are four such pairs, only four states are active at any given moment. A switch from one member of a pair being active to the other member of the pair being active is referred to as a reversal, thus reversal theory (Reversal Theory Society, 2007). For example on the tension scales, when respondents are in the Telic state (serious), they cannot be in the Paratelic state (playful) at the same time. When respondents answer “Telic” on a Tension scale to represent the state they were in just before overeating, they completed four discrepancy items for the Telic state only, as the computer routing did not present any items for the Paratelic state. There are eight metamotivational states and a respondent only answers question for four of the states, thus leaving the columns for the items for the unchosen states blank. When respondent data are downloaded into the Statistical Packaging for the Social Sciences (SPSS), the columns for the items not answered are left blank and treated as system-missing values (see SPSS table example). It would be theoretically inaccurate to replace the missing vales with anything, including zeros. Respondent discrepancy items that equal zero signify a neutral score or no tension in that state item.

When a factor analysis is activated by SPSS, all cases with missing values are deleted listwise; observations with missing values on any of the variables in the analysis are omitted from the analysis (Statistical Procedures Social sciences, 2007). Because of the theoretical structure of the Tension scales, participants will have missing data and thus all participants would be omitted for the analysis. It is for this reason that a factor analysis cannot be conducted to establish instrument reliability. It is possible to test a three-factor analysis with each of the 16 possible pathways for a sample size >1000. On the other hand, Inter-item correlations and Cronbach's internal consistency reliability coefficients can be calculated using SPSS, as it uses score data for the four discrepancy items of each reversal theory state. Similarly, the same system-missing values issue in SPSS as with factor analysis occurs with correlations and internal consistency reliabilities that use all discrepancy items together. When all eight reversal theory states are used in an analysis together, an error message results because SPSS believes that all of the cases have missing data and deletes them from the analysis. Total tension scale scores can be calculated by combining pairs of reversal theory states by hand and then using SPSS programming to examine correlations and alphas for tension total scores.

Construct Validity (Convergent Validity)

When establishing construct validity, the multitrait-multimethod approach is preferred, because it produces more data with more efficiency than other techniques (Waltz et al., 2005). Convergent validity is a type of multitrait-multimethod approach where different instruments of the same construct should correlate highly with each

other (Waltz et al., 2005). Convergent validity was examined using Pearson correlation coefficients for the Tension measures and their matched TESI instrument (overeating, skipping exercise, feeling low or down), which are similar in concept and expected to be moderately positively correlated, but not highly correlated. The TESI asks, “ Estimate the degree of pressure, stress, challenge, or demand that you have been exposed to over the last thirty days as due to: ____”. Instead of having participants complete this inventory three times (for overeating, skipping exercise, and feeling down or low), each participant completed only one of the three situations. The investigator alternated the three situations to provide one-third of participants responding to each TESI question (1/3rd, 1/3rd, 1/3rd). Having participants complete only one TESI situation reduced respondent burden and confusion between TESI instruments. Correlations of $\geq .30$ to $.70$ were considered an acceptable level for moderate correlations (Waltz et al., 2005).

Construct Validity (Hypothesis testing approach)

Hypothesis-testing approaches are the experimental manipulations used for examining the underlying theoretical framework of an instrument’s design (Waltz, Strickland & Lenz, 2006). Hypotheses test participants’ behavior using their scores on measures under study to make inferences on the basis of findings. Construct validity attests to whether or not the rationale underlying the instrument’s construction were adequate to explain data collected.

The hypothesis-testing approach was used to evaluate construct validity with these hypotheses: (a) The Overeating tension scale will be moderately correlated with

the BULIT bulima scale (.30-.60); (b) The Exercise Tension scale and the International Physical Activity Questionnaire scores will be moderately inversely correlated (high exercise tension scores with low IPAQ exercise scores); (c) The Feelings Tension scale and Rosenberg Self-esteem scale will be moderately inversely correlated (high feelings tension with low Rosenberg esteem scores); and (d) Participants with higher body mass index (BMI) will have higher tension scores compared to participants with lower BMIs on the Overeating Tension, Exercise Tension, and Feelings Tension Scales (BMI; weight [kg]/height [m²]. Pearson Product Moment correlations were used to estimate associations between BMI and all tension scales ($p \leq .05$) examining the affect size (0-0.20 small; 0.20-0.50 medium; .50-.80 strong; and .80+ very strong). Additionally, correlations between known groups (normal weight and overweight weight) and BMI were evaluated.

The Pearson correlation coefficient is an index of effect size that ranges from -1 (two variables are perfectly negatively correlated; one increases and the other decreases) to +1 (two variables are perfectly positively correlated; one increases and the other increases). A coefficient of zero indicated that there was no relationship between the two variables (Green, Salkind & Akey, 2000). At this exploratory stage, Bonferoni adjustments of significance levels were not made.

Ethical Considerations

After approval from the human subject committee, volunteers were recruited and interviewed to determine if they meet entry criteria. They were informed about the study and the consent form was thoroughly explained. No data were gathered until

the consent forms were signed. Benefits of participation included contributing to science and gaining insights about self. Risks were minimal and possibly included surfacing emotions through increased awareness.

Participation of Human Subjects

The University of Kansas Medical Center Internal Review Board reviewed and approved this study prior to implementation. Recruitment of subjects was conducted by the investigator in Horton, Kansas (6 subjects in Phase 1), Pittsburg, Kansas (22 participants in Phase 2) and Sedan, Kansas (39 participants in Phase 2) using posters, flyers, and advertisements in the local newspapers and through the Kansas University Telehealth programs. These subject recruitment methods had worked well in the primary investigator's previous studies.

Both Phase 1 and 2 studies used convenience samples of healthy individuals 21 or older. Participants participated regardless of socioeconomic level or ethnic background. Participants were informed that the purpose of the study was to test the computer-administered questionnaires. Study advertisements described the study as involving one 30 to 60 minute session that included height and weight measurement and completing eight computer-administered instruments. Through telephone screening and the in-person visit, the study was explained further and consent form with HIPAA disclosure information was given to all participants. Their signature was witnessed and they were given a copy of their signed consent. The consent form included a description of the study, nature of data collection, the potential benefits and risks anticipated, and the controls used for confidentiality.

The research team personnel abided by all tenets of the University confidentiality policies as well as the privacy protection for research subjects. All research staff was current in their NIH required human subjects protection and HIPAA certification. The *KUMC Tutorial for Human Subjects' Protection* program examines the context for human subjects' protection; the foundational principles that govern the ethical conduct of research; policies and practices that promote the welfare of research volunteers; and the collective responsibilities shared by the institution, faculty, and staff. The KUMC Tutorial for HIPAA provides legal and ethical information about protected health care information.

1. Risks to the Subjects

The involvement of human subjects was detailed in the research design and methods section. Subjects attended one 30 to 60 minute session. All participants answered questionnaires and had physical measures taken during the appointment session.

Human Subject's Involvement and Characteristics

The study population included men and women 21 or older who could speak, read and write English at the 5th grade level. Those who were: (1) currently under medical care or on medications that might affect psychological perceptions, (2) currently diagnosed as having an eating disorder or mental illness, and (3) currently pregnant were excluded from the study.

Sources of Materials

Research data were collected from physical and behavioral measures taken during the study. All data was gathered for the explicit purpose of this study using

procedures to ensure confidentiality. All subjects were encouraged to contact the Human Subjects' Committee with any concerns about the informed consent document or process.

Potential Risks

There were no anticipated risks to subjects. The time required to complete computer-administered instruments could have been considered an inconvenience or possibly fatiguing.

2. Adequacy of Protection Against Risks

Recruitment and informed consent

All recruitment, consent, and data forms for the study proposals were submitted to the University IRB prior to enrollment. Informed consent was obtained by a trained research team member who had completed the NIH approved Human Subjects Protection certification. Consent included the standard elements: a study description, potential risks, benefits and options for non-participation. All questions were answered and consents were signed and were kept in a locked file at the study office.

Protection Against Risks

No subject withdrew from the study. Access to the laptop required an access code to activate and knowledge of the website address to reach the instruments, which was only known by investigators (no open access). Subjects were assigned a confidential ID number, which when entered started the display of instructions and the measure. Data from the program were input directly into a data base to reduce

data entry errors. Data stored on the laptop computer hard drive were backed-up on a flash drive. Computers, flash drives, and subject forms were kept in a locked cabinet in the study office.

3. Potential Benefits of the Research to the Subjects and Others

Subjects became more aware of their health habits of eating, exercise, and self-esteem.

4. Importance of the Knowledge to be Gained

Obesity prevention is a national priority. This study helped to develop scales that will contribute to future weight management interventions.

Women and Minorities in Research - Inclusion of Women

All women of all ethnic minorities who met the inclusion criteria were qualified as study subjects. The proposed sample exceeded the gender represented in the local populations, which was approximately half the population.

Inclusion of Minorities

All volunteers representing ethnic minorities who met the inclusion criteria were qualified as study subjects. Efforts were made to recruit subjects to match the ethnic/racial distributions represented in each geographic area in cooperation with the Area Health Education Center (AHEC) nurses. AHEC nurses, who were familiar with the communities and demographics of the clinics, helped in recruitment. In Phase 1 (located at Horton), six rural subjects were recruited having an expected cultural mix of approximately 3.7 % Hispanic, 1.3 % African American, 6.2 % Native American, 90 % Caucasian, and all other ethnicities significantly less than 1% combined (Brown

County Health Profiles, 1999). In Phase 2 of the recruitment approximately 20 residents of Crawford county (Pittsburg) who have a cultural mix of approximately of 1% American Indian, 2% African American, 93% Caucasian, and all other ethnicities significantly less than 1% combined; and the recruitment of 40+ residents in Chautauqua county (Sedan) who have a cultural mix of approximately 4% American Indian, 0.5% African American, 95% Caucasian, and all other ethnicities 0.5% combined; (U.S. Census Bureau, 2004). The sample similarly paralleled the ethnic groups represented in the local population.

Inclusion of Children

Adults above the age of 21 years were targeted for this study, which will provide feasibility data for future studies of adults. Children were not studied due to the instrument development nature of the study of adult responses; children should be included in future studies.

Racial/Ethnic Data for Kansans

ENROLLMENT: Number of Subjects = 61			
Ethnic Category	Sex/Gender		
	Females	Males	Total
Hispanic or Latino	1	0	1
Not Hispanic or Latino	47	13	60
Ethnic Category Total of All Subjects*	48	13	61
Racial Categories			
American Indian/Alaska Native	6	0	
Asian	0	0	0
Native Hawaiian or Other Pacific Islander	0	0	0
Black or African American	0	0	0
White	42	13	
Racial Categories: Total of All Subjects	48	13	61

**All categories in the populations of Brown (Phase1) and Crawford (Phase 2) are similar except the Native American population in Brown county (9%).

Data Safety and Monitoring Plan

The KUMC Data Safety Monitoring Board (DSMB) provides supplemental oversight for high-risk human studies. This study was not high risk and did not require DSMB oversight.

CHAPTER 4

Phase 1: Results

Psychometric Evaluation of Three Computer-Administered Tension Scales for Weight Management in Rural Telehealth Settings

Phase 1: Development of Computer-Administered Instruments

Background: Currently, measures are lacking to assess the parameters of the multifaceted problem of overweight and obesity. Earlier study suggests that measures are needed to assess overeating tension, exercise tension, and feelings tension as contributing factors to the obesity epidemic in America. *Purpose:* The purpose of this pilot study was to evaluate the computer-administration and psychometric analysis of the three tension scales, the Overeating Tension, Exercise Tension, and Feeling Tension, in three rural settings served by the University of Kansas Telehealth Program. *Methods:* Computer-administration measures were evaluated for readability, content validity, usability, human-computer interface, and performance. *Results:* Phase 1 established: readability at less than a 5th grade level using an linguistics expert; content validity using reversal theory experts, content validity index, and kappa score; usability, human-computer interface, and performance using expert evaluation; and participant evaluation. *Conclusions:* This study established the computer-administration, readability, content validity, usability, human-computer interface, and performance of the three tension scales.

Keywords: overeating, exercise, feeling tension scales; weight management; rural telehealth; readability; content validity; usability; human-computer interface; performance evaluation; participant evaluation

The purpose of this study was to evaluate the computer administration and psychometric properties of three computer-administered tension scales, the Overeating Tension (OTS), Exercise Tension (ETS), and Feelings Tension (FTS), in three rural Telehealth settings. The prototype for the study was based on development studies of the original OTS in 2000 (Popkess-Vawter, Gerkovich, & Wendel, 2000). The present study was divided into two Phases: (a) Phase 1 was a field test of the readability, content validity, usability and human-computer interaction, performance, and participant evaluation of the scales; and (b) Phase 2 was an evaluation of internal consistency reliability and construct validity (convergent validity and hypothesis testing) of the tension scales. This study addressed the need for specific weight management outcome instruments for use with patients in underserved rural Kansas communities.

Background

The National Heart, Lung, and Blood Institute (NHLBI) recommends three components for multifactorial weight loss programs—dietary therapy, increased physical activity, and behavioral therapy (National Heart, Lung, and Blood Institute, 2002). Generally, there is a lack of multifactorial measures to evaluate participants' progress in weight loss programs (Popkess-Vawter, Gerkovich, & Wendel, 2000).

Research literature and clinical practice suggest that unhealthy behaviors, such as overeating, skipping exercise, and feeling down or low, may be responses related to attempts to relieve high tension (Kramer, Luder, & Popkess-Vawter, 2004; Popkess-Vawter, et al., 2000; Rotenberg & Boucsein, 1993). Reliable and valid instruments that specifically measure what stimulates the unhealthy responses of overeating, skipping exercise and feeling down or low are needed in weight management practices. Additionally, computer-administered weight management instruments can potentially serve as evaluation measures for baseline and progress in Telehealth programs that serve rural populations.

Conceptual Framework

The instrument development study, based on reversal theory (Apter, 1989), explains motivations for overeating, skipping exercise, and feeling down or low. Reversal theory has guided research studies for 30 years in smoking cessation, sexual risk taking, exercise adherence, and eating-disordered and exercise-dependent triathletes (Blaydon, Lindner, & Kerr, 2004; Keele-Smith & Leon, 2003; O'Connell, Cook, Gerkovich, Potocky & Swan, 1990; Pain & Kerr, 2004). Reversal theory addresses the inconsistency and changeability of individuals, in which personality is inherently inconsistent and individuals reverse between opposing metamotivational states (Reversal Theory Society, 2007).

Motivations exist in pairs of serious/playful, compliant/defiant, mastery/sympathy, and other-centered/ self-centered) (Appendix A1). When in the *serious state*, individuals are serious-minded, goal-oriented, and prefer low levels of

arousal (feeling relaxed). In the *playful state*, individuals are playful, spontaneous, and prefer high levels of arousal (feeling pleasantly excited). When in the *compliant state*, people prefer to go along with rules and regulations; while in the *defiant state*, they prefer to break rules and want to be rebellious or noncompliant. When in the *mastery state*, individuals feel that being tough and being in control are important; while in the *sympathy state* they feel that being tender and not competing are important. In the *other-centered state*, individuals think of others before themselves; while in the *self-centered state* they think of themselves first and put others after themselves (Reversal Theory Society, 2007).

All motivational states have associated pleasant and unpleasant feelings. Pleasant feelings include calmness (serious), excitement (playful), free (defiant), and hardy (mastery). No or low tension is associated with pleasant feelings because individuals feel the way they want to feel. Examples of unpleasant feelings (medium or high tension) within each state are anxiety (serious), boredom (playful), trapped (defiant), and soft (mastery). Tension results when a discrepancy occurs between what individuals are feeling and what they prefer to be feeling; greater discrepancies show more tension (Popkess-Vawter, Gerkovich, & Wendel, 2000).

Tension could be one reason why overweight individuals are inconsistent in managing weight as depicted in Figure 1. Beginning at the left of Figure 1, overweight individuals may not be feeling the way they want to feel (cognitions), with a medium to high tension emotional response, and unhealthy behavioral responses of overeating, skipping exercise, and feeling down or low (Perri & Foreyt,

2003; Poston, Walker, Hyder, O'Bryne, & Foreyt, 2000; Wadden & Stunkard, 2002). Conversely, when they feel the way they want to feel, low or no tension emotional responses occur with healthy behavioral responses eating for hunger only, exercising regularly, and feeling up. For the purpose of this study, tension is the participants' self-reported preferred and actual feelings when responding to specific incidences of overeating, skipped exercise, and feeling down or low.

Development of Overeating Tension Scale

Reversal theory (Apter, 1989) was used as the theoretical basis to explain increased tension as a precipitating factor of overeating. Five instrument development studies were conducted to establish reliability and validity of the overeating tension scale (Popkess-Vawter et al., 2000). After the first two instrument development studies ($N=373$, $N=208$), 48 items were refined and reduced to 32 (four each for eight states). Two more studies ($N=330$, $N=130$) provided internal consistency reliability ($\alpha = .70 - .93$) using normal weight and overweight women participants. Construct validity was supported using hypothesis testing that overweight participants reported higher overeating tension than those normal weight [$F(1,126) = 7.12$, $p < .009$]. The Overeating Tension Scale (OTS) was found to have sufficient reliability and validity to measure tension *before* overeating and motivation-specific feelings preceding overeating.

Development of the Exercise and Feelings Tension Scales

Formal steps were taken in the development process of the norm-referenced Exercise Tension Scale (ETS) and Feelings Tension Scale (FTS), including selection

of a theoretical model, explication of objectives for the measure, development of a blueprint, and scoring and procedures of the instruments (Waltz et al., 2005). The investigator explored the literature for theoretical frameworks different from reversal theory used in the original Overeating Tension Scale (OTS). The search revealed no measures that focused on antecedents of skipping exercise and feeling bad about self. The decision was made to use the reversal theory framework that guided development of the OTS as it explained tension as the discrepancy between feelings felt and desired. The directions for the new scales give a time frame of one month for participants to focus on the two behaviors under study: “just before skipping a planned exercise session” (ETS) and “just before feeling bad about self” (FTS). The original format of the OTS remained the same for the blueprint of the two Tension scales, which included the eight motivational states, each with four bipolar terms that measure the amount of tension. Scale titles were changed and the overeating scale instruction stems were changed from, “Just before overeating...” to the exercise tension stem “before choosing not to exercise ...”, and the feelings tension stem “before feeling bad about self”. Scoring procedures also remained the same as for the original instrument. Preliminary content and expert validity were established by one lay professional and one reversal theory expert; they found both measures to be clear, representative of the test blueprint and guidelines, and appropriate for obese populations.

A pilot study was conducted with 17 normal weight and overweight female volunteers at a nursing educational program focused on weight management.

Participants verbally related that the three tension scales were relevant for recalling incidents within the past month when they overate, skipped exercise, and felt down or low. Pilot study findings attested to the content and face validity of measures: (a) before overeating, participants' tension was significantly associated with feeling anxious and uneasy (serious state), isolated and uncomfortable (compliant state), resentful (sympathy-self-centered), and guilty (sympathy-other-centered); (b) before skipping planned exercise, participants' tension was significantly associated with feeling anxious and uneasy (serious), isolated and uncomfortable (compliant), trapped and restricted (defiant), resentful (sympathy-self-centered) and guilty (sympathy-other-centered); and (c) before feeling down, participants' tension was significantly associated with feeling isolated and uncomfortable (compliant) and guilty (sympathy-other-centered). Findings were similar to earlier overeating tension studies and suggested that a different array of unpleasant feelings (tension) were associated with skipping exercise and feeling down that warranted further descriptive study.

Description, Administration, and Scoring of the Instrument

The instrument format used for the Overeating Tension Scale is a semantic differential that reflects motivational states and related pleasant and unpleasant feelings. Semantic differential scales use bipolar terms to provide item ratings that sum to become subscales within the composite scale (Osgood, Suci, & Tannebaum, 1975). The instrument development blueprint for the OTS required six bipolar terms generated for each of the eight reversal theory motivations to describe pleasant and unpleasant feelings (48 total terms). Terms originally were chosen directly from a list

of feeling words and their antonyms found in the 1989 Apter text. Six opposing pairs of feeling words, chosen in collaboration with Apter and other reversal theory experts, most clearly and accurately represented each of the eight motivations. Two content experts attested to content validity that all words in the scale accurately represented the theory and were understood at the eighth grade level.

Administration procedures of the three scales are explained in the procedures section. Scoring of the three Tension Scales is explained here as performed on paper and pencil scales; computerized scoring is automatically programmed in the same manner. On the 10-point continuum, participants mark an “X” for “how they were feeling just before overeating, skipping exercise, and feeling down or low; they mark an “O” for “how they wanted to feel”; this format was adapted from the Sherwood Inventory of the Self-concept (Robinson & Shaver, 1970). Unpleasant feeling words are on the left, lower end of the 10-point continuum (unsettled, uneasy, anxious, nervous) and pleasant feeling words are at the upper end (e.g., settled, at ease, calm, composed). The highest value of 10 corresponds with the strongest of pleasant feelings (no/low tension) and the lowest value of one corresponds with the strongest of unpleasant feelings (medium/high tension). The difference between the values marked for actual feelings (X) and desired feelings (O) provides a discrepancy score (D) that matches the theoretical definition of tension ($O-X=D$). Total overeating tension scores were summed for the three subscales to provide an overall tension score ranging from 0-108 (highest discrepancy scores of 9×4 items \times 3 subscales = 108). Motivation-specific tension subscale scores ranging from 0-36 (highest

discrepancy scores of 9 X 4 items = 36) were compared to detect which motivation carries the most tension (highest discrepancy score).

Methods

Sample

Sufficient numbers of participants were recruited using community-wide local media (newspaper, flyers, e-mails). The study was divided into two Phases: (a) Phase 1 used six participants (based on power analysis) for a field test of the readability, content validity, usability, human-computer interaction, performance, and participant evaluations of three computer-administered tension scales. Phase one is described here. The one male and five female participants in Phase 1 were all married, Caucasian, and ranged in age from 33-55 years old ($M=42$). Four participants had some college education. They were normal to obese in weight with Body Mass Index's (BMI) ranging from (20-37, $M=28$).

Procedures

Individuals responded to local advertisements by calling the local Telehealth Nurse to express interest in the study; the investigator telephoned interested, explained the study, answered questions, established that participants met the study criteria and scheduled data collection appointments. Entry criteria for both Phases included (a) women and men, (b) ages 21 or older, and (c) English-speaking, reading, and writing at a 5th grade level or above. Exclusion criteria for both Phases included those who self-report being pregnant, having any illness/health process that could influence weight loss/gain (anorexia, bulimia, psychosis), or those taking medications

that might affect psychological perceptions measured in the study (steroids; anti-psychotic medications, e.g., tricyclic antidepressant medications for psychological disorders; insulin for diabetes mellitus). Fifth grade reading level was confirmed for all participants using the Slosson reading list (Slosson & Nichols, 1990). The investigator measured participants' height and weight to calculate BMI.

BMI TABLE

Body Mass Index Table																																				
	Normal					Overweight					Obese					Extreme Obesity																				
BMI	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54
Height (inches)	Body Weight (pounds)																																			
58	91	96	100	105	110	115	119	124	129	134	138	143	148	153	158	162	167	172	177	181	186	191	196	201	205	210	215	220	224	229	234	239	244	248	253	258
59	94	99	104	109	114	119	124	128	133	138	143	148	153	158	163	168	173	178	183	188	193	198	203	208	212	217	222	227	232	237	242	247	252	257	262	267
60	97	102	107	112	118	123	128	133	138	143	148	153	158	163	168	174	179	184	189	194	199	204	209	215	220	225	230	235	240	245	250	255	261	266	271	276
61	100	105	111	116	122	127	132	137	143	148	153	158	164	169	174	180	185	190	195	201	206	211	217	222	227	232	238	243	248	254	259	264	269	275	280	285
62	104	109	115	120	126	131	136	142	147	153	158	164	169	175	180	186	191	196	202	207	213	218	224	229	235	240	246	251	256	262	267	273	278	284	289	295
63	107	113	118	124	130	135	141	146	152	158	163	169	175	180	186	191	197	203	208	214	220	225	231	237	242	248	254	259	265	270	278	282	287	293	299	304
64	110	116	122	128	134	140	145	151	157	163	169	174	180	186	192	197	204	209	215	221	227	232	238	244	250	256	262	267	273	279	285	291	296	302	308	314
65	114	120	126	132	138	144	150	156	162	168	174	180	186	192	198	204	210	216	222	228	234	240	246	252	258	264	270	276	282	288	294	300	306	312	318	324
66	118	124	130	136	142	148	155	161	167	173	179	186	192	198	204	210	216	223	229	235	241	247	253	260	266	272	278	284	291	297	303	309	315	322	328	334
67	121	127	134	140	146	153	159	166	172	178	185	191	198	204	211	217	223	230	236	242	249	255	261	268	274	280	287	293	299	306	312	319	325	331	338	344
68	125	131	138	144	151	158	164	171	177	184	190	197	203	210	216	223	230	236	243	249	256	262	269	276	282	289	295	302	308	315	322	328	335	341	348	354
69	128	135	142	149	155	162	169	176	182	189	196	203	209	216	223	230	236	243	250	257	263	270	277	284	291	297	304	311	318	324	331	338	345	351	358	365
70	132	139	146	153	160	167	174	181	188	195	202	209	216	222	229	236	243	250	257	264	271	278	285	292	299	306	313	320	327	334	341	348	355	362	369	376
71	136	143	150	157	165	172	179	186	193	200	208	215	222	229	236	243	250	257	265	272	279	286	293	301	308	315	322	329	336	343	351	358	365	372	379	386
72	140	147	154	162	169	177	184	191	199	206	213	221	228	235	242	250	258	265	272	279	287	294	302	309	316	324	331	338	346	353	361	368	375	383	390	397
73	144	151	159	166	174	182	189	197	204	212	219	227	235	242	250	257	265	272	280	288	295	302	310	318	325	333	340	348	355	363	371	378	386	393	401	408
74	148	155	163	171	179	186	194	202	210	218	225	233	241	249	256	264	272	280	287	295	303	311	319	326	334	342	350	358	365	373	381	389	396	404	412	420
75	152	160	168	176	184	192	200	208	216	224	232	240	248	256	264	272	279	287	295	303	311	319	327	335	343	351	359	367	375	383	391	399	407	415	423	431
76	156	164	172	180	189	197	205	213	221	230	238	246	254	263	271	279	287	295	304	312	320	328	336	344	353	361	369	377	385	394	402	410	418	426	435	443

Source: Adapted from Clinical Guidelines on the Identification, Evaluation, and Treatment of Overweight and Obesity in Adults: The Evidence Report.

After gaining consent and completing physical instruments, participants were asked to sit by the investigator at a computer during the entire testing time. If participants were comfortable using the computer, the investigator entered responses for them. Participants were assigned confidential identification numbers that were randomly ordered to a set of measures to control for response set (Creswell, 2002). Measures included: the three tension scales, BULIT bulimia scale, International Physical Activity Questionnaire, Rosenberg Self-Esteem scale, Tension and Effort

Stress Inventory, Marlowe-Crowne Social Desirability scale. Six participants in Phase 1 also completed two pencil-and-paper measures, including the System Usability Scale and Participant Opinion Survey. After testing, participants were thanked and given a ten-dollar gift certificate to a local store.

Approaches to Reliability and Validity Assessments

Phase 1 included six evaluation steps to establish: (a) readability, (b) content validity, (c) usability, (d) human-computer interaction, (e) performance, and (f) participant opinion. Instruments included the Expert Readability Checklist (reading level; Appendix A4), Expert Content Validity Checklist (reversal theory content; Appendix A5), Expert Usability and Human-Computer Interaction Checklist (usability and interaction; Appendix A6), and Performance Record completed by the Investigator (Appendix; A3). Participants in Phase 1 completed the System Usability Scale (SUS; Appendix A8) and the Participants' Opinion Survey (clarity, importance, ease, timing, logistics (Appendix A9).

Literacy Level (Readability)

The literacy goal of this study was to establish readability of the three scales at the fifth grade reading level. The fifth grade reading level was chosen based on similar studies, patient promotional materials, and psychometric guidelines that suggest a fifth grade level is suited for diverse cultural populations (Gottlieb & Rogers, 2004; Waltz, Strickland & Lenz, 2005). A Literacy expert assessed each word of the scales and recommend changes to assure the fifth grade reading level. Among all three instruments, the directions, 47 descriptive words and phrases, and 64

feeling words were examined for reading level and clarity. “No” ratings were given suggested revisions in consultation with the expert until she rated all items “Yes”.

Content Validity

Of the four reversal theory experts who evaluated the content validity of the tension scales, three had evaluated the original Overeating Tension Scale (OTS). Experts included Dr. Apter, author of reversal theory, and three scholars who had conducted research based on reversal theory. Experts came from England, Canada, and the United States, thus increasing chances of identifying colloquial terms that would be inappropriate for the scales (Grant, Kinney & Guzzetta, 1990; Grant & Davis, 1997). Experts judged 47 descriptive phrases and 64 feeling words on the tension scales for representation of the content domain, reversal theory accuracy, relevance, sufficiency, and clarity (Berk, 1990; Lynn, 1986; Grant & Davis, 1997; Waltz, et al., 2005). They used a 4-point rating scale: (1) not accurate, (2) somewhat accurate, (3) quite accurate, and (4) very accurate (Polit & Beck, 2006; Waltz et al., 2005). Scale Content Validity Index Averaged (S-CVI/Ave), is the proportion of items rated relevant (3 or 4) across experts (Polit & Beck, 2006). Ideally, if all items are given ratings of 3 or 4 by all raters, interrater agreement would be perfect and the value of the S-CVI/Ave would be 1.00. A S-CVI/Ave of .90 was used as acceptable agreement between experts (Polit & Beck, 2006, Waltz et al., 2005). Items rated a one or two, were revised from suggestion given by the experts, then re-evaluated in a second and third evaluation round. Multi-rater kappa coefficient of agreement also was calculated to further evaluate the content validity and random effects of the scales (Wynd, Schmidt, & Schaefer, 2003). The kappa statistic [$k = (P_o - P_e) / (1 - P_e)$] was used to calculate percent agreement remaining after chance agreement

is removed ($k \geq .60$ acceptable). P_e is the proportion of agreements expected to occur by chance alone, and $(P_o - P_e)$ represents the observations for which there are “real” agreements versus chance agreements. (Wynd et al., 2003).

Internet Technology Development

Internet technology personal support is critical during and after development: programming, linking, and multiple revisions and refinement will be necessary during this process. A computer programmer was consulted in transforming the paper and pencil versions of the three scales to the electronic versions. A “mock up” was created for each page of the website for the technology designer to format using programming code. Participant options were linked (routed) to the next appropriate electronic page so the participant could continue answering question on the scales. For example, if participants choose a paratelic metamotivational state over a telic metamotivational state, the computer routed a link to the electronic paratelic questions page instead of the unselected telic page. This routing feature of the computer eliminates confusion that the paper and pencil version respondents had in past administrations.

Usability and Human Computer-Interaction

Usability includes range of evaluation methods (automated evaluations, inspection evaluation, operational evaluations, and human performance testing) to identify issues that inhibit effective use of a website or instrument (U.S. Department of Health and Human Services, 2003). Usability and human computer interaction principles for computer-administered instruments should be established before using

instruments with participants, including expert evaluation, participant evaluation and performance evaluation (U.S. Department of Health and Human Services, 2003).

There are no gold-standard usability and human computer-interaction guidelines because instruments vary in need and function, making it difficult to compare across different instruments (Jordon, Thomas, Weerdmeester, & McClelland, 1996).

However, the International Organization for Standardization (ISO 9241-11) and the American National Standards Institute suggest the following usability standards:

effectiveness (ability of users to complete tasks using the system and quality of output of those tasks); efficiency (level of resource consumed in performing tasks); satisfaction (users' participative reactions to using the system); cost-effectiveness; practically; simplistically; and speed (Brooke, 1996; Reed et al. 1999).

Results

Literacy Level (Readability)

Readability for the three tension scales took about one month in consultation with the literacy expert. Twenty-one of the 47 descriptive words and 29 of the 64 feeling words were modified to the lower reading level. Fry and Raygor readability formula was used by the literacy expert to evaluate the measures including consideration of conceptual density, word frequency, and writing clarity (Raygor, 1977). At completion of the literacy Phase the Fry and Raygor scales and the Microsoft word readability rates established all three scales at or under the 5th grade reading level (OTS 4.2 grade level; ETS 4.9 grade level; FTS 4.2 grade level).

Table 36

Progression of Changes to Tension Scale

TELIC FEELING WORDS	Literacy changes to 5th grade reading level	Round one changes by Theory Experts	Round two changes by Theory Experts	Round three changes by Theory Experts
Serious minded	Serious	Serious		
Goal oriented	Had a goal	Had a goal	Have an important goal	
Planning ahead	Planned ahead	Planning ahead		
Trying to accomplish something	Tried to accomplish something	Trying to accomplish something	Trying to accomplish something important	
Future-oriented	Looked to the future	Looked to the future	Aware of future outcomes	Care about future outcomes
High tension words				
Unsettled		Unsettled		
Uneasy		Uneasy	Anxious	
Anxious	Worried	Worried		
Nervous		Nervous		
Low tension words				
Settled		Settled	Settled **	
At ease		At ease	Relaxed	
Calm	Not worried	Not worried		
Composed	Calm	Calm		
PARATELIC FEELING WORDS				
Playful		Playful		
Spontaneous	Spur-of-the-moment	Spur-of-the-moment	Spontaneous	
Emphasizing good feelings	Enjoyed good feelings	Enjoying good feelings	Looking to feel good	Looking to have a good time
Having fun for fun's sake	Had fun	Had fun	Looking to have fun	
Present-	Focused on	Focused on the		

oriented	the here and now	here and now		
High tension words				
Bored		Bored		
Unstimulated		Unstimulated		
Uninterested		Uninterested		
Indifferent		Indifferent		
Low tension words				
Excited		Excited		
Stimulated		Stimulated		
Interested		Interested		
Enthusiastic	Enthused	Enthused		
Conformist FEELING WORDS				
Following the rules	Followed the rules	Following the rules		
Not “making waves” or disagreeing with others	Did not make waves	Did not make waves	Not “making waves”	
Feeling concerned if I broke a rule	Worried if I broke a rule	Worrying if I broke a rule		
Feeling compliant and agreeable	Felt agreeable	Felt agreeable	Looking to fit in	
Trying to stay in line	Tried to stay in line	Trying to stay in line		
Doing what others did	Followed others	Followed others	Looking to do the same as others	Trying to be the same as others
Concerned about what others thought	Worried about what others thought	Worrying about what others thought		
High tension words				
Embarrassed		Embarrassed		
Foolish		Foolish	Stupid	Misunderstood
Isolate	Alone	Alone	Rejected	

Uncomfortable		Uncomfortable	Insecure	
Low tension words				
Not embarrassed		Not embarrassed		
Sensible	Wise	Wise	Smart	Agreed with**
Belonging		Belonging		
Comfortable		Comfortable	Secure	
Negativistic FEELING WORDS				
Sticking up for what I thought	Stood for what I thought	Standing up for what I thought		
Bending/ breaking the rule	Bent the rules	Bending the rules		
Angry		Angry		
Stubborn		Stubborn		
Rebellious/ defiant	Disobedient	Disobedient		
Wanting to be difficult	Wanted to be difficult	Looking to be difficult		
Doing my own thing	Wanted to do my own thing	Looking to do my own thing		
High tension words				
Trapped		Trapped		
Held back		Held back		
Caught		Caught		
Restricted	Limited	Limited		
Low tension words				
Free		Free		
Released		Released		
Liberated	Freed	Freed	Loose	Unrestricted
Unrestricted	Unlimited	Unlimited		
Mastery Autic FEELING WORDS				

Doing my best		Doing my best		
Giving it my all		Giving it my all		
Being strong and not showing tender feelings		Being strong and not showing tender feelings	Being strong and not showing tender feelings	Not showing tender feelings **
Being tough with myself and others		Being tough with myself and others	Being tough with myself and others	Being tough with myself
Feeling competitive		Feeling competitive		
High tension words				
Out of control		Out of control	Losing control	Not in control
Humiliated	Shamed	Shamed		
Wimpy		Wimpy	Weak	
Disrespected		Disrespected		
Low tension words				
In control		In control		
Proud		Proud		
Sturdy		Sturdy		
Respected		Respected		
Sympathy Autic FEELING WORDS				
Wanting to be in harmony with others	Wanting to be in agreement with others	Wanting to be in agreement with others	Looking for closeness with others	
Looking to others for sympathy for help	Looking for help	Looking for help		
Feeling I deserved a reward/treat	Feeling I deserved a treat	Feeling I deserved a treat		
Showing tender	Showing caring	Showing caring feelings	Looking to others for	

feelings	feelings		tenderness	
Wanting to feel cared for	Wanting to feel cared for	Looking to feel cared for		
High tension words				
Resentful	Not valued	Not valued		
Deprived	Not cared for	Not cared for		
Offended	Not grateful	Not grateful	Resentful	
Hurt		Hurt		
Low tension words				
Appreciative	Valued	Valued		
Cared for		Cared for		
Grateful		Grateful		
Pleased		Pleased	Loved	
Mastery Aloic FEELING WORDS				
Letting others win		Letting others win		
Helping others profit		Helping other profit		
Helping others succeed		Helping other succeed		
Letting others be in charge		Letting others be in charge		
Giving self to a cause		Giving self to a cause		
High tension words				
Ashamed		Ashamed	Ashamed	Not standing up for others
Dishonorable	Not proper	Not proper	Letting others down	
Burdensome	A burden	A burden	Useless	
Disloyal		Disloyal		
Low tension words				
Satisfied		Satisfied	Satisfied with myself	Stood up for others
Honorable	Proper	Proper	Not letting other	Being there

			down	for others
Useful		Useful		
Loyal		Loyal		
Sympathy Alloic FEELING WORDS				
Wanted to make others feel good	Wanting to make others feel good	Looking to make others feel good		
Put self out for others	Putting others before myself	Putting other before myself	Putting others before myself	Putting others needs before my own
Gave up something of mine to give to others	Giving up something of mine to someone else	Giving up something of mine to someone else	Giving up something of mine to help someone else	Giving up something to help someone else
Being nice/ kind to others		Being nice/kind to others	Being nice/ kind to others	Being kind to others
Putting other's needs before my own		Putting other's needs before my own		
High tension words				
Guilty		Guilty		
Bad about myself		Bad about myself		
Heavy conscience	Selfish	Selfish		
Blameworthy		Blameworthy	Blameworthy	Not worthy
Low tension words				
Virtuous	Righteous	Righteous	Generous	
Good about myself		Good about myself		
Clear conscience	Giving	Giving		
Worthy	Worthy	Worthy		

**** Items kept but not agreed upon by all experts**

Content Validity

Items altered by the literacy expert or original items not accepted (1 or 2) by all experts were revised according to experts' recommendations and reading level was ascertained. When disagreements occurred between reading level (being too high) and theoretical accuracy, decisions were made according to theoretical accuracy. The content validity process included three rounds over five months before 99% agreement was reached among all experts (Table 36). One-hundred and six of the 109 items had an item CVI of 1.00. Subscale CVI scores ranged from 0.875 to 1.00 and S-CVI/Ave of .96 (Table 12). A new content valid instrument should have a minimum content validity index of .90 (Pilot & Beck, 2006; Waltz et al., 2005). Reversal theory experts also confirmed the overall theoretical relevance and completeness of the content domain for the overall scales (Grant & Davis, 1997). After content expert agreement was reached, literacy levels were confirmed again, all measures being below the 5th grade reading level (OTS 3.8 grade level; ETS 4.4 grade level; FTS 3.9 grade level). The kappa statistic also was run to assess the proportion of agreement remaining after chance agreement is removed (Cohen, 1960). Content validity was established with a kappa scores across all possible combinations averaging 0.986 with an average standard deviation of -.0002 ($k \geq .60$ acceptable; Wynd et al., 2003).

Expert Usability and Human Computer-Interaction Evaluation

Heuristic evaluation of usability and human computer-interaction involved an expert judging compliance of measures with recognized usability principles. The usability principles used in this study were adapted from the *Research-Based Web Design and Usability Guidelines* developed by the U.S. Department of Health and

Human Services (2003). Guidelines focused on ten categories of usability and human computer interaction assessment: optimizing user experience, accessibility, page layout, navigation, scrolling and paging, headings, titles and labels, text appearance, lists, screen-based controls and content organization. In this study, the expert responded to each of the three computer-administered instruments by completing the Expert Usability and Human Computer Interaction Checklist developed by investigator. The expert marked a “yes” if the item was met and a “no” if the item was not met. The investigator collaborated with the expert to resolve problematic issues with the procedures and instruments to reduce extraneous verbiage and streamline computerized administration.

Participant Opinion

After participants completed all computerized questionnaires, they were asked to complete two paper-and pencil questionnaires: the System Usability Scale and Participant Opinion Survey (Appendix A8, A9). The System Usability Scale measures effectiveness, efficiency and satisfaction (Brooke, 1996), consisting of a ten-item Likert scale with five-point degree of disagreement (1) to agreement (5). Questions are positively and negatively worded and cover a variety of aspects of system usability (support, training, complexity), thus, having a level of face validity for measuring usability of systems (Brooke, 1996). The scale is robust and reliable with item correlations (0.7 to 0.9; Brooke, 1996) Phase 1 results ranged from 70 to 100. Higher scores on the Usability Scale indicate user friendliness; with a maximum of 100. Participants were asked to make suggestions for revisions of the scales. Suggestions were taken into consideration in revising the scales before Phase 2.

The Participant Opinion Survey has nine questions about the clarity, completeness, significance, ease of completion, and amount of time to complete scales, one open-ended question, and two ten-point Likert-type items. Items with ratings less than a 7.0 average were evaluated and revised before Phase 2 evaluation. The open-ended question was transcribed verbatim and content analyzed for possible changes. The investigator collaborated with technology experts to resolve all issues raised by participants to improve procedures for Phase 2.

Performance Evaluation

The goal of performance evaluation was to identify issues that inhibit completion of the scales and instruments. Once the navigation, basic content, and display features were in place, quantitative performance testing (measuring time, wrong pathways, failure to find content, etc.) was conducted to ensure that usability objectives were met. Performance testing is a usability test that is characterized by having typical users perform a series of tasks in which speed, accuracy and success are closely monitored and measured (U.S. Department of Health and Human Services, 2003). The usability field study (performance evaluation) was conducted by the investigator, in which participants were observed as they completed all the computerized instruments. Six participants identified problems with the information architecture (navigation) and overall design issues (U.S. Department of Health and Human Services, 2003). The investigator monitored participant completion time for all measures (30 to 60 minutes), comments and questions about scales and procedures, and observed difficulty, all recorded on the performance record

(Appendix A9). The investigator collaborated with technology experts to resolve performance issues to improve procedures for upcoming Phase 2.

Technology Evaluation

After completing Phase 1 with experts and participants, the data bases were double checked for correct routing. At this time that the investigator and Information Technology expert found participants that chose the Mastery Autic state were being routed to the Sympathy Alloic questions and vice versa. Steps were taken to correct the routing before Phase 2 was started. No other routing issues were found.

Discussion and Implications

Readability of the Tension scales was established at the fifth grade level. Content validity was established using S-CVI/Ave (of .96) and kappa scores (across all possible combinations averaging 0.986). Usability and Human Computer-interaction was established by an expert reviewer and participants. Performance evaluation was conducted to improve the procedures. Participant evaluations yielded high scores on the System Usability Scale and Participant Opinion Survey. Phase 1 computer-administered routing of instrument data were evaluated and revised before Phase 2 was started.

Assessment of computer-administration issues; readability, content validity, usability and human-computer interaction (expert and participant) participant opinion and performance evaluation, should be conducted before reliability and validity evaluation. Assessing for computer-administration issues such as reading level, usability (procedures, font, navigation), layout of instruments (by expert) and

performance issue allows for correction of these issues prior to use of the instruments. Revising any computer-administration issues, not only creates user-friendly instruments and procedures, but improves the chances of supporting reliability and validity results uncluttered with computer-administration issues.

Limitations

Limitations in Phase 1 included: (a) the three scales do not address other contributing factors of obesity, such as the environment, heredity, socioeconomics, and physiologic factors; (b) the lack of an iterative process between the Literacy expert and the Content Validity experts could have effected the readability results by not having an expert double check the findings (c) financial constraints prevented computer screen advancement to the next pages when all items were completed. This feature is to avoid missing data and will be installed in the future; and (d) the sample of six individuals were all Caucasian. Even though Kansans are predominantly Caucasian, greater ethnic mix may have revealed unknown issues with scales.

Conclusions

Phase 1 established: the readability of the scales at less than a 5th grade reading level per expert use of Fry/ Ragor measure; content validity per S-CVI/Ave of .96 and kappa scores across all possible combinations average 0.986; usability and human-computer interface per expert evaluation and participant evaluation and; performance through an evaluation with participants. Phase 1's goal to establish the computer-administration of the three tension scales was achieved. Phase 2 internal consistency reliability and construct validity evaluation of the Tension Scales will consist of four

evaluation steps: (a) item analysis, (b) internal consistency reliability, (c) convergent validity testing and (d) hypothesis testing. The long-term objective is to establish measures for assessing impact of overeating tension, exercise tension and feelings tension in rural Telehealth weight management patients.

Phase 2: Results

Psychometric Evaluation of Three Computer-Administered Tension Scales for Weight Management in Rural Telehealth Settings

Phase 2: Evaluation of Psychometric Properties of Instruments

Background: Currently, measures are lacking to assess the parameters of the multifaceted problem of overweight and obesity. Earlier study suggests that measures are needed to assess overeating tension, exercise tension, and feelings tension as contributing factors to the obesity epidemic in America. *Purpose:* The purpose of this pilot study was to evaluate the psychometric analysis of the three tension scales, Overeating Tension, Exercise Tension and Feelings Tension, in three rural settings served by the University of Kansas Telehealth Program. *Methods:* Psychometric evaluations of internal consistency reliability and construct validity were conducted with 61 participants in Phase 2. *Results:* Internal consistency reliability and construct validity were supported. Participants with higher Body Mass Index (BMI; $[kg]/height [m^2]$) had higher tension scores on the Overeating Tension, Exercise Tension, and Feelings Tension Scales compared to those with lower BMI. *Conclusions:* This study established preliminary internal consistency reliability and construct validity of the three computer-administered tension scales.

Keywords: overeating, exercise, feeling tension scales; weight management; rural telehealth; internal consistency reliability; construct validity; hypothesis testing; convergent validity

The purpose of this pilot study was to evaluate the computer administration and psychometric properties of three computer-administered tension scales, Overeating Tension (OTS), Exercise Tension (ETS), and Feelings Tension (FTS), in three rural tele-health settings. The prototype for the study was based on development studies of the original OTS in 2000 (Popkess-Vawter, Gerkovich, & Wendel, 2000). The present study was divided into two Phases: (a) Phase 1 (reported in Part one) was a field test of the readability, content validity, usability and human-computer interaction, performance, and participant evaluation of the scales; and (b) Phase 2 (reported in Part two) was an evaluation of internal consistency reliability and construct validity (convergent validity and hypothesis testing) of the tension scales. This study addressed the need for specific weight management outcome instruments for use with patients in underserved rural Kansas communities.

Phase 1 established: readability at less than a 5th grade level using a linguistics expert; content validity using reversal theory experts, content validity index and kappa scores; usability, human-computer interface and performance using expert evaluation; and participant evaluation. Background and development of the Tension measures will not be repeated here; instead, results of Phase 2 of study will be presented, namely, the psychometric evaluation of the Overeating Tension Scale (OTS), Exercise Tension Scale (ETS), and Feelings Tension Scale (FTS). Each scale is comprised of 32 items (4 bipolar terms for 8 metamotivational states) derived directly from reversal theory (Apter, 1989). In Phase 1 of study, a linguistics expert established readability at a 5th grade level, reversal theory content experts verified

validity of the measures, and a technology expert verified usability and human computer interface for three Tension scales. Phase 2 of this study consisted of three reliability and validity evaluation steps: (a) internal consistency reliability, (b) convergent validity, and (c) construct validity hypothesis testing.

Measures

Eight computer-administered measures were used in this study, including three Tension Scales being tested, and four measures used to evaluate convergent validity, including the BULIT bulimia scale, International Physical Activity Questionnaire (IPAC), Rosenberg Self-Esteem scale, and the Tension and Effort Stress Inventory (TESI). The Marlow-Crowne Social Desirability scale was used to evaluate social desirability for purposes of exclusion. Complete information about measures is found in Table 1.

Table 1
Outcome Measures

INSTRUMENT NAMES AND AUTHORS	# OF ITEMS, VARIABLE, MEASURES SPECIFICS, AND PREVIOUS RELIABILITIES, NORMATIVE DATA (M)	STUDY RELIABILTY COEFFICIENTS	NORMATIVE DATA (M/ SD)
Bulimia Test (BULIT), Thelen, McLaughlin-Mann Pruitt, and Smith (1987).	36-item, scale for bulimia diagnosis. Positive predictive value of .74, negative predictive value of .84, specificity of .89, and sensitivity of .64 id diagnosing bulimia	α =.924	M=60.8 SD.=17.7 N=33
International Physical	7-item short-answer measure of physical	α =.577	N=61

Activity Questionnaire (IPAQ)	activity. Test-retest reliability was established with Spearman's Rho clustering around 0.8. Criterion validity was established with a median Rho of .30 against the CSA accelerometer minutes		
Rosenberg Self-Esteem Scale (RSES) Rosenberg, 1965	10-item, four-point Likert-type general measure of self-esteem. alpha=.77-.88	$\alpha = .85$	<i>N</i> =67 M=20.9 <i>SD</i> =4.6 <i>N</i> =61
Tension and Effort Stress Inventory (TESI) (Svebak, 1993) overeating situation	24-item survey measure of individuals' experiences of stressors, moods, and efforts to cope. Stressor and effort-scores positively correlated ($r = .57, p < .0001$), effort discrepancy scores positively correlate to overall scores on tension-stress ($r = .65, p < .0001$)	Stressor and effort-scores positively correlated ($r = .57, p < .0001$), effort discrepancy scores positively correlate to overall scores on tension-stress ($r = .65, p < .0001$) $\alpha = .873$	<i>N</i> =15
Tension and Effort Stress Inventory (TESI) (Svebak, 1993) Skipped exercise situation	24-item survey measure of individuals' experiences of stressors, moods, and efforts to cope. Stressor and effort-scores positively correlated ($r = .57, p < .0001$), effort discrepancy scores positively correlate to overall scores on tension-stress ($r = .65, p < .0001$)	$\alpha = .707$	<i>N</i> =14
Tension and Effort Stress Inventory	24-item survey measure of individuals' experiences of stressors,	$\alpha = .61$	<i>N</i> =12

(TESI) (Svebak, 1993) low esteem situation	moods, and efforts to cope. Stressor and effort-scores positively correlated ($r = .57, p < .0001$), effort discrepancy scores positively correlate to overall scores on tension-stress ($r = .65, p < .0001$)		
Marlowe-Crowne 2(10) Social Desirability Scale (Reynolds, 1982)	10 true-false items of social desirability. Total scale alpha = .80	$\alpha = .589$	$N = 61$

The Tension Scales

The Overeating Tension Scale is comprised of 32 items (4 bipolar terms for 8 motivational states) derived directly from reversal theory (Popkess-Vawter, et al., 2000). Content experts attested to the scale's content validity, accuracy in representing the theory (Apter, 1989), and understanding at the eighth grade level. In this study, the investigator sought to lower reading level to fifth grade as suggested by current psychometric experts (Gottlieb & Rogers, 2004) to more appropriately target rural populations. The Overeating Tension Scale is unique in focus on measuring tension *before* overeating (rather than focusing on situations and eating behaviors themselves) and motivation-specific feelings preceding overeating. Validity and reliability studies for development of the overeating tension scale were reported in the Theoretical Framework section of Part One of this article.

Convergent validity was tested for the computer-administered version of the three Tension Scales comparing them with the TESI specific to an overeating, skipping exercise, and feeling down situations. Since tension scales and TESI are all state measures of tension, it was anticipated that their total score correlations would be moderately correlated, between .30 to .60, but not highly correlated as the Tension scales and the TESI measures assess slightly different reversal theory variables (Waltz et al., 2005).

The Exercise Tension Scale measures the discrepancy between the way individuals felt and the way they wanted to feel before skipping planned exercise. Exercise is self-defined by participants as regular, repeated bodily exertion to maintain physical fitness. Convergent validity was tested for the computer-administered version of the Exercise Tension Scale using the items from the TESI specific to the situation of skipping exercise. Since both are state instruments of tension it is anticipated that their total score correlations would be moderately correlated, between .30 to .60 (Waltz et al., 2005).

The Feelings Tension Scale measures the discrepancy between the way individuals felt and the way they wanted to feel before recognizing they were down or low. Convergent validity was tested for the computer-administered version of the Feelings Tension Scale using the items from the TESI specific to feeling down and low. Since both are state instruments of tension it is anticipated that their total score correlations would be moderately correlated, between .30 to .60 (Waltz et al., 2005).

Scoring of the three Tension Scales is explained here as performed on paper and pencil scales; computerized scoring is automatically programmed in the same manner. On the 10-point continuum, participants mark an “X” for “how they were feeling just before overeating, skipping exercise, and feeling down or low; they mark an “O” for “how they wanted to feel”; this format was adapted from the Sherwood Inventory of the Self-concept (Robinson & Shaver, 1970). Unpleasant feeling words are on the left, lower end of the 10-point continuum (unsettled, uneasy, anxious, nervous) and pleasant feeling words are at the upper end (e.g., settled, at ease, calm, composed). The highest value of 10 corresponds with the strongest of pleasant feelings (no/low tension) and the lowest value of 1 corresponds with the strongest of unpleasant feelings (medium/high tension). The difference between the values marked for actual feelings (X) and desired feelings (O) provides a discrepancy score (D) that matches the theoretical definition of tension ($O-X=D$). Total overeating tension scores were summed for the three subscales to provide an overall tension score ranging from 0-108 (highest discrepancy scores of $9 \times 4 \text{ items} \times 3 \text{ subscales} = 108$). Motivation-specific tension subscale scores ranging from 0-36 (highest discrepancy scores of $9 \times 4 \text{ items} = 36$) were compared to detect which motivation carries the most tension (highest discrepancy score).

The Convergent Validity and Hypothesis-Testing Measures

Measures chosen to evaluate convergent validity in Phase 2 included the Bulimia Test (BULIT), International Physical Activity Questionnaire (IPAQ), and Rosenberg Self-Esteem Scale (RSES). Instruments were selected based on their

extensive use in health-related research and robust reliability and validity. The BULIT was established as useful for describing overeating behaviors and bulimia in earlier weight management research (Popkess-Vawter & Owens, 1999). The IPAQ is recommended as a viable method of monitoring population levels of physical activity globally for populations 18-69 years of age (IPAQ, 2002). Rosenberg's self-esteem scale was chosen for its short length and global sense of self-worth, self-acceptance, and self-respect (Rosenberg, 1965). The Tension and Effort Stress Inventory (TESI) is the only comparable measure of individuals' experiences of stressors, moods, and efforts to cope, which is also based on reversal theory (Svebak, 1993).

The BULIT is a 32-item, self-report, five-point multiple-choice scale used to distinguish among individuals with bulimia, those at risk for binge eating, and those with no eating problems (Popkess-Vawter & Owens, 1999). Possible total scores range from 32 to 160 (there are no subscales); individuals who score high (102 and above) are classified as having a probable diagnosis of bulimia. Thelen, McLaughlin-Mann Pruitt, and Smith (1987) reported the BULIT to have positive predictive value of .74, negative predictive value of .84, specificity of .89, and sensitivity of .64 for identifying individuals with bulimia in college populations (Popkess-Vawter, et al., 2000; Popkess-Vawter & Owens, 1999; Appendix B4).

The International Physical Activity Questionnaire (IPAQ) is a seven-item short-answer instrument of physical activity, with established reliability and validity in 12 countries. Test-retest reliability was established with Spearman's Rho clustering around 0.8. Criterion validity was established with a median Rho of .30 against

accelerometer minutes of moderate, vigorous, walking, and sedentary behaviors. The IPAQ instrument has acceptable measurement properties comparable to other established instruments (Appendix B5; IPAQ, 2002).

Rosenberg self-esteem scale (RSES), a 10-item, four-point Likert-type general measure of self-esteem, has been widely used in self-esteem research over the past 30 years ($\alpha = .77-.88$). Self-esteem refers to self-worth, self-acceptance, and self-respect, as well as evaluations of self appearance, academics and athletic abilities (Rosenberg, 1965; Rosenberg, Scholler, Schoenbach, & Rosenberg, 1995). Repeated application of Rosenberg to measure short-term changes has been shown in intervention studies, contrary to past belief that self-esteem is a stable trait (Crocker & Wolfe, 2001) (Appendix B6).

The Tension and Effort Stress Inventory (TESI) is a one page, 24-item survey measure of individuals' experiences of stressors, moods, and efforts to cope. The term "tension-stress" refers to "pushing oneself, or the exertion of willing power to reduce the tension that is provoked by a stressor" (p. 195). The state TESI estimates the degree of pressure, stress, challenge or demand that you have been exposed to in everyday life over that last thirty days as do to: (1) work, (2) family, (3) finance, and (4) one's own body. The first four items on stressors are on a 7-point scale rated from "No pressure" to "Very much pressure". The same labeling format is given for the next 4 items that examine efforts invested to cope. The last 16 items on moods are presented with a 7-point scale rate from "Not at all" to "Very much". Svebak (1993) reported correlations of (a) stressor and effort-scores were positively correlated ($r=$

.57, $p < .0001$), (b) versus effort discrepancy scores were positively correlated to overall scores on tension-stress ($r = .65$, $p < .0001$) confirming basic assumptions about relations between amount of stressors and related efforts to cope. Results from a intervention study validated support of the TESI through hypothesis testing and hierarchical regression analysis (content validity; Svebak, 1993).

The revised Marlow-Crowne 2 (10) Social Desirability Scale contains 10 true-false items that discriminate between respondents who are and are not willing to report socially undesirable information (Reynolds, 1982). The revised short form was found to have improved psychometric characteristics ($\alpha = .80$), no gender differences, and less administration time than the full 33-item scale (Loo & Thorpe, 2000). The Marlow-Crowne scale was used to detect subjects' use of socially desirable answers that could negatively influence construct validity. Possible scores on the Marlow-Crowne range from zero to ten; zero being low social desirability and ten being high social desirability. No participant scored the highest score of ten, but three participants scored a nine. When these participants' scores were removed from the data sets and Cronbach's alphas were recalculated, alpha scores on the measures did not change. No participants were excluded from the data analysis due to high social desirable scores.

Methods

Procedures

Potential participants called their local Telehealth Nurse in response to local media advertisements, giving their names, phone numbers, and a time they could be

reached. The Telehealth Nurse emailed or called potential participants information to the investigator. Rural residents are accustomed to scheduling appointments with Telehealth Nurses; this procedure avoided long distance telephone calls for participants to inquire about the study. The Investigator explained the study in detail to participants, answered questions, established that participants met study criteria, and scheduled appointment times at local clinics. Entry criteria for both Phases included (a) women and men, (b) ages 21 or older, and (c) English-speaking, reading, and writing at a 5th grade level or above. Exclusion criteria for both Phases included those who self-reported being pregnant, having any illness/health process that could influence weight loss/gain (self-reported anorexia, bulimia or psychosis), or those taking medications that might affect psychological perceptions measured in the study (steroids; anti-psychotic medications, e.g., tricyclic antidepressant medications for psychological disorders; insulin for diabetes mellitus).

At the appointed time, potential participants arrived at the clinic and were escorted by the investigator to a private room. Entry and exclusion criteria were verified, participants' questions were answered, and consents were signed and copied for those who were qualified and consented. Fifth grade reading levels were confirmed for all participants using the Slosson reading list (Slosson, 1977). All participants correctly read aloud 20 of 40, 46-font words listed on four pages. The investigator measured participants' height and weight (no shoes or excess clothing) to calculate Body Mass Index (BMI). All participants' BMI were assessed using

measured height and weight plotted on the NIH/NIHBI BMI chart and recorded on the Procedural Checklist.

After completing physical instruments, participants were asked to sit beside the investigator at a computer; the investigator was seated adjacent to participants at all times. The investigator determined if participants were comfortable using the computer mouse; two individuals opted to be shown a demonstration; the investigator entered responses for one participant. Participants were assigned confidential identification numbers in the same order as their arrival for data collection. The investigator used three alternate orders of the questionnaires (using a randomized table) to control for response set.

Sample

The 61 participants lived in two rural communities in a Midwestern state. Participants, ranging in age from 21 to 77 years, were predominately female (80%) Caucasian, and married; 60% percent had greater than 12 years of education. One participant was under weight (BMI < 20), thirteen were normal weight (BMI 20-24), thirteen were overweight (BMI 25-29), twenty-five were obese (BMI 30-39), and nine were morbidly obese (BMI >39). Table 2 shows participants' demographic characteristics.

Table 2
 Descriptive Statistics for Sample for Phase 1 and Phase 2
 Psychometric Testing

Variable	Phase 1 Freq. (%) (N=6)	Phase 2 Freq. (%) (N=61)
Gender		
Male	1 (13)	13 (20)
Female	5 (87)	48 (80)
Marital Status		
Single	0	9 (14)
Married	6 (100)	47 (78)
Divorced	0	4 (7)
Widowed	0	1 (2)
Ethnicity		
Caucasian	6 (100)	54 (88)
Native American	0	6 (10)
Hispanic	0	1 (2)
Age		
21-29	0	11 (19)
30-39	2 (30)	8 (14)
40-49	3 (50)	6 (7)
50-59	1 (20)	15 (24)
60-69	0	16 (24)
70-79	0	6 (10)

Results

Internal Consistency Reliability

Internal consistency reliability examines the consistency of performance of one group of individuals across the items on a single measure (Waltz et al., 2005). The Cronbach alpha coefficient is the preferred index of internal consistency reliability and “represents the extent to which performance on any one item on an instrument is a good indicator of performance on any other item in the same instrument” (Waltz, Strickland & Lenz, 2005, p140). An alpha coefficient greater than or equal .70 was considered acceptable evidence of internal consistency (Nunnally & Bernstein, 2005).

Internal consistency of each of the eight subscales for the OTS, ETS, and FTS was estimated by calculating the coefficient alpha for the four discrepancy scores for each reversal theory state while using SPSS programming to filter out opposite states measured by the subscale; for example, Paratelic discrepancy scores were filtered to calculate alpha coefficients for Telic and vica versa. Overall, alpha coefficients for the eight metamotivational states on the OTS ranged from .719 to .970; on the ETS ranged from .883 to .975; and on the FTS ranged from .730 to .955 (Tables 3, 4, 5). Internal consistency reliability of the total scores on the three tension scales (sum of three subscales) had alpha coefficients higher than the acceptable level of $\geq .70$; specifically, OTS $\alpha = .898$; ETS $\alpha = .801$; FTS $\alpha = .879$ (Table 6).

Table 3

Reliability Analysis for the Overeating Tension Scale for Discrepancy

MOTIVATIONAL STATE	ITEMS INCLUDED	Alpha if item deleted	ALPA COEFF	<i>n</i>
TELIC	unsettled/settled	.887	.925	13
	anxious/relaxed	.920		
	worried/notworried	.907		
	nervous/calm	.892		
PARATELIC	bored/excited	.876	.912	41
	unstimulated/stimulated	.941		
	uninterested/interested	.874		
	indifferent/enthused	.850		
CONFORMIST	embarrassed/notembarrassed	.929	.932	42
	misunderstood/agreewith	.898		
	rejected/ belonging	.888		
	insecure/secure	.932		
NEGATIVISTIC	trapped/free	.813	.889	11
	held back/released	.771		
	caught/unrestricted	.983		
	limited/unlimited	.771		
MASTERY-AUTIC	notincontrol/incontrol	.968	.970	7
	shamed/proud	.976		
	weak/sturdy	.949		
	disrespected/respected	.944		
MASTERY-ALLOIC	notvalued/valued	.960	.789	3
	notcaredfor/caredfor	.634		
	resentful/grateful	.733		
	hurt/loved	.671		
SYMPATHY-AUTIC	notstandingupforothers/stoodupforothers	.951	.962	17
	lettingothersdown/beingthere for others	.951		
	useless/useful	.960		
	disloyal/loyal	.939		
SYMPATHY-ALLOIC	guilty/generous	.569	.719	25
	badaboutmyself/ goodaboutmyself	.538		
	selfish/giving	.836		
	notworthy/worthy	.591		

Table 4

Reliability Analysis for the Exercise Tension Scale for Discrepancy Scores

MOTIVATIONAL STATE	ITEMS INCLUDED	Alpha if item deleted	ALPHA COEFF.	<i>n</i>
TELIC	unsettled/settled	.910	.883	41
	anxious/relaxed	.831		
	worried/notworried	.852		
	nervous/calm	.799		
PARATELIC	bored/excited	.906	.920	15
	unstimulated/stimulated	.870		
	uninterested/interested	.872		
	indifferent/enthused	.929		
CONFORMIST	embarrassed/notembarrassed	.923	.923	47
	misunderstood/agreewith	.896		
	rejected/ belonging	.897		
	insecure/secure	.880		
NEGATIVISTIC	trapped/free	.950	.921	18
	held back/released	.882		
	caught/unrestricted	.866		
	limited/unlimited	.892		
MASTERY-AUTIC	notincontrol/incontrol	.950	.961	12
	shamed/proud	.943		
	weak/sturdy	.949		
	disrespected/respected	.952		
MASTERY-ALLOIC	notvalued/valued	.869	.902	6
	notcaredfor/caredfor	.814		
	resentful/grateful	.872		
	hurt/loved	.946		
SYMPATHY-AUTIC	notstandingupforothers/stoodupforothers	.970	.975	10
	hers	.961		
	lettingothersdown/beingthere for others	.976		
	useless/useful	.958		
	disloyal/loyal			
SYMPATHY-ALLOIC	guilty/generous	.935	.940	28
	badaboutmyself/ goodaboutmyself	.922		
	selfish/giving	.923		
	notworthy/worthy	.904		

Table 5

Reliability Analysis for the Feelings Tension Scale for Discrepancy Scores

MOTIVATIONAL STATE	ITEMS INCLUDED	Alpha if item deleted	ALPA COEF F.	<i>n</i>
TELIC	unsettled/settled	.926	.941	48
	anxious/relaxed	.913		
	worried/notworried	.909		
	nervous/calm	.941		
PARATELIC	bored/excited	.911	.855	6
	unstimulated/stimulated	.725		
	uninterested/interested	.795		
	indifferent/enthused	.748		
CONFORMIST	embarrassed/notembarrassed	.918	.874	46
	misunderstood/agreewith	.818		
	rejected/ belonging	.817		
	insecure/secure	.773		
NEGATIVISTIC	trapped/free	.851	.902	8
	held back/released	.866		
	caught/unrestricted	.873		
	limited/unlimited	.899		
MASTERY-AUTIC	notincontrol/incontrol	.751	.810	18
	shamed/proud	.724		
	weak/sturdy	.739		
	disrespected/respected	.819		
MASTERY-ALLOIC	notvalued/valued	.627	.730	3
	notcaredfor/caredfor	.699		
	resentful/grateful	.842		
	hurt/loved	.330		
SYMPATHY-AUTIC	notstandingupforothers/stoodupforothers	.943	.955	9
	lettingothersdown/beingthere for others	.949		
	useless/useful	.933		
	disloyal/loyal	.937		
SYMPATHY-ALLOIC	guilty/generous	.950	.939	24
	badaboutmyself/ goodaboutmyself	.919		
	selfish/giving	.901		
	notworthy/worthy	.911		

Table 6

Total Scale Score: Cronbach's Alpha Correlation Coefficients

OTS	Total score Alpha	Subscale	Alpha if item deleted	M/ SD	n
OTS	.898	P/T	.915	8.65/ 9.40	54
		C/D	.825	6.93/ 8.35	
		MA/MAII/SA/SAll	.818	8.09/ 8.85	
ETS	.801	P/T	.804	14.39/ 9.74	56
		C/D	.724	11.29/ 10.47	
		MA/MAII/SA/SAll	.650	10.34/ 9.57	
FTS	.879	P/T	.882	18.24/ 11.96	54
		C/D	.804	11.87/ 10.49	
		MA/MAII/SA/SAll	.805	12.69/ 10.29	

P= Paratelic; T= Telic; C= Compliant; D= Defiant; MA= Mastery Autic; MAII= Mastery Alloic; SA= Sympathy Autic; SAll= Sympathy Alloic

Alpha if-item-deleted scores were examined for each of the eight metamotivational state's four discrepancy items to determine whether items should be omitted to improve the internal consistency. Each of the Tension scales (OTS, ETS, FTS) had four different items from different states. Improvements of alpha coefficients if items were deleted were minimal, increasing overall alphas coefficients only .003 to .017 (Tables 7-30). The three combined subscales for each tension scale have item-if-delete scores of OTS (.818 - .915); ETS (.650 - .804); FTS (.804 - .882) (Table 31-33).

Inter-item correlations also were examined to assess internal consistency. The OTS scale's eight metamotivational states had inter-item correlations ranging from .498 to .994 (Table 1-14); the ETS scale's eight metamotivational states had inter-item correlations ranging from .532 to .921 (Table 15-22) ; and the FTS scale's eight metamotivational states had inter-item correlations of .483 to .933 (Table 23-30).The

correlations for all three subscales of the three tension measures are highly correlated and ranged from OTS ($r = .697-.845, p = .000$); ETS ($r = .483-.675, p = .000$); FTS ($r = .680-.789, p = .000$) (Table 31-33). For each of the three tension scales, all subscale correlations were greater than .30 and considered sufficiently related (Ferketich, 1991).

Table 7

Inter Item correlations Overeating Tension Scale (OTS) TELIC $n=13$

correlations	unsettled/settled	anxious/relaxed	worried/notworried	nervous/calm
unsettled/settled	$n=13$			
anxious/relaxed	.890** .000	$n=13$		
worried/notworried	.763** .002	.622* .011	$n=13$	
nervous/calm	.758** .000	.673* .012	.786** .000	$n=13$

Table 8

Inter Item correlations OTS PARATELIC $n=41$

correlations	bored/excited	unstimulated/stimulated	uninterested/interested	indifferent/enthusiased
bored/excited	$n=41$			
unstimulated/stimulated	.598** .000	$n=41$		
uninterested/interested	.838** .000	.562** .000	$n=41$	
indifferent/enthusiased	.813** .000	.703** .000	.822** .000	$n=41$

Table 9

Inter Item correlations OTS COMPLIANT *n*=42

correlations	embarrassed/embarrassed	misunderstood/agreed with	rejected/belonging	insecure/secure
embarrassed/embarrassed	<i>n</i> =42			
misunderstood/agreed with	.809**	<i>n</i> =42		
rejected/belonging	.000		<i>n</i> =42	
insecure/secure	.834**	.872**		<i>n</i> =42
	.000	.000		
	.635**	.768**	.847**	
	.000	.000	.000	

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)

Table 10

Inter Item correlations OTS DEFIANT *n*=11

correlations	trapped/free	held back/released	caught/unrestricted	limited/unlimited
trapped/free	<i>n</i> =11			
Held back/released	.944**	<i>n</i> =11		
caught/unrestricted	.000		<i>n</i> =11	
limited/unlimited	.166	.377		<i>n</i> =11
	.625	.253		
	.982**	.970**	.337	
	.000	.000	.310	

Table 11

Inter Item correlations OTS MASTERY AUTIC *n*=7

correlations	notincontrol/incontrol	shamed/proud	weak/sturdy	disrespected/respected
notincontrol/incontrol	<i>n</i> =7			
Shamed/proud	.899**	<i>n</i> =7		
weak/sturdy	.006		<i>n</i> =7	
disrespected/respected	.898**	.978**		<i>n</i> =7
	.006	.000		
	.903**	.993**	.996**	
	.005	.000	.000	

Table 12

Inter Item correlations OTS MASTERY ALLOIC *n*=1

correlations	notvalued/ valued	notcaredfor/ caredfor	resentful/grateful	hurt/loved
Notvalued/ valued	<i>n</i> =1			
notcaredfor/ caredfor		<i>n</i> =1		
resentful/ grateful			<i>n</i> =1	
hurt/loved				<i>n</i> =1

Table 13

Inter Item correlations OTS SYMPATHY AUTIC *n*=17

correlations	notstandingupfor others/ stoodupforothers	lettingothersdown/ own/ beingthere for others	useless/ useful	disloyal/ loyal
notstandingupfor others/ stoodupforothers	<i>n</i> =17			
lettingothersdown/ beingthere for others	.894** .000	<i>n</i> =17		
useless/ useful	.841** .000	.805** .000	<i>n</i> =17	
lettingothersdown/ disloyal/loyal	.863** .000	.917** .000	.919** .000	<i>n</i> =17

Table 14

Inter Item correlations OTS SYMPATHY ALLOIC *n*=25

correlations	guilty/generous	Anxious/relaxed badaboutmyself / goodaboutmyself	selfish/giving	notworthy/worthy
guilty/generous	<i>n</i> =25			
badaboutmyself/ goodaboutmyself	.717** .000	<i>n</i> =25		
selfish/giving	.150 .474	.044 .843	<i>n</i> =25	
notworthy/worthy	.498** .011	.706** .000	.224 .281	<i>n</i> =25

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)

TABLE 15

Inter Item correlations Exercise Tension Scale (ETS) TELIC *n*=41

Correlations	unsettled/settled	anxious/relaxed	worried/notworried	nervous/calm
unsettled/settled	<i>n</i> =41			
anxious/relaxed	.532** .000	<i>n</i> =41		
worried/notworried	.479** .002	.711** .000	<i>n</i> =41	
nervous/calm	.623** .000	.837** .000	.784** .000	<i>n</i> =41

TABLE 16

Inter Item correlations ETS PARATELIC *n*=15

Correlations	bored/excited	unstimulated/stimulated	uninterested/interested	indifferent/enthusiased
bored/excited	<i>n</i> =15			
unstimulated/stimulated	.757** .001	<i>n</i> =15		
uninterested/interested	.824** .000	.901** .000	<i>n</i> =15	
Indifferent/enthusiased	.583** .000	.775** .0010	.682** .005	<i>n</i> =15

TABLE 17

Inter Item correlations ETS COMPLIANT *n*=37

Correlations	embarrassed/not embarrassed	misunderstood/agree with	rejected/belonging	insecure/secure
embarrassed/not embarrassed	<i>n</i> =37			
misunderstood/agree with	.620** .000	<i>n</i> =37		
rejected/belonging	.775** .000	.743** .000	<i>n</i> =37	
insecure/secure	.706** .000	.896** .000	.758** .000	<i>n</i> =37

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)

Table 18.

Inter Item correlations ETS DEFIANT *n*=18

correlations	trapped/free	held back/released	caught/unrestricted	limited/unlimited
trapped/free	<i>n</i> =18			
held back/released	.682** .002	<i>n</i> =18		
caught/unrestricted	.705** .000	.860** .000	<i>n</i> =18	
limited/unlimited	.578* .012	.847** .000	.889** .000	<i>n</i> =18

Table 19

Inter Item correlations ETS MASTERY AUTIC <i>n</i> =12				
correlations	notincontrol/incontrol	shamed/proud	weak/sturdy	disrespected/respected
notincontrol/incontrol	<i>n</i> =12			
shamed/proud	.832** .001	<i>n</i> =12		
weak/sturdy	.849** .000	.924** .000	<i>n</i> =12	
disrespected/respected	.925** .000	.880** .000	.829** .000	<i>n</i> =12

Table 20

Inter Item correlations ETS MASTERY ALLOIC <i>n</i> =6				
correlations	notvalued/valued	notcaredfor/caredfor	resentful/grateful	hurt/loved
notvalued/valued	<i>n</i> =6			
notcaredfor/caredfor	.959** .003	<i>n</i> =6		
resentful/grateful	.795 .059	.891* .017	<i>n</i> =6	
hurt/loved	.673 .143	.733 .097	.567 .240	<i>n</i> =6

Table 21

Inter Item correlations ETS SYMPATHY AUTIC <i>n</i> =10				
Correlations	notstandingupforothers/ stoodupforothers	lettingothers down/ beingthere for others	useless/useful	disloyal/loyal
notstandingupforothers/ stoodupforothers	<i>n</i> =10			
Lettingothersdown/ beingthere for others	.921** .000	<i>n</i> =10		
useless/useful	.864** .000	.883** .001	<i>n</i> =10	
Lettingothersdown/ disloyal/loyal	.910** .000	.964** .000	.913** .000	<i>n</i> =10

Table 22

Inter Item correlations ETS SYMPATHY ALLOIC *n*=28

Correlations	guilty/generous	Anxious/relaxed badaboutmyself/ goodaboutmyself	selfish/giving	notworthy/worthy
guilty/generous	<i>n</i> =28			
badaboutmyself/ goodaboutmyself	.745**	<i>n</i> =28		
selfish/giving	.809**	.739**	<i>n</i> =28	
Notworthy/worthy	.769**	.904**	.860**	<i>n</i> =28
	.000	.000	.000	

Table 23

Inter Item correlations Feelings Tension Scale (FTS) TELIC *n*=48

correlations	unsettled/settled	anxious/relaxed	worried/notworried	nervous/calm
unsettled/settled	<i>n</i> =48			
anxious/relaxed	.833**	<i>n</i> =48		
worried/notworried	.821**	.874*	<i>n</i> =48	
nervous/calm	.727**	.752**	.796**	<i>n</i> =48
	.000	.000	.000	

Table 24

Inter Item correlations FTS PARATELIC *n*=7

correlations	bored/excited	unstimulated/stimulated	uninterested/interested	indifferent/enthusiased
bored/excited	<i>n</i> =7			
unstimulated/stimulated	.766	<i>n</i> =7		
uninterested/interested	.225	.715	<i>n</i> =7	
indifferent/enthusiased	.668	.071	.835*	<i>n</i> =7
	.496	.933**	.038	
	.317	.007		

Table 25

Inter Item correlations FTS COMPLIANT *n*=47

correlations	embarrassed/not embarrassed	misunderstood/ agreewith	rejected/ belonging	insecure /secure
embarrassed/note mbarrassed	<i>n</i> =47			
misunderstood/ag reewith	.437** .002	<i>n</i> =47		
rejected/ belonging	.424** .0023	.723** .000	<i>n</i> =47	
insecure/secure	.515** .000	.820** .000	.835** .000	<i>n</i> =47

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)

Table 26

Inter Item correlations FTS DEFIANT *n*=8

Correlations	trapped/free	held back/release d	caught/unre stricted	limited/un limited
trapped/free	<i>n</i> =8			
held back/released	.812* .014	<i>n</i> =8		
caught/unrestricted	.814* .014	.616 .104	<i>n</i> =8	
limited/unlimited	.584 .129	.692 .057	.664 .072	<i>n</i> =8

Table 27

Inter Item correlations FTS MASTERY AUTIC *n*=18

Correlations	notincontrol/i ncontrol	shamed/pro ud	weak/sturdy	disrespect ed/respect ed
notincontrol/incontrol	<i>n</i> =18			
shamed/proud	.483* .042	<i>n</i> =18		
weak/sturdy	.621** .006	.738** .000	<i>n</i> =18	
disrespected/respecte d	.486* .041	.518* .027	.289 .244	<i>n</i> =18

Table 28

Inter Item correlations FTS MASTERY ALLOIC $n=3$

Correlations	notvalued/valued	notcaredfor/caredfor	resentful/grateful	hurt/loved
notvalued/valued	$n=3$			
notcaredfor/caredfor	.976 .139	$n=3$		
resentful/grateful	.000 .1000	-.217 .861	$n=3$	
hurt/loved	.836 .370	.691 .509	.549 .630	$n=3$

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)

Table 29

Inter Item correlations FTS SYMPATHY AUTIC $n=9$

correlations	notstandingupforothers/ stoodupforothers	lettingothersdown/ beingthere for others	useless/useful	disloyal/loyal
notstandingupforothers/ stoodupforothers	$n=9$			
lettingothersdown/ beingthere for others	.953** .000	$n=9$		
useless/useful	.837** .005	.805** .009	$n=9$	
lettingothersdown/ disloyal/loyal	.777* .014	.802** .009	.972** .000	$n=9$

Table 30

Inter Item correlations FTS SYMPATHY ALLOIC *n*=24

correlations	guilty/generous	Anxious/relaxed badaboutmyself / goodaboutmyself	selfish/giving	notworthy/worthy
guilty/generous	<i>n</i> =24			
badaboutmyself/ goodaboutmyself	.677** .000	<i>n</i> =24		
selfish/giving	.737** .000	.910** .000	<i>n</i> =24	
Notworthy/worthy	.773** .000	.815** .000	.871** .000	<i>n</i> =24

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)

Table 31

OTS subscale correlations *n*=54

Correlations Of subscales with negatives removed	Telic/ Paratelic	Compliant/ Defiant	Master Autic/ Master Alloic/ Sympathy Autic/ Sympathy Alloic
Telic/ Paratelic	<i>n</i> =54		
Compliant/ Defiant	.697** .000	<i>n</i> =54	
Master Autic/ Master Alloic/ Sympathy Autic/ Sympathy Alloic	.704** .000	.845** .000	<i>n</i> =54

Table 32

ETS subscale correlations $n=56$

Correlations Of subscales with negatives removed	Telic/ Paratelic	Compliant/ Defiant	Master Autic/ Master Alloic/ Sympathy Autic/ Sympathy Alloic
Telic/ Paratelic	$n=56$		
Compliant/ Defiant	.483** .000	$n=56$	
Master Autic/ Master Alloic/ Sympathy Autic/ Sympathy Alloic	.567** .000	.675** .000	$n=56$

Table 33

FTS subscale correlations $n=54$

Correlations Of subscales with negatives removed	Telic/ Paratelic	Compliant/ Defiant	Master Autic/ Master Alloic/ Sympathy Autic/ Sympathy Alloic
Telic/ Paratelic	$n=54$		
Compliant/ Defiant	.680** .000	$n=54$	
Master Autic/ Master Alloic/ Sympathy Autic/ Sympathy Alloic	.680** .000	.789** .000	$n=54$

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)

Significant inter-item correlations for the eight metamotivational states of all three tension scales were correlated above .30 (.424-.972), and considered sufficiently related. All three tension scales were significantly correlated (.483-.845 >.30). All eight metamotivational states for the three tension scales were found to be internally consistent $\alpha \geq .70$.

Construct Validity (Convergent Validity)

The Tension and Effort Stress Inventory (TESI) is a one page, 24-item survey measure of individuals' experiences of stressors, moods, and efforts to cope. The term "tension-stress" refers to "pushing oneself, or the exertion of will power to reduce the tension that is provoked by a stressor" (p. 195). The TESI state measure estimates the degree of pressure, stress, challenge, or demand that individuals have been exposed to in everyday life over that last thirty days related to work, family, finance, and their bodies. The first four items deal with stressors and are on a 7-point scale rated from "No pressure" to "Very much pressure". The same labeling format is given for the next four items that examine efforts invested to cope. The last 16 items on moods are presented with a 7-point scale rate from "Not at all" to "Very much". Svebak (1993) reported correlations of stressor and effort-scores positively correlated ($r = .57, p < .0001$), versus effort discrepancy scores positively correlated to overall scores on tension-stress ($r = .65, p < .0001$), which confirmed basic assumptions about relations between amount of stressors and related efforts to cope. Results from an intervention study validated support of the TESI through hypothesis testing and hierarchical regression analysis (content validity; Svebak, 1993).

Convergent validity was examined using Pearson correlation coefficients for the Tension scales and their matched TESI measure (overeating, skipping exercise, feeling down), which are similar in concept and expected to be moderately correlated, but not highly correlated. The TESI asks “ Estimate the degree of pressure, stress, challenge, or demand that you have been exposed to over the last thirty days as due to:_____” . To avoid added response burden, participants were asked to complete this inventory only once; one third of participants were randomly assigned to each scale with the stem question related to an overeating situation, skipping exercise, and feeling down during the past month. For example, the Feelings Tension Scale asks, ‘Think of a time in the last month when you felt low or down. Below is a space. In this space describe a time just before you were low or down. Please give details like who, what, when and where:’”

The investigator alternated what version each participant got so that each of the three situation on the TESI were completed equally by one-third of participants.

The Overeating Tension Scale is unique in focusing on tension *before* overeating (rather than on situations and eating behaviors themselves) and motivation-specific feelings preceding overeating. Validity and reliability studies for development of the overeating tension scale were reported in the reliability section. Convergent validity was tested for the computer-administered version of the Overeating Tension Scale comparing the TESI specific to an overeating situation. It was found that total stressor and effort-scores were correlated with the overeating

situation (TESI-O) ($r = .963, p < .000$) but the TESI-O total stressor score was moderately correlated with the OTS, but was not significant ($r = .355, p < .434$).

The Exercise Tension Scale measures the discrepancy between the way individuals felt and the way they wanted to feel before skipping exercise. Exercise is self-defined by subjects as regular, repeated bodily exertion to maintain physical fitness. Convergent validity was tested for the computer-administered version of the Exercise Tension Scale using the TESI specific to the situation of skipping exercise. This study's total stressor and effort-scores were positively correlated on the TESI with the skipping exercise situation (TESI-E) ($r = .850, p < .004$) and the TESI-E total stressor scores was positively significantly correlated with the ETS ($r = .711, p < .032$).

The Feelings Tension Scale measures the discrepancy between the way individuals felt and the way they wanted to feel just before recognizing they felt down or low. Convergent validity was tested for the computer-administered version of the Feelings Tension Scale using the TESI specific to feeling down and low. This study's total stressor and effort-scores were correlated on the TESI with the down feelings situation (TESI=F) ($r = .963, p < .000$) and the TESI-F total stressor scores were not significantly correlated with the FTS ($r = .139, p < .667$).

Construct Validity (Hypothesis Testing Approach)

Hypothesis testing uses the underlying theoretical framework for the measure's design to state hypotheses and to make inferences about the adequacy of measures construction to explain the findings (Waltz et al., 2005, p. 157). Hypothesis

testing was used to evaluate construct validity to answer the following research hypotheses: (a) the Overeating Tension Scale scores will be moderately correlated with the BULIT bulimia scale scores (.30-.60), (b) the Exercise tension scale scores and the International Physical Activity Questionnaire scores will be inversely moderately correlated (high exercise tension scores with low IPAQ exercise scores). (c) the Feelings Tension scale scores will be inversely moderately correlated with the Rosenberg Self-esteem scale scores (high feelings tension with low Rosenberg esteem scores), and (d) participants with higher body mass index (BMI) will have higher tension scores compared to participants with lower BMIs on the Overeating Tension, Exercise Tension, and Feelings Tension Scales (BMI; weight [kg]/height [m²]. Additionally, the relationship between know groups (obese weight and normal weight) and BMI will be assessed.

Hypothesis 1: the Overeating Tension Scale scores will be moderately correlated with the BULIT bulimia scale scores (.30-.60). Internal consistency reliability for the BULIT test in this study was satisfactory ($\alpha = .92$). The research question for the OTS and BULIT was supported by evidence of convergent validity; a significant moderate correlation ($r = .318, p < .028$) was found between scores on the Overeating Tension Scale and the BULIT Bulimia Test.

Hypothesis 2: the Exercise tension scale scores will be moderately inversely correlated with the International Physical Activity Questionnaire scores (high exercise tension scores with low IPAQ exercise scores). Internal consistency reliability for the IPAQ was not satisfactory ($\alpha = .58$). The research question for the

ETS and IPAQ was not supported by evidence of convergent validity; there was no significant inverse relationship found between scores on the Exercise Tension Scale and the IPAQ ($r = -.095, p < .535$).

Hypothesis 3: The Feelings Tension scale scores will be moderately inversely correlated with the Rosenberg Self-esteem scores (high feelings tension with low Rosenberg esteem scores). Internal consistency reliability for the RSES in this study was satisfactory ($\alpha = .875$). The research question for the FTS and RSES was not supported by evidence for convergent validity; there inverse relationship found was not a statistically-significant moderate correlation between the Feelings Tension Scale and the RSES ($r = -.129, p < .351$).

Hypothesis 4: the Overeating Tension, Exercise Tension, and Feelings Tension Scales scores will be positively correlated with subjects' body mass index (BMI; weight [kg]/height [m²]). Pearson correlations were used to estimate the association (small; $r = 0.20-0.50$ medium; $r = .50-.80$ strong; and $r = .80+$ very strong). At this exploratory stage, Bonferoni adjustments of significance levels were not made. Overall, OTS total scores were moderately correlated with BMI and statistically significant [$r = .451, p = .001, N = 53$]. For known weight groups, OTS total score significantly correlated with the obese weight participants' BMI [$r = .379, p = .016, N = 40, M = 34.5, SD = 8.8$], but was not correlated with normal weight participants' BMI [$r = .343, p = .257, N = 13, M = 22.46, SD = 1.76$].

Overall, the ETS total scores were correlated with BMI [$r = .521, p = .000, N = 51$]. For known weight groups, the ETS total scores were significantly correlated

with the obese weight participants' BMI [$r = .486, p = .002, N = 38, M = 34.5, SD = 8.9$], and were correlated with normal weight participants' BMI, but was not significant [$r = .386, p = .192, N = 13, M = 22.46, SD = 1.7$]. Similarly, the FTS total scores were significantly correlated with BMI [$r = .373, p = .007, N = 51, M = 30.9, SD = 8.0$]. For known weight groups, FTS total scores were correlated with the obese weight participants' BMI [$r = .442, p = .005, N = 38, M = 33.89, SD = 7.2$], and correlated with normal weight participants' BMI, but was not significant [$r = .369, p = .215, N = 13, M = 22.4, SD = 1.7$].

On the OTS, both normal weight and obese weight participants were predominantly in Paratelic, Compliant, and Mastery Alloic states. On the ETS and FTS, normal weight and obese weight participants were predominantly in Telic, Compliant, and Sympathy Alloic states. On the FTS, normal weight and obese weight participants were predominantly in Telic, Compliant, and Sympathy Alloic or Mastery Alloic states (Table 34).

Table 34

Tension States Selected by BMI for Normal, Overweight, and Obese Weight

Scale and State	Body mass index Freq. (%) <i>N=54</i>	Normal weight Freq. (%) <i>n=13</i>	Obese weight Freq. (%) <i>n=38</i>
OTS			
Telic	13 (24)	4 (30)	9 (22)
Paratelic	42 (78)	9 (70)	32 (80)
Compliant	42 (78)	12 (92)	29 (75)
Defiant	11 (20)	1 (8)	10 (25)
Mastery Autic	7 (13)	3 (23)	4 (10)
Mastery Alloic	25 (46)	0	16 (40)
Sympathy Autic	18 (33)	2 (15)	3 (8)
Sympathy Alloic	3 (6)	8 (61)	17 (42)
ETS			
Telic	41 (73)	8 (62)	30 (79)
Paratelic	15 (27)	5 (38)	8 (21)
Compliant	38 (68)	8 (62)	28 (74)
Defiant	18 (32)	5 (38)	10 (26)
Mastery Autic	12 (21)	3 (23)	8 (21)
Mastery Alloic	6 (11)	4 (31)	3 (8)
Sympathy Autic	10 (18)	1 (8)	6 (16)
Sympathy Alloic	29 (52)	5 (39)	21 (55)
FTS			
Telic	48 (89)	12 (92)	33 (87)
Paratelic	6 (11)	1 (8)	5 (13)
Compliant	46 (85)	13 (100)	31 (81)
Defiant	8 (15)	0	7 (19)
Mastery Autic	18 (34)	4 (31)	12 (32)
Mastery Alloic	3 (6)	0	2 (5)
Sympathy Autic	9 (17)	3 (23)	6 (16)
Sympathy Alloic	24 (44)	6 (46)	18 (47)

Discussion and Implications

Internal Consistency Reliability

All eight metamotivational states for all three tension scales were found to be internally consistent $\alpha > .70$. Although a few items were found to slightly increase internal consistency reliability coefficients if omitted, all items will be retained until

further testing can be completed with greater numbers of participants. Significant inter-item correlations for the eight metamotivational states of all three tension scales were correlated above .30 ($r = .424 - .972$), and considered sufficiently related. Internal consistency reliability was established for the three tension scales and they were significantly inter-correlated, showing they consistently assess tension.

Construct Validity (Convergent Validity)

All three scales were evaluated using the standard of moderate correlations (.30-.60) to establish convergent validity. The TESI total stressor scores were positively and moderately correlated with the OTS, ETS and FTS, but the relationships between the TESI total stressor scores and OTS and FTS was not significant; thus, convergent validity was not well established with the Tension scales.

The Construct Validity and Hypothesis-Testing Measures

Other measures used to establish construct validity were correlated with tension measures, including the OTS and BULIT, ETS and IPAQ, and the FTS and RSES. Only a moderate correlation was found for the OTS and BULIT, thus, convergent validity was not well established with the Tension scales. Two possible reasons for lack of construct validity could be that the chosen instruments measure different theoretical concepts, and a low power due to small sample size may have contributed to non significant correlations. A post-Hoc analysis was conducted to establish the power level of the calculations for future studies. The current study sample size of 61 participants, with a medium effect size for calculating correlations (.30) and alpha level of .05 estimates the power at 0.675 (Lenth, 2006). Further testing with other

theoretically matched measures and larger numbers of participants could offer better evidence of convergent validity.

OTS, ETS, and FTS significantly correlated with BMI, showing there is a relationship between overeating tension, exercise tension, and feelings tension and participant's body mass index. OTS, ETS and FTS were not correlated among normal weight participants, showing no relationships. Significant correlations between tension scores and obese participants' BMIs provides evidence that relationships exist between obese individuals' body mass indexes and their tension levels before overeating, skipping exercise, and feeling down. The computer-administered tension scale results are consistent with earlier testing as cited in the background studies.

Using reversal theory states to describe participants' experiences before skipping exercise, and feeling down, normal weight and overweight participants reported states being predominantly serious-minded (Telic), conforming (Compliant), and other-centered tender (Sympathy Alloic). Before overeating, both normal and overweight participants were in a playful (Paratelic) and conforming (Compliant). However, normal weight participants were predominantly other-centered tender (Sympathy Alloic) while overweight participants were more other-centered tough states. Although normal weight and overweight participants appeared to have similar experiences before overeating, skipping exercise, and feeling down, their tension or discrepancy scores (difference between the way they wanted to feel and the way they felt) revealed differences. In post hoc analysis, participants' BMIs

were categorized into two known groups: (a) <25 for normal weight and (b) ≥ 25 for overweight groups. T-test were calculated for total tension scores on the OTS, ETS, and FTS for the two weight groups, with significant differences ($p < .05$) found for the OTS and ETS scales; there were no significant differences for the FTS.

Overweight participants reported higher levels of total overeating tension ($N=40$, $M=27.93$, $SD=25.24$) than normal weight participants ($N=13$, $M=11.85$, $SD=17.09$) [$t(1, 51) = -2.14$, $p < .014$]. Similarly, overweight participants reported higher levels of total exercise tension ($N=38$, $M=40.84$, $SD=24.74$) than normal weight participants ($N=13$, $M=23.54$, $SD=23.23$) [$t(1, 49) = -2.28$, $p < .033$]. There were no differences found for the FTS.

These post-hoc findings offer additional support for construct validity with the overweight participants reporting higher tension than normal weight participants before overeating and skipping exercise. A unique characteristic of the Tension scales is the ability to name participants' frames of reference (metamotivational states) for different situations and the tension felt (discrepancy scores), as demonstrated by these post-hoc findings.

Limitations

Limitations of this study included: (a) a predominantly Caucasian sample representative of rural mid-America (the study focused on three rural Kansas communities); (b) exclusion of children in the sample (children need to be studied in the future to complete a full spectrum of ages and their tension-related responses); (c) computer-administration may have caused some potential participants not to

volunteer; (d) use of touch-screen instruments could have been helpful in maximizing participation but was not financially feasible; (e) response burden was generally improved by use of computer-administered methods; however some burden may have occurred due to participants being expected to complete measures using the computer, as a less familiar means to completing questionnaires; and (f) recruitment methods did not produce the maximum number of participants desired; resulting sample size of 61 and a power level ranging from .67 to .99 (medium to large effect size).

Conclusions

Phase 1 established the readability, content validity, usability and human computer interactions of the three computer-administrated Tension scales. In Phase 2 of study, internal consistency was established for the three tension scales. Convergent validity was not well established and will be explored in the future along with establishing a scoring range (low, medium, high) for the scales. The most promising result of this study is the medium to strong correlations of the Overeating, Exercise, and Feelings tension scales with participants' body mass index. After continued psychometric testing, nurses and weight management specialists may find these measures useful during counseling sessions to assess the level of tension during an overeating situation, skipping exercise situation or feeling down or low situation. Further, measures may provide data for long-term evaluation of weight management progress.

CHAPTER 5

Summary

Phase 1 Results

Literacy Level (Readability)

Readability for the three tension scales took about one month in consultation with the literacy expert. Twenty-one of the 47 descriptive words and 29 of the 64 feeling words were modified to the lower reading level. Fry and Raygor readability formula was used by the literacy expert to evaluate the measures including consideration of conceptual density, word frequency, and writing clarity (Raygor, 1977). At completion of the literacy Phase the Fry and Raygor scales and the Microsoft word readability rates established all three scales at or under the 5th grade reading level (OTS 4.2 grade level; ETS 4.9 grade level; FTS 4.2 grade level).

Table 36

Progression of Changes to Tension Scales

TELIC FEELING WORDS	Literacy changes to 5th grade reading level	Round one changes by Theory Experts	Round two changes by Theory Experts	Round three changes by Theory Experts
Serious minded	Serious	Serious		
Goal oriented	Had a goal	Had a goal	Have an important goal	
Planning ahead	Planned ahead	Planning ahead		
Trying to accomplish something	Tried to accomplish something	Trying to accomplish something	Trying to accomplish something important	
Future-oriented	Looked to the future	Looked to the future	Aware of future outcomes	Care about future outcomes
High tension				

words				
Unsettled		Unsettled		
Uneasy		Uneasy	Anxious	
Anxious	Worried	Worried		
Nervous		Nervous		
Low tension words				
Settled		Settled	Settled **	
At ease		At ease	Relaxed	
Calm	Not worried	Not worried		
Composed	Calm	Calm		
PARATELI C FEELING WORDS				
Playful		Playful		
Spontaneous	Spur-of-the-moment	Spur-of-the-moment	Spontaneous	
Emphasizing good feelings	Enjoyed good feelings	Enjoying good feelings	Looking to feel good	Looking to have a good time
Having fun for fun's sake	Had fun	Had fun	Looking to have fun	
Present-oriented	Focused on the here and now	Focused on the here and now		
High tension words				
Bored		Bored		
Unstimulated		Unstimulated		
Uninterested		Uninterested		
Indifferent		Indifferent		
Low tension words				
Excited		Excited		
Stimulated		Stimulated		
Interested		Interested		
Enthusiastic	Enthused	Enthused		
Conformist FEELING WORDS				
Following the rules	Followed the rules	Following the rules		
Not "making	Did not make	Did not make	Not "making	

waves” or disagreeing with others	waves	waves	waves”	
Feeling concerned if I broke a rule	Worried if I broke a rule	Worrying if I broke a rule		
Feeling compliant and agreeable	Felt agreeable	Felt agreeable	Looking to fit in	
Trying to stay in line	Tried to stay in line	Trying to stay in line		
Doing what others did	Followed others	Followed others	Looking to do the same as others	Trying to be the same as others
Concerned about what others thought	Worried about what others thought	Worrying about what others thought		
High tension words				
Embarrassed		Embarrassed		
Foolish		Foolish	Stupid	Misunderstood
Isolate	Alone	Alone	Rejected	
Uncomfortable		Uncomfortable	Insecure	
Low tension words				
Not embarrassed		Not embarrassed		
Sensible	Wise	Wise	Smart	Agreed with**
Belonging		Belonging		
Comfortable		Comfortable	Secure	
Negativistic FEELING WORDS				
Sticking up for what I thought	Stood for what I thought	Standing up for what I thought		
Bending/ breaking the rule	Bent the rules	Bending the rules		
Angry		Angry		

Stubborn		Stubborn		
Rebellious/ defiant	Disobedient	Disobedient		
Wanting to be difficult	Wanted to be difficult	Looking to be difficult		
Doing my own thing	Wanted to do my own thing	Looking to do my own thing		
High tension words				
Trapped		Trapped		
Held back		Held back		
Caught		Caught		
Restricted	Limited	Limited		
Low tension words				
Free		Free		
Released		Released		
Liberated	Freed	Freed	Loose	Unrestricted
Unrestricted	Unlimited	Unlimited		
Mastery Autic FEELING WORDS				
Doing my best		Doing my best		
Giving it my all		Giving it my all		
Being strong and not showing tender feelings		Being strong and not showing tender feelings	Being strong and not showing tender feelings	Not showing tender feelings**
Being tough with myself and others		Being tough with myself and others	Being tough with myself and others	Being tough with myself
Feeling competitive		Feeling competitive		
High tension words				
Out of control		Out of control	Losing control	Not in control
Humiliated	Shamed	Shamed		
Wimpy		Wimpy	Weak	

Disrespected		Disrespected		
Low tension words				
In control		In control		
Proud		Proud		
Sturdy		Sturdy		
Respected		Respected		
Sympathy Autic FEELING WORDS				
Wanting to be in harmony with others	Wanting to be in agreement with others	Wanting to be in agreement with others	Looking for closeness with others	
Looking to others for sympathy for help	Looking for help	Looking for help		
Feeling I deserved a reward/treat	Feeling I deserved a treat	Feeling I deserved a treat		
Showing tender feelings	Showing caring feelings	Showing caring feelings	Looking to others for tenderness	
Wanting to feel cared for	Wanting to feel cared for	Looking to feel cared for		
High tension words				
Resentful	Not valued	Not valued		
Deprived	Not cared for	Not cared for		
Offended	Not grateful	Not grateful	Resentful	
Hurt		Hurt		
Low tension words				
Appreciative	Valued	Valued		
Cared for		Cared for		
Grateful		Grateful		
Pleased		Pleased	Loved	
Mastery Alloic FEELING WORDS				
Letting others		Letting others		

win		win		
Helping others profit		Helping other profit		
Helping others succeed		Helping other succeed		
Letting others be in charge		Letting others be in charge		
Giving self to a cause		Giving self to a cause		
High tension words				
Ashamed		Ashamed	Ashamed	Not standing up for others
Dishonorable	Not proper	Not proper	Letting others down	
Burdensome	A burden	A burden	Useless	
Disloyal		Disloyal		
Low tension words				
Satisfied		Satisfied	Satisfied with myself	Stood up for others
Honorable	Proper	Proper	Not letting other down	Being there for others
Useful		Useful		
Loyal		Loyal		
Sympathy Alloic FEELING WORDS				
Wanted to make others feel good	Wanting to make others feel good	Looking to make others feel good		
Put self out for others	Putting others before myself	Putting other before myself	Putting others before myself	Putting others needs before my own
Gave up something of mine to give to others	Giving up something of mine to someone else	Giving up something of mine to someone else	Giving up something of mine to help someone else	Giving up something to help someone else
Being nice/ kind to others		Being nice/kind to others	Being nice/ kind to others	Being kind to others

Putting other's needs before my own		Putting other's needs before my own		
High tension words				
Guilty		Guilty		
Bad about myself		Bad about myself		
Heavy conscience	Selfish	Selfish		
Blameworthy		Blameworthy	Blameworthy	Not worthy
Low tension words				
Virtuous	Righteous	Righteous	Generous	
Good about myself		Good about myself		
Clear conscience	Giving	Giving		
Worthy	Worthy	Worthy		

**** Items that were not accepted by all experts**

Content Validity

Items altered by the literacy expert or original items not accepted (1 or 2) by all experts were revised according to experts' recommendations and reading level was ascertained. When disagreements occurred between reading level (being too high) and theoretical accuracy, decisions were made according to theoretical accuracy. The content validity process included three rounds over five months before 99% agreement was reached among all experts (Table 36). One-hundred and six of the 109 items had an item CVI of 1.00. Subscale CVI scores ranged from 0.875 to 1.00 and S-CVI/Ave of .96 (Table 12). A new content valid instrument should have a minimum content validity index of .90 (Pilot & Beck, 2006; Waltz et al., 2005). Reversal theory experts also confirmed the overall theoretical relevance and completeness of the content domain for the overall scales (Grant & Davis,

1997). After content expert agreement was reached, literacy levels were confirmed again, all measures being below the 5th grade reading level (OTS 3.8 grade level; ETS 4.4 grade level; FTS 3.9 grade level). The kappa statistic also was run to assess the proportion of agreement remaining after chance agreement is removed (Cohen, 1960). Content validity was established with a kappa scores across all possible combinations averaging 0.986 with an average standard deviation of -.0002 ($k \geq .60$ acceptable; Wynd et al., 2003).

Expert Usability and Human Computer-Interaction Evaluation

Heuristic evaluation of usability and human computer-interaction involved an expert judging compliance of measures with recognized usability principles. The usability principles used in this study were adapted from the *Research-Based Web Design and Usability Guidelines* developed by the U.S. Department of Health and Human Services (2003). Guidelines focused on ten categories of usability and human computer interaction assessment: optimizing user experience, accessibility, page layout, navigation, scrolling and paging, headings, titles and labels, text appearance, lists, screen-based controls and content organization. In this study, the expert responded to each of the three computer-administered instruments by completing the Expert Usability and Human Computer Interaction Checklist developed by investigator. The expert marked a “yes” if the item was met and a “no” if the item was not met. The investigator collaborated with the expert to resolve problematic issues with the procedures and instruments to reduce extraneous verbiage and streamline computerized administration.

Participant Opinion

After participants completed all computerized questionnaires, they were asked to complete two paper-and pencil questionnaires: the System Usability Scale and Participant Opinion Survey (Appendix A8, A9). The System Usability Scale measures effectiveness, efficiency and satisfaction (Brooke, 1996), consisting of a ten-item Likert scale with five-point degree of disagreement (1) to agreement (5). Questions are positively and negatively worded and cover a variety of aspects of system usability (support, training, complexity). Thus, having a level of face validity for measuring usability of systems (Brooke, 1996). The scale is robust and reliable with item correlations (0.7 to 0.9; Brooke, 1996) Phase 1 results ranged from 70 to 100. Higher scores on the Usability Scale indicate user friendliness; with a maximum of 100. Participants were asked to make suggestions for revisions of the scales. Suggestions were taken into consideration in revising the scales before Phase 2.

The Participant Opinion Survey has nine questions about the clarity, completeness, significance, ease of completion, and amount of time to complete scales, one open-ended question, and two ten-point Likert-type items. Items with ratings less than a 7.0 average were evaluated and revised before Phase 2 evaluation. The open-ended question was transcribed verbatim and content analyzed for possible changes. The investigator collaborated with technology experts to resolve all issues raised by participants to improve procedures for Phase 2.

Performance Evaluation

The goal of performance evaluation was to identify issues that inhibit completion of the scales and instruments. Once the navigation, basic content, and

display features were in place, quantitative performance testing (measuring time, wrong pathways, failure to find content, etc.) was conducted to ensure that usability objectives were met. Performance testing is a usability test that is characterized by having typical users perform a series of tasks in which speed, accuracy and success are closely monitored and measured (U.S. Department of Health and Human Services, 2003). The usability field study (performance evaluation) was conducted by the investigator, in which participants were observed as they completed all the computerized instruments. Six participants identified problems with the information architecture (navigation) and overall design issues (U.S. Department of Health and Human Services, 2003). The investigator monitored participant completion time for all measures (30 to 60 minutes), comments and questions about scales and procedures, and observed difficulty, all recorded on the performance record (Appendix A9). The Investigator collaborated with technology experts to resolve performance issues to improve procedures for upcoming Phase 2.

Technology Evaluation

After completing Phase 1 with experts and participants, the data bases were double checked for correct routing. At this time that the investigator and Information Technology expert found participants that chose the Mastery Autic state were being routed to the Sympathy Alloic questions and vice versa. Steps were taken to correct the routing before Phase 2 was started. No other routing issues were found.

Phase 2 Results

Internal Consistency Reliability

Internal consistency reliability examines the consistency of performance of one group of individuals across the items on a single measure (Waltz et al., 2005). The Cronbach alpha coefficient is the preferred index of internal consistency reliability and “represents the extent to which performance on any one item on an instrument is a good indicator of performance on any other item in the same instrument” (Waltz, Strickland & Lenz, 2005, p140). An alpha coefficient greater than or equal .70 was considered acceptable evidence of internal consistency (Nunnally & Bernstein, 2005). Internal consistency of each of the eight subscales for the OTS, ETS, and FTS was estimated by calculating the coefficient alpha for the four discrepancy scores for each reversal theory state while using SPSS programming to filter out opposite states measured by the subscale; for example, Paratelic discrepancy scores were filtered to calculate alpha coefficients for Telic and vica versa. Overall, alpha coefficients for the eight metamotivational states on the OTS ranged from .719 to .970; on the ETS ranged from .883 to .975; and on the FTS ranged from .730 to .955 (Tables 3, 4, 5). Internal consistency reliability of the total scores on the three tension scales (sum of three subscales) had alpha coefficients higher than the acceptable level of $\geq .70$; specifically, OTS $\alpha = .898$; ETS $\alpha = .801$; FTS $\alpha = .879$ (Table 6).

Table 3

Reliability Analysis for the Overeating Tension Scale for Discrepancy

MOTIVATIONAL STATE	ITEMS INCLUDED	Alpha if item deleted	ALPA COEFF	<i>n</i>
TELIC	unsettled/settled	.887	.925	13
	anxious/relaxed	.920		
	worried/notworried	.907		
	nervous/calm	.892		
PARATELIC	bored/excited	.876	.912	41
	unstimulated/stimulated	.941		
	uninterested/interested	.874		
	indifferent/enthused	.850		
CONFORMIST	embarrassed/notembarrassed	.929	.932	42
	misunderstood/agreewith	.898		
	rejected/ belonging	.888		
	insecure/secure	.932		
NEGATIVISTIC	trapped/free	.813	.889	11
	held back/released	.771		
	caught/unrestricted	.983		
	limited/unlimited	.771		
MASTERY-AUTIC	notincontrol/incontrol	.968	.970	7
	shamed/proud	.976		
	weak/sturdy	.949		
	disrespected/respected	.944		
MASTERY-ALLOIC	notvalued/valued	.960	.789	3
	notcaredfor/caredfor	.634		
	resentful/grateful	.733		
	hurt/loved	.671		
SYMPATHY-AUTIC	notstandingupforothers/stoodupforothers	.951	.962	17
	lettingothersdown/beingthere for others	.951		
	useless/useful	.960		
	disloyal/loyal	.939		
SYMPATHY-ALLOIC	guilty/generous	.569	.719	25
	badaboutmyself/ goodaboutmyself	.538		
	selfish/giving	.836		
	notworthy/worthy	.591		

Table 4

Reliability Analysis for the Exercise Tension Scale for Discrepancy Scores

MOTIVATIONAL STATE	ITEMS INCLUDED	Alpha if item deleted	ALPHA COEFF.	<i>n</i>
TELIC	unsettled/settled	.910	.883	41
	anxious/relaxed	.831		
	worried/notworried	.852		
	nervous/calm	.799		
PARATELIC	bored/excited	.906	.920	15
	unstimulated/stimulated	.870		
	uninterested/interested	.872		
	indifferent/enthused	.929		
CONFORMIST	embarrassed/notembarrassed	.923	.923	47
	misunderstood/agreewith	.896		
	rejected/ belonging	.897		
	insecure/secure	.880		
NEGATIVISTIC	trapped/free	.950	.921	18
	held back/released	.882		
	caught/unrestricted	.866		
	limited/unlimited	.892		
MASTERY-AUTIC	notincontrol/incontrol	.950	.961	12
	shamed/proud	.943		
	weak/sturdy	.949		
	disrespected/respected	.952		
MASTERY-ALLOIC	notvalued/valued	.869	.902	6
	notcaredfor/caredfor	.814		
	resentful/grateful	.872		
	hurt/loved	.946		
SYMPATHY-AUTIC	notstandingupforothers/stoodupforothers	.970	.975	10
	lettingothersdown/beingthere for others	.961		
	useless/useful	.976		
	disloyal/loyal	.958		
SYMPATHY-ALLOIC	guilty/generous	.935	.940	28
	badaboutmyself/ goodaboutmyself	.922		
	selfish/giving	.923		
	notworthy/worthy	.904		

Table 5

Reliability Analysis for the Feelings Tension Scale for Discrepancy Scores

MOTIVATIONAL STATE	ITEMS INCLUDED	Alpha if item deleted	ALPA COEF F.	n
TELIC	unsettled/settled	.926	.941	48
	anxious/relaxed	.913		
	worried/notworried	.909		
	nervous/calm	.941		
PARATELIC	bored/excited	.911	.855	6
	unstimulated/stimulated	.725		
	uninterested/interested	.795		
	indifferent/enthused	.748		
CONFORMIST	embarrassed/notembarrassed	.918	.874	46
	misunderstood/agreewith	.818		
	rejected/ belonging	.817		
	insecure/secure	.773		
NEGATIVISTIC	trapped/free	.851	.902	8
	held back/released	.866		
	caught/unrestricted	.873		
	limited/unlimited	.899		
MASTERY-AUTIC	notincontrol/incontrol	.751	.810	18
	shamed/proud	.724		
	weak/sturdy	.739		
	disrespected/respected	.819		
MASTERY-ALLOIC	notvalued/valued	.627	.730	3
	notcaredfor/caredfor	.699		
	resentful/grateful	.842		
	hurt/loved	.330		
SYMPATHY-AUTIC	notstandingupforothers/stoodupforothers	.943	.955	9
	lettingothersdown/beingthere for others	.949		
	useless/useful	.933		
	disloyal/loyal	.937		
SYMPATHY-ALLOIC	guilty/generous	.950	.939	24
	badaboutmyself/ goodaboutmyself	.919		
	selfish/giving	.901		
	notworthy/worthy	.911		

Table 6

Total Scale Score: Cronbach Alpha Correlation Coefficients

OTS	Total score Alpha	Subscale	Alpha if item deleted	M/ SD	n
OTS	.898	P/T	.915	8.65/ 9.40	54
		C/D	.825	6.93/ 8.35	
		MA/MAlI/SA/SAlI	.818	8.09/ 8.85	
ETS	.801	P/T	.804	14.39/ 9.74	56
		C/D	.724	11.29/ 10.47	
		MA/MAlI/SA/SAlI	.650	10.34/ 9.57	
FTS	.879	P/T	.882	18.24/ 11.96	54
		C/D	.804	11.87/ 10.49	
		MA/MAlI/SA/SAlI	.805	12.69/ 10.29	

P= Paratelic; T= Telic; C= Compliant; D= Defiant; MA= Mastery Autic; MAlI= Mastery Alloic; SA= Sympathy Autic; SAlI= Sympathy Alloic

Alpha if-item-deleted scores were examined for each of the eight metamotivational state's four discrepancy items to determine whether items should be omitted to improve the internal consistency. Each of the Tension scales (OTS, ETS, FTS) had four different items from different states. Improvements of alpha coefficients if items were deleted were minimal, increasing overall alphas coefficients only .003 to .017 (Tables 7-30). The three combined subscales for each tension scale have item-if-delete scores of OTS (.818 - .915); ETS (.650 - .804); FTS (.804 - .882) (Table 31-33).

Inter-item correlations also were examined to assess internal consistency. The OTS scale's eight metamotivational states had inter-item correlations ranging from .498 to .994 (Table 1-14); the ETS scale's eight metamotivational states had inter-item correlations ranging from .532 to .921 (Table 15-22) ; and the FTS scale's eight metamotivational states had inter-item correlations of .483 to .933 (Table 23-30).The

correlations for all three subscales of the three tension measures are highly correlated and ranged from OTS ($r = .697-.845, p = .000$); ETS ($r = .483-.675, p = .000$); FTS ($r = .680-.789, p = .000$) (Table 31-33). For each of the three tension scales, all subscale correlations were greater than .30 and considered sufficiently related (Ferketich, 1991).

Table 7

Inter Item correlations Overeating Tension Scale (OTS) TELIC $n=13$

correlations	unsettled/settled	anxious/relaxed	worried/notworried	nervous/calm
unsettled/settled	$n=13$			
anxious/relaxed	.890** .000	$n=13$		
worried/notworried	.763** .002	.622* .011	$n=13$	
nervous/calm	.758** .000	.673* .012	.786** .000	$n=13$

Table 8

Inter Item correlations OTS PARATELIC $n=41$

correlations	bored/excited	unstimulated/stimulated	uninterested/interested	indifferent/enthusiased
bored/excited	$n=41$			
unstimulated/stimulated	.598** .000	$n=41$		
uninterested/interested	.838** .000	.562** .000	$n=41$	
indifferent/enthusiased	.813** .000	.703** .000	.822** .000	$n=41$

Table 9

Inter Item correlations OTS COMPLIANT *n*=42

correlations	embarrassed/embarrassed	misunderstood/agreed with	rejected/belonging	insecure/secure
embarrassed/embarrassed	<i>n</i> =42			
misunderstood/agreed with	.809**	<i>n</i> =42		
rejected/belonging	.000		<i>n</i> =42	
insecure/secure	.834**	.872**		<i>n</i> =42
	.000	.000		
	.635**	.768**	.847**	
	.000	.000	.000	

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)

Table 10

Inter Item correlations OTS DEFIANT *n*=11

correlations	trapped/free	held back/released	caught/unrestricted	limited/unlimited
trapped/free	<i>n</i> =11			
Held back/released	.944**	<i>n</i> =11		
caught/unrestricted	.000		<i>n</i> =11	
limited/unlimited	.166	.377		<i>n</i> =11
	.625	.253		
	.982**	.970**	.337	
	.000	.000	.310	

Table 11

Inter Item correlations OTS MASTERY AUTIC *n*=7

correlations	notincontrol/incontrol	shamed/proud	weak/sturdy	disrespected/respected
notincontrol/incontrol	<i>n</i> =7			
Shamed/proud	.899**	<i>n</i> =7		
weak/sturdy	.006		<i>n</i> =7	
disrespected/respected	.898**	.978**		<i>n</i> =7
	.006	.000		
	.903**	.993**	.996**	
	.005	.000	.000	

Table 12

Inter Item correlations OTS MASTERY ALLOIC *n*=1

correlations	notvalued/ valued	notcaredfor/ caredfor	resentful/grateful	hurt/loved
Notvalued/valued	<i>n</i> =1			
notcaredfor/ caredfor		<i>n</i> =1		
resentful/grateful			<i>n</i> =1	
hurt/loved				<i>n</i> =1

Table 13

Inter Item correlations OTS SYMPATHY AUTIC *n*=17

correlations	notstandingupfor others/ stoodupforothers	lettingothersdown/ beingthere for others	useless/ useful	disloyal/ loyal
notstandingupfor others/ stoodupforothers	<i>n</i> =17			
lettingothersdown/ beingthere for others	.894** .000	<i>n</i> =17		
useless/ useful	.841** .000	.805** .000	<i>n</i> =17	
lettingothersdown/ disloyal/loyal	.863** .000	.917** .000	.919** .000	<i>n</i> =17

Table 14

Inter Item correlations OTS SYMPATHY ALLOIC *n*=25

correlations	guilty/generous	Anxious/relaxed badaboutmyself / goodaboutmyself	selfish/giving	notworthy/worthy
guilty/generous	<i>n</i> =25			
badaboutmyself/ goodaboutmyself	.717** .000	<i>n</i> =25		
selfish/giving	.150 .474	.044 .843	<i>n</i> =25	
notworthy/worthy	.498** .011	.706** .000	.224 .281	<i>n</i> =25

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)

Table 15

Inter Item correlations Exercise Tension Scale (ETS) TELIC *n*=41

Correlations	unsettled/settled	anxious/relaxed	worried/not worried	nervous/calm
unsettled/settled	<i>n</i> =41			
anxious/relaxed	.532** .000	<i>n</i> =41		
worried/not worried	.479** .002	.711** .000	<i>n</i> =41	
nervous/calm	.623** .000	.837** .000	.784** .000	<i>n</i> =41

Table 16

Inter Item correlations ETS PARATELIC *n*=15

Correlations	bored/excited	unstimulated/stimulated	uninterested/interested	indifferent/enthusiased
bored/excited	<i>n</i> =15			
unstimulated/stimulated	.757** .001	<i>n</i> =15		
uninterested/interested	.824** .000	.901** .000	<i>n</i> =15	
Indifferent/enthusiased	.583** .000	.775** .0010	.682** .005	<i>n</i> =15

Table 17

Inter Item correlations ETS COMPLIANT *n*=37

Correlations	embarrassed/not embarrassed	misunderstood/agree with	rejected/belonging	insecure/secure
embarrassed/not embarrassed	<i>n</i> =37			
misunderstood/agree with	.620** .000	<i>n</i> =37		
rejected/belonging	.775** .000	.743** .000	<i>n</i> =37	
insecure/secure	.706** .000	.896** .000	.758** .000	<i>n</i> =37

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)

Table 18

Inter Item correlations ETS DEFIANT *n*=18

correlations	trapped/free	held back/released	caught/unrestricted	limited/unlimited
trapped/free	<i>n</i> =18			
held back/released	.682** .002	<i>n</i> =18		
caught/unrestricted	.705** .000	.860** .000	<i>n</i> =18	
limited/unlimited	.578* .012	.847** .000	.889** .000	<i>n</i> =18

Table 19

Inter Item correlations ETS MASTERY AUTIC <i>n</i> =12				
correlations	notincontrol/incontrol	shamed/proud	weak/sturdy	disrespected/respected
notincontrol/incontrol	<i>n</i> =12			
shamed/proud	.832** .001	<i>n</i> =12		
weak/sturdy	.849** .000	.924** .000	<i>n</i> =12	
disrespected/respected	.925** .000	.880** .000	.829** .000	<i>n</i> =12

Table 20

Inter Item correlations ETS MASTERY ALLOIC <i>n</i> =6				
correlations	notvalued/valued	notcaredfor/caredfor	resentful/grateful	hurt/loved
notvalued/valued	<i>n</i> =6			
notcaredfor/caredfor	.959** .003	<i>n</i> =6		
resentful/grateful	.795 .059	.891* .017	<i>n</i> =6	
hurt/loved	.673 .143	.733 .097	.567 .240	<i>n</i> =6

Table 21

Inter Item correlations ETS SYMPATHY AUTIC <i>n</i> =10				
Correlations	notstandingupforothers/ stoodupforothers	lettingothers down/ beingthere for others	useless/useful	disloyal/loyal
notstandingupforothers/ stoodupforothers	<i>n</i> =10			
Lettingothersdown/ beingthere for others	.921** .000	<i>n</i> =10		
useless/useful	.864** .000	.883** .001	<i>n</i> =10	
Lettingothersdown/ disloyal/loyal	.910** .000	.964** .000	.913** .000	<i>n</i> =10

Table 22

Inter Item correlations ETS SYMPATHY ALLOIC *n*=28

Correlations	guilty/generous	Anxious/relaxed badaboutmyself/ goodaboutmyself	selfish/giving	notworthy/worthy
guilty/generous	<i>n</i> =28			
badaboutmyself/ goodaboutmyself	.745**	<i>n</i> =28		
selfish/giving	.809**	.739**	<i>n</i> =28	
Notworthy/worthy	.769**	.904**	.860**	<i>n</i> =28
	.000	.000	.000	

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)

Table 23

Inter Item correlations Feelings Tension Scale (FTS) TELIC *n*=48

correlations	unsettled/settled	anxious/relaxed	worried/notworried	nervous/calm
unsettled/settled	<i>n</i> =48			
anxious/relaxed	.833**	<i>n</i> =48		
	.000			
worried/notworried	.821**	.874*	<i>n</i> =48	
	.000	.000		
nervous/calm	.727**	.752**	.796**	<i>n</i> =48
	.000	.000	.000	

Table 24

Inter Item correlations FTS PARATELIC *n*=7

correlations	bored/excited	unstimulated/stimulated	uninterested/interested	indifferent/enthusiased
bored/excited	<i>n</i> =7			
unstimulated/stimulated	.766 .076	<i>n</i> =7		
uninterested/interested	.225 .668	.715 .071	<i>n</i> =7	
indifferent/enthusiased	.496 .317	.933** .007	.835* .038	<i>n</i> =7

Table 25

Inter Item correlations FTS COMPLIANT *n*=47

correlations	embarrassed/not embarrassed	misunderstood/agreewith	rejected/belonging	insecure/secure
embarrassed/not embarrassed	<i>n</i> =47			
misunderstood/agreewith	.437** .002	<i>n</i> =47		
rejected/belonging	.424** .0023	.723** .000	<i>n</i> =47	
insecure/secure	.515** .000	.820** .000	.835** .000	<i>n</i> =47

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)

Table 26

Inter Item correlations FTS DEFIANT *n*=8

Correlations	trapped/free	held back/release d	caught/unrestricted	limited/unlimited
trapped/free	<i>n</i> =8			
held back/released	.812* .014	<i>n</i> =8		
caught/unrestricted	.814* .014	.616 .104	<i>n</i> =8	
limited/unlimited	.584 .129	.692 .057	.664 .072	<i>n</i> =8

Table 27

Inter Item correlations FTS MASTERY AUTIC *n*=18

Correlations	notincontrol/incontrol	shamed/proud	weak/sturdy	disrespected/respected
notincontrol/incontrol	<i>n</i> =18			
shamed/proud	.483* .042	<i>n</i> =18		
weak/sturdy	.621** .006	.738** .000	<i>n</i> =18	
disrespected/respected	.486* .041	.518* .027	.289 .244	<i>n</i> =18

Table 28

Inter Item correlations FTS MASTERY ALLOIC *n*=3

Correlations	notvalued/valued	notcaredfor/caredfor	resentful/grateful	hurt/loved
notvalued/valued	<i>n</i> =3			
notcaredfor/caredfor	.976 .139	<i>n</i> =3		
resentful/grateful	.000 .1000	-.217 .861	<i>n</i> =3	
hurt/loved	.836 .370	.691 .509	.549 .630	<i>n</i> =3

Table 29

Inter Item correlations FTS SYMPATHY AUTIC *n*=9

Correlations	notstandingupforothers/ stoodupforothers	lettingothersdown/ beingthere for others	useless/useful	disloyal/loyal
notstandingupforothers/ stoodupforothers	<i>n</i> =9			
Lettingothersdown beingthere for others	.953** .000	<i>n</i> =9		
useless/useful	.837** .005	.805** .009	<i>n</i> =9	
lettingothersdown disloyal/loyal	.777* .014	.802** .009	.972** .000	<i>n</i> =9

Table 30

Inter Item correlations FTS SYMPATHY ALLOIC *n*=24

Correlations	guilty/generous	Anxious/relaxed badaboutmyself / goodaboutmyself	selfish/giving	notworthy/worthy
guilty/generous	<i>n</i> =24			
badaboutmyself/ goodaboutmyself	.677** .000	<i>n</i> =24		
selfish/giving	.737** .000	.910** .000	<i>n</i> =24	
Notworthy/worthy	.773** .000	.815** .000	.871** .000	<i>n</i> =24

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)

Table 31

OTS subscale correlations *n*=54

Correlations Of subscales with negatives removed	Telic/ Paratelic	Compliant/ Defiant	Master Autic/ Master Alloic/ Sympathy Autic/ Sympathy Alloic
Telic/ Paratelic	<i>n</i> =54		
Compliant/ Defiant	.697** .000	<i>n</i> =54	
Master Autic/ Master Alloic/ Sympathy Autic/ Sympathy Alloic	.704** .000	.845** .000	<i>n</i> =54

Table 32

ETS subscale correlations $n=56$

Correlations Of subscales with negatives removed	Telic/ Paratelic	Compliant/ Defiant	Master Autic/ Master Alloic/ Sympathy Autic/ Sympathy Alloic
Telic/ Paratelic	$n=56$		
Compliant/ Defiant	.483** .000	$n=56$	
Master Autic/ Master Alloic/ Sympathy Autic/ Sympathy Alloic	.567** .000	.675** .000	$n=56$

Table 33

FTS subscale correlations $n=54$

Correlations Of subscales with negatives removed	Telic/ Paratelic	Compliant/ Defiant	Master Autic/ Master Alloic/ Sympathy Autic/ Sympathy Alloic
Telic/ Paratelic	$n=54$		
Compliant/ Defiant	.680** .000	$n=54$	
Master Autic/ Master Alloic/ Sympathy Autic/ Sympathy Alloic	.680** .000	.789** .000	$n=54$

Significant inter-item correlations for the eight metamotivational states of all three tension scales were correlated above .30 (.424-.972), and considered sufficiently

related. All three tension scales were significantly correlated (.483-.845 >.30). All eight metamotivational states for the three tension scales were found to be internally consistent $\alpha \geq .70$.

Construct Validity (Convergent Validity)

The Tension and Effort Stress Inventory (TESI) is a one-page, 24-item survey measure of individuals' experiences of stressors, moods, and efforts to cope. The term "tension-stress" refers to "pushing oneself, or the exertion of will power to reduce the tension that is provoked by a stressor" (p. 195). The TESI state measure estimates the degree of pressure, stress, challenge, or demand that individuals have been exposed to in everyday life over that last thirty days related to work, family, finance, and their bodies. The first four items deal with stressors and are on a 7-point scale rated from "No pressure" to "Very much pressure". The same labeling format is given for the next four items that examine efforts invested to cope. The last 16 items on moods are presented with a 7-point scale rate from "Not at all" to "Very much". Svebak (1993) reported correlations of stressor and effort-scores positively correlated ($r = .57, p < .0001$), versus effort discrepancy scores positively correlated to overall scores on tension-stress ($r = .65, p < .0001$), which confirmed basic assumptions about relations between amount of stressors and related efforts to cope. Results from an intervention study validated support of the TESI through hypothesis testing and hierarchical regression analysis (content validity; Svebak, 1993).

Convergent validity was examined using Pearson correlation coefficients for the Tension scales and their matched TESI measure (overeating, skipping exercise,

feeling down), which are similar in concept and expected to be moderately correlated, but not highly correlated. The TESI asks “ Estimate the degree of pressure, stress, challenge, or demand that you have been exposed to over the last thirty days as due to:_____” . To avoid added response burden, participants were asked to complete this inventory only once; one third of participants were randomly assigned to each scale with the stem question related to an overeating situation, skipping exercise, and feeling down during the past month. For example, the Feelings Tension Scale asks, ‘Think of a time in the last month when you felt low or down. Below is a space. In this space describe a time just before you were low or down. Please give details like who, what, when and where:’”

The investigator alternated what version each participant got so that each of the three situation on the TESI were completed equally by one-third of participants.

The Overeating Tension Scale is unique in focusing on tension *before* overeating (rather than on situations and eating behaviors themselves) and motivation-specific feelings preceding overeating. Validity and reliability studies for development of the overeating tension scale were reported in the reliability section. Convergent validity was tested for the computer-administered version of the Overeating Tension Scale comparing the TESI specific to an overeating situation. It was found that total stressor and effort-scores were correlated with the overeating situation (TESI-O) ($r = .963, p < .000$) but the TESI-O total stressor score was moderately correlated with the OTS, but was not significant ($r = .355, p < .434$).

The Exercise Tension Scale measures the discrepancy between the way individuals felt and the way they wanted to feel before skipping exercise. Exercise is self-defined by subjects as regular, repeated bodily exertion to maintain physical fitness. Convergent validity was tested for the computer-administered version of the Exercise Tension Scale using the TESI specific to the situation of skipping exercise. This study's total stressor and effort-scores were positively correlated on the TESI with the skipping exercise situation (TESI-E) ($r = .850, p < .004$) and the TESI-E total stressor scores was positively significantly correlated with the ETS ($r = .711, p < .032$).

The Feelings Tension Scale measures the discrepancy between the way individuals felt and the way they wanted to feel just before recognizing they felt down or low. Convergent validity was tested for the computer-administered version of the Feelings Tension Scale using the TESI specific to feeling down and low. This study's total stressor and effort-scores were correlated on the TESI with the down feelings situation (TESI=F) ($r = .963, p < .000$) and the TESI-F total stressor scores were not significantly correlated with the FTS ($r = .139, p < .667$).

Construct Validity (Hypothesis Testing Approach)

Hypothesis testing uses the underlying theoretical framework for the measure's design to state hypotheses and to make inferences about the adequacy of measures construction to explain the findings (Waltz et al., 2005, p. 157). Hypothesis testing was used to evaluate construct validity to answer the following research hypotheses: (a) the Overeating Tension Scale scores will be moderately correlated

with the BULIT bulimia scale scores (.30-.60), (b) the Exercise tension scale scores and the International Physical Activity Questionnaire scores will be inversely moderately correlated (high exercise tension scores with low IPAQ exercise scores), (c) the Feelings Tension scale scores will be inversely moderately correlated with the Rosenberg Self-esteem scale scores (high feelings tension with low Rosenberg esteem scores), and (d) participants with higher body mass index (BMI) will have higher tension scores compared to participants with lower BMIs on the Overeating Tension, Exercise Tension, and Feelings Tension Scales (BMI; weight [kg]/height [m²]. Additionally, the relationship between known groups (obese weight and normal weight) and BMI were assessed.

Hypothesis 1: the Overeating Tension Scale scores will be moderately correlated with the BULIT bulimia scale scores (.30-.60). Internal consistency reliability for the BULIT test in this study was satisfactory ($\alpha = .92$). The research question for the OTS and BULIT was supported by evidence of convergent validity; a significant moderate correlation ($r = .318, p < .028$) was found between scores on the Overeating Tension Scale and the BULIT Bulimia Test.

Hypothesis 2: the Exercise tension scale scores will be moderately inversely correlated with the International Physical Activity Questionnaire scores (high exercise tension scores with low IPAQ exercise scores). Internal consistency reliability for the IPAQ was not satisfactory ($\alpha = .58$). The research question for the ETS and IPAQ was not supported by evidence of convergent validity; there was no

significant inverse relationship found between scores on the Exercise Tension Scale and the IPAQ ($r = -.095, p < .535$).

Hypothesis 3: The Feelings Tension scale scores will be moderately inversely correlated with the Rosenberg Self-esteem scores (high feelings tension with low Rosenberg esteem scores). Internal consistency reliability for the RSES in this study was satisfactory ($\alpha = .875$). The research question for the FTS and RSES was not supported by evidence for convergent validity; there inverse relationship found was not a statistically-significant moderate correlation between the Feelings Tension Scale and the RSES ($r = -.129, p < .351$).

Hypothesis 4: the Overeating Tension, Exercise Tension, and Feelings Tension Scales scores will be positively correlated with subjects' body mass index (BMI; weight [kg]/height [m²]). Pearson correlations were used to estimate the association (small; $r = 0.20-0.50$ medium; $r = .50-.80$ strong; and $r = .80+$ very strong). At this exploratory stage, Bonferoni adjustments of significance levels were not made. Overall, OTS total scores were moderately correlated with BMI and statistically significant [$r = .451, p = .001, N = 53$]. For known weight groups, OTS total score significantly correlated with the obese weight participants' BMI [$r = .379, p = .016, N = 40, M = 34.5, SD = 8.8$], but was not correlated with normal weight participants' BMI [$r = .343, p = .257, N = 13, M = 22.46, SD = 1.76$].

Overall, the ETS total scores were correlated with BMI [$r = .521, p = .000, N = 51$]. For known weight groups, the ETS total scores were significantly correlated with the obese weight participants' BMI [$r = .486, p = .002, N = 38, M = 34.5, SD$

=8.9], and were correlated with normal weight participants' BMI, but were not significant [$r = .386, p = .192, N = 13, M = 22.46, SD = 1.7$]. Similarly, the FTS total scores were significantly correlated with BMI [$r = .373, p = .007, N = 51, M = 30.9, SD = 8.0$]. For known weight groups, FTS total scores were correlated with the obese weight participants' BMI [$r = .442, p = .005, N = 38, M = 33.89, SD = 7.2$], and correlated with normal weight participants' BMI, but were not significant [$r = .369, p = .215, N = 13, M = 22.4, SD = 1.7$].

On the OTS, both normal weight and obese weight participants were predominantly in Paratelic, Compliant, and Mastery Alloic states. On the ETS and FTS, normal weight and obese weight participants were predominantly in Telic, Compliant, and Sympathy Alloic states. On the FTS, normal weight and obese weight participants were predominantly in Telic, Compliant, and Sympathy Alloic or Mastery Alloic states (Table 34).

Table 34

Tension States Selected by BMI for Normal, Overweight, and Obese Weight

Scale and State	Body mass index Freq. (%) <i>N=54</i>	Normal weight Freq. (%) <i>n=13</i>	Obese weight Freq. (%) <i>n=38</i>
OTS			
Telic	13 (24)	4 (30)	9 (22)
Paratelic	42 (78)	9 (70)	32 (80)
Compliant	42 (78)	12 (92)	29 (75)
Defiant	11 (20)	1 (8)	10 (25)
Mastery Autic	7 (13)	3 (23)	4 (10)
Mastery Alloic	25 (46)	0	16 (40)
Sympathy Autic	18 (33)	2 (15)	3 (8)
Sympathy Alloic	3 (6)	8 (61)	17 (42)
ETS			
Telic	41 (73)	8 (62)	30 (79)
Paratelic	15 (27)	5 (38)	8 (21)
Compliant	38 (68)	8 (62)	28 (74)
Defiant	18 (32)	5 (38)	10 (26)
Mastery Autic	12 (21)	3 (23)	8 (21)
Mastery Alloic	6 (11)	4 (31)	3 (8)
Sympathy Autic	10 (18)	1 (8)	6 (16)
Sympathy Alloic	29 (52)	5 (39)	21 (55)
FTS			
Telic	48 (89)	12 (92)	33 (87)
Paratelic	6 (11)	1 (8)	5 (13)
Compliant	46 (85)	13 (100)	31 (81)
Defiant	8 (15)	0	7 (19)
Mastery Autic	18 (34)	4 (31)	12 (32)
Mastery Alloic	3 (6)	0	2 (5)
Sympathy Autic	9 (17)	3 (23)	6 (16)
Sympathy Alloic	24 (44)	6 (46)	18 (47)

Discussion and Implications

Readability of the Tension scales was established at the fifth grade level.

Content validity was established using S-CVI/Ave (of .96) and kappa scores (across all possible combinations averaging 0.986). Usability and Human Computer-interaction was established by an expert reviewer and participants. Performance

evaluation was conducted to improve the procedures. Participant evaluations yielded high scores on the System Usability Scale and Participant Opinion Survey. Phase 1 computer-administered routing of instrument data were evaluated and revised before Phase 2 was started.

Assessment of computer-administration issues; readability, content validity, usability and human-computer interaction (expert and participant) participant opinion and performance evaluation, should be conducted before reliability and validity evaluation. Assessing for computer-administration issues such as reading level, usability (procedures, font, navigation), layout of instruments (by expert) and performance issue allows for correction of these issues prior to use of the instruments. Revising any computer-administration issues, not only creates user-friendly instruments and procedures, but improves the chances of supporting reliability and validity results uncluttered with computer-administration issues.

Internal Consistency Reliability

All eight metamotivational states for all three tension scales were found to be internally consistent $\alpha > .70$. Although a few items were found to slightly increase internal consistency reliability coefficients if omitted, all items will be retained until further testing can be completed with greater numbers of participants. Significant inter-item correlations for the eight metamotivational states of all three tension scales were correlated above .30 ($r = .424 - .972$), and considered sufficiently related. Internal consistency reliability was established for the three tension scales and they were significantly inter-correlated, showing they consistently assess tension.

Content Validity (Convergent Validity)

All three scales were evaluated using the standard of .30-.60 correlations to establish convergent validity. The TESI total stressor scores were positively correlated with the ETS, but non significant correlations were found for the OTS and FTS; thus, convergent validity was not well established with the Tension scales.

The Construct Validity and Hypothesis-Testing Measures

Other measures used to establish construct validity were correlated with tension measures, including the OTS and BULIT, ETS and IPAQ, and the FTS and RSES. Only a moderate correlation was found for the OTS and BULIT, thus, convergent validity was not well established with the Tension scales. Two possible reasons for lack of construct validity could be that the chosen instruments measure different theoretical concepts, and a low power due to small sample size may have contributed to non significant correlations. A post-Hoc analysis was conducted to establish the power level of the calculations for future studies. The current study sample size of 61 participants, with a medium effect size for calculating correlations (.30) and alpha level of .05 estimates the power at 0.675 (Lenth, 2006). Further testing with other theoretically matched measures and larger numbers of participants could offer better evidence of convergent validity.

OTS, ETS, and FTS significantly correlated with BMI, showing there is a relationship between overeating tension, exercise tension, and feelings tension and participant's body mass index. OTS, ETS and FTS were not correlated with normal weight participants, showing no relationships. Significant correlations between

tension scores and obese participants' BMIs provides evidence that relationships exist between obese individuals' body mass indexes and their tension levels before overeating, skipping exercise, and feeling down. The computer-administered tension scale results are consistent with earlier testing as cited in the background studies.

Using reversal theory states to describe participants' experiences before skipping exercise, and feeling down, normal weight and overweight participants reported being predominantly in serious-minded (Telic), conforming (Compliant), and other-centered tender (Sympathy Alloic) states. Before overeating, both normal and overweight participants were in a playful (Paratelic) and conforming (Compliant); however, normal weight participants were predominantly other-centered tender (Sympathy Alloic), while overweight participants were more other-centered tough states. Although normal weight and overweight participants appeared to have similar experiences before overeating, skipping exercise, and feeling down, their tension or discrepancy scores (difference between the way they wanted to feel and the way they felt) revealed differences. In post hoc analysis, participants' BMIs were categorized as <25 for normal weight and ≥ 25 for overweight groups. T-test were calculated for total tension scores on the OTS, ETS, and FTS for weight groups, with significant differences found for the OTS and ETS; there were no significant differences on the FTS. Overweight participants reported higher levels of total overeating tension ($N=40$, $M=27.93$, $SD=25.24$) than normal weight participants ($N=13$, $M=11.85$, $SD=17.09$) [$t(1,51) = -2.14$, $p<.014$]. Similarly, overweight participants reported higher levels of total exercise tension ($N=38$, $M=40.84$,

$SD=24.74$) than normal weight participants ($N=13$, $M=23.54$, $SD=23.23$) [$t(1,49) = -2.28$, $p<.033$]. There were no differences found for the FTS.

These post-hoc findings offer additional support for construct validity with the overweight participants reporting higher tension than normal weight participants before overeating and skipping exercise. A unique characteristic of the Tension scales is the ability to name participants' frames of reference (metamotivational states) for different situations and the tension felt (discrepancy scores), as demonstrated by these post-hoc findings.

Limitations

Limitations of the study included: (a) the three scales do not address other contributing factors of obesity, such as environmental, hereditary, socioeconomic, and physiological factors; (b) the lack of an iterative process between the Literacy expert and the Content Validity experts could have effected the readability results by not having an expert double check the findings (c) financial constraints prevented computer screen advancement to the next pages when all items were completed. This feature is to avoid missing data and will be installed in the future; (d) a predominantly Caucasian sample representative of rural mid-America (the study focused on three rural Kansas communities); (e) exclusion of children in the sample (children need to be studied in the future to complete a full spectrum of ages and their tension-related responses); (f) computer-administration may have caused some potential participants not to volunteer; (g) response burden was generally improved by use of computer-administered methods; however some burden may have occurred due to participants

being expected to complete measures using the computer, as a less familiar means to completing questionnaires; and (h) recruitment methods did not produce the maximum number of participants desired; resulting sample size of 61 and a power level ranging from .67 to .99 (medium to large effect size).

Conclusions

Phase 1 established: the readability of the scales at less than a 5th grade reading level per expert use of Fry/ Ragor measure; content validity per S-CVI/Ave of .96 and kappa scores across all possible combinations average 0.986; usability and human-computer interface per expert evaluation and participant evaluation and; performance through an evaluation with participants. Phase 1's goal to establish the computer-administration of the three tension scales was achieved. In Phase 2 of study, internal consistency was established for the three tension scales. Convergent validity was not well established and will be explored in the future along with establishing a scoring range (low, medium, high) for the scales. The most promising result of this study is the medium to strong correlations of the Overeating, Exercise, and Feelings tension scales with participants' body mass index. After continued psychometric testing, nurses and weight management specialists may find these measures useful during counseling sessions to assess the level of tension during an overeating situation, skipping exercise situation or feeling down or low situation. Further, measures may provide data for long-term evaluation of weight management progress.

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Table 1
Outcome Measures

INSTRUMENT NAMES AND AUTHORS	# OF ITEMS, VARIABLE, MEASURES SPECIFICS, AND PREVIOUS RELIABILITIES, NORMATIVE DATA (M)	STUDY RELIABILITY COEFFICIENTS	NORMATIVE DATA (M/SD)
Bulimia Test (BULIT), Thelen, McLaughlin-Mann Pruitt, and Smith (1987).	36-item, scale for bulimia diagnosis. Positive predictive value of .74, negative predictive value of .84, specificity of .89, and sensitivity of .64 id diagnosing bulimia	$\alpha=.924$	M=60.8 SD.=17.7 N=33
International Physical Activity Questionnaire (IPAQ)	7-item short-answer measure of physical activity. Test-retest reliability was established with Spearman's Rho clustering around 0.8. Criterion validity was established with a median Rho of .30 against the CSA accelerometer minutes	$\alpha=.577$	N=61
Rosenberg Self-Esteem Scale (RSES) Rosenberg, 1965	10-item, four-point Likert-type general measure of self-esteem. alpha=.77-.88	$\alpha=.85$	N=67 M=20.9 SD=4.6 N=61
Tension and Effort Stress Inventory (TESI) (Svebak, 1993) overeating situation	24-item survey measure of individuals' experiences of stressors, moods, and efforts to cope. Stressor and effort-scores positively correlated ($r=.57, p < .0001$), effort	Stressor and effort-scores positively correlated ($r=.57, p < .0001$), effort discrepancy scores positively correlate to overall scores on tension-stress ($r=$	N=15

	discrepancy scores positively correlate to overall scores on tension-stress ($r = .65, p < .0001$)	$.65, p < .0001$ $\alpha = .873$	
Tension and Effort Stress Inventory (TESI) (Svebak, 1993) Skipped exercise situation	24-item survey measure of individuals' experiences of stressors, moods, and efforts to cope. Stressor and effort-scores positively correlated ($r = .57, p < .0001$), effort discrepancy scores positively correlate to overall scores on tension-stress ($r = .65, p < .0001$)	$\alpha = .707$	$N = 14$
Tension and Effort Stress Inventory (TESI) (Svebak, 1993) low esteem situation	24-item survey measure of individuals' experiences of stressors, moods, and efforts to cope. Stressor and effort-scores positively correlated ($r = .57, p < .0001$), effort discrepancy scores positively correlate to overall scores on tension-stress ($r = .65, p < .0001$)	$\alpha = .61$	$N = 12$
Marlowe-Crowne 2(10) Social Desirability Scale (Reynolds, 1982)	10 true-false items of social desirability. Total scale alpha = .80	$\alpha = .589$	$N = 61$

Table 2
 Descriptive Statistics for Sample for Phase 1 and Phase 2
 Psychometric Testing

Variable	Phase 1 Freq. (%) (N=6)	Phase 2 Freq. (%) (N=61)
Gender		
Male	1 (13)	13 (20)
Female	5 (87)	48 (80)
Marital Status		
Single	0	9 (14)
Married	6 (100)	47 (78)
Divorced	0	4 (7)
Widowed	0	1 (2)
Ethnicity		
Caucasian	6 (100)	54 (88)
Native American	0	6 (10)
Hispanic	0	1 (2)
Age		
21-29	0	11 (19)
30-39	2 (30)	8 (14)
40-49	3 (50)	6 (7)
50-59	1 (20)	15 (24)
60-69	0	16 (24)
70-79	0	6 (10)

Table 3

Reliability Analysis for the Overeating Tension Scale for Discrepancy

MOTIVATIONAL STATE	ITEMS INCLUDED	Alpha if item deleted	ALPA COEFF	<i>n</i>
TELIC	unsettled/settled	.887	.925	13
	anxious/relaxed	.920		
	worried/notworried	.907		
	nervous/calm	.892		
PARATELIC	bored/excited	.876	.912	41
	unstimulated/stimulated	.941		
	uninterested/interested	.874		
	indifferent/enthused	.850		
CONFORMIST	embarrassed/notembarrassed	.929	.932	42
	misunderstood/agreewith	.898		
	rejected/ belonging	.888		
	insecure/secure	.932		
NEGATIVISTIC	trapped/free	.813	.889	11
	held back/released	.771		
	caught/unrestricted	.983		
	limited/unlimited	.771		
MASTERY-AUTIC	notincontrol/incontrol	.968	.970	7
	shamed/proud	.976		
	weak/sturdy	.949		
	disrespected/respected	.944		
MASTERY-ALLOIC	notvalued/valued	.960	.789	3
	notcaredfor/caredfor	.634		
	resentful/grateful	.733		
	hurt/loved	.671		
SYMPATHY-AUTIC	notstandingupforothers/stoodupforothers	.951	.962	17
	lettingothersdown/beingthere for others	.951		
	useless/useful	.960		
	disloyal/loyal	.939		
SYMPATHY-ALLOIC	guilty/generous	.569	.719	25
	badaboutmyself/ goodaboutmyself	.538		
	selfish/giving	.836		
	notworthy/worthy	.591		

Table 4

Reliability Analysis for the Exercise Tension Scale for Discrepancy Scores

MOTIVATIONAL STATE	ITEMS INCLUDED	Alpha is item deleted	ALPHA COEFF.	<i>n</i>
TELIC	unsettled/settled	.910	.883	41
	anxious/relaxed	.831		
	worried/notworried	.852		
	nervous/calm	.799		
PARATELIC	bored/excited	.906	.920	15
	unstimulated/stimulated	.870		
	uninterested/interested	.872		
	indifferent/enthused	.929		
CONFORMIST	embarrassed/notembarrassed	.923	.923	47
	misunderstood/agreewith	.896		
	rejected/ belonging	.897		
	insecure/secure	.880		
NEGATIVISTIC	trapped/free	.950	.921	18
	held back/released	.882		
	caught/unrestricted	.866		
	limited/unlimited	.892		
MASTERY-AUTIC	notincontrol/incontrol	.950	.961	12
	shamed/proud	.943		
	weak/sturdy	.949		
	disrespected/respected	.952		
MASTERY-ALLOIC	notvalued/valued	.869	.902	6
	notcaredfor/caredfor	.814		
	resentful/grateful	.872		
	hurt/loved	.946		
SYMPATHY-AUTIC	notstandingupforothers/stoodupforothers	.970	.975	10
	lettingothersdown/beingthere for others	.961		
	useless/useful	.976		
	disloyal/loyal	.958		
SYMPATHY-ALLOIC	guilty/generous	.935	.940	28
	badaboutmyself/ goodaboutmyself	.922		
	selfish/giving	.923		
	notworthy/worthy	.904		

Table 5

Reliability Analysis for the Feelings Tension Scale for Discrepancy Scores

MOTIVATIONAL STATE	ITEMS INCLUDED	Alpha if item deleted	ALPA COEF F.	<i>n</i>
TELIC	unsettled/settled	.926	.941	48
	anxious/relaxed	.913		
	worried/notworried	.909		
	nervous/calm	.941		
PARATELIC	bored/excited	.911	.855	6
	unstimulated/stimulated	.725		
	uninterested/interested	.795		
	indifferent/enthused	.748		
CONFORMIST	embarrassed/notembarrassed	.918	.874	46
	misunderstood/agreewith	.818		
	rejected/ belonging	.817		
	insecure/secure	.773		
NEGATIVISTIC	trapped/free	.851	.902	8
	held back/released	.866		
	caught/unrestricted	.873		
	limited/unlimited	.899		
MASTERY-AUTIC	notincontrol/incontrol	.751	.810	18
	shamed/proud	.724		
	weak/sturdy	.739		
	disrespected/respected	.819		
MASTERY-ALLOIC	notvalued/valued	.627	.730	3
	notcaredfor/caredfor	.699		
	resentful/grateful	.842		
	hurt/loved	.330		
SYMPATHY-AUTIC	notstandingupforothers/stoodupforothers	.943	.955	9
	lettingothersdown/beingthere for others	.949		
	useless/useful	.933		
	disloyal/loyal	.937		
	guilty/generous	.950		
SYMPATHY-ALLOIC	badaboutmyself/ goodaboutmyself	.919	.939	24
	selfish/giving	.901		
	notworthy/worthy	.911		

Table 6

Total Scale Score: Cronbach's Alpha Correlation Coefficients

OTS	Total score Alpha	Subscale	Alpha if item deleted	M/ SD	<i>n</i>
OTS	.898	P/T	.915	8.65/ 9.40	54
		C/D	.825	6.93/ 8.35	
		MA/MAll/SA/SAll	.818	8.09/ 8.85	
ETS	.801	P/T	.804	14.39/ 9.74	56
		C/D	.724	11.29/ 10.47	
		MA/MAll/SA/SAll	.650	10.34/ 9.57	
FTS	.879	P/T	.882	18.24/ 11.96	54
		C/D	.804	11.87/ 10.49	
		MA/MAll/SA/SAll	.805	12.69/ 10.29	

P= Paratelic; T= Telic; C= Compliant; D= Defiant; MA= Mastery Autic; MAll= Mastery Alloic; SA= Sympathy Autic; SAll= Sympathy Alloic

Table 7

Inter Item correlations Overeating Tension Scale (OTS) TELIC *n*=13

correlations	unsettled/settled	anxious/relaxed	worried/notworried	nervous/calm
unsettled/settled	<i>n</i> =13			
anxious/relaxed	.890** .000	<i>n</i> =13		
worried/notworried	.763** .002	.622* .011	<i>n</i> =13	
nervous/calm	.758** .000	.673* .012	.786** .000	<i>n</i> =13

Table 8

Inter Item correlations OTS PARATELIC *n*=41

correlations	bored/excited	unstimulated/stimulated	uninterested/interested	indifferent/enthusiased
bored/excited	<i>n</i> =41			
unstimulated/stimulated	.598** .000	<i>n</i> =41		
uninterested/interested	.838** .000	.562** .000	<i>n</i> =41	
indifferent/enthusiased	.813** .000	.703** .000	.822** .000	<i>n</i> =41

Table 9

Inter Item correlations OTS COMPLIANT *n*=42

correlations	embarrassed/notembarrassed	misunderstood/agreed with	rejected/belonging	insecure/secure
embarrassed/notembarrassed	<i>n</i> =42			
misunderstood/agreed with	.809** .000	<i>n</i> =42		
rejected/belonging	.834** .000	.872** .000	<i>n</i> =42	
insecure/secure	.635** .000	.768** .000	.847** .000	<i>n</i> =42

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)

Table 10

Inter Item correlations OTS DEFIANT *n*=11

correlations	trapped/free	held back/released	caught/unrestricted	limited/ unlimited
trapped/free	<i>n</i> =11			
Held	.944**	<i>n</i> =11		
back/released	.000			
caught/unrestricted	.166	.377	<i>n</i> =11	
	.625	.253		
limited/unlimited	.982**	.970**	.337	<i>n</i> =11
	.000	.000	.310	

Table 11

Inter Item correlations OTS MASTERY AUTIC *n*=7

correlations	notincontrol/ incontrol	shamed/proud	weak/sturdy	disrespected/ respected
notincontrol/incontrol	<i>n</i> =7			
Shamed/proud	.899**	<i>n</i> =7		
	.006			
weak/sturdy	.898**	.978**	<i>n</i> =7	
	.006	.000		
disrespected/respected	.903**	.993**	.996**	<i>n</i> =7
	.005	.000	.000	

Table 12

Inter Item correlations OTS MASTERY ALLOIC *n*=1

correlations	notvalued/ valued	notcaredfor/ caredfor	resentful/grateful	hurt/loved
Notvalued/valued	<i>n</i> =1			
notcaredfor/ caredfor		<i>n</i> =1		
resentful/grateful			<i>n</i> =1	
hurt/loved				<i>n</i> =1

Table 13

Inter Item correlations OTS SYMPATHY AUTIC <i>n</i> =17				
Correlations	notstandingupforothers/stoodupforothers	lettingothersdown/beingthere for others	useless/useful	disloyal/loyal
notstandingupforothers/stoodupforothers	<i>n</i> =17			
lettingothersdown/beingthere for others	.894**	<i>n</i> =17		
useless/useful	.841**	.805**	<i>n</i> =17	
lettingothersdown/disloyal/loyal	.863**	.917**	.919**	<i>n</i> =17
	.000	.000	.000	

Table 14.

Inter Item correlations OTS SYMPATHY ALLOIC <i>n</i> =25				
Correlations	guilty/generous	Anxious/relaxed/badaboutmyself/goodaboutmyself	selfish/giving	notworthy/worthy
guilty/generous	<i>n</i> =25			
badaboutmyself/goodaboutmyself	.717**	<i>n</i> =25		
selfish/giving	.150	.044	<i>n</i> =25	
notworthy/worthy	.498**	.706**	.224	<i>n</i> =25
	.011	.000	.281	

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)

Table 15

Inter Item correlations Exercise Tension Scale (ETS) TELIC *n*=41

Correlations	unsettled/settled	anxious/relaxed	worried/not worried	nervous/calm
unsettled/settled	<i>n</i> =41			
anxious/relaxed	.532** .000	<i>n</i> =41		
worried/notworried	.479** .002	.711** .000	<i>n</i> =41	
nervous/calm	.623** .000	.837** .000	.784** .000	<i>n</i> =41

Table 16

Inter Item correlations ETS PARATELIC *n*=15

Correlations	bored/excited	unstimulated/stimulated	uninterested/interested	indifferent/enthusiased
bored/excited	<i>n</i> =15			
unstimulated/stimulated	.757** .001	<i>n</i> =15		
uninterested/interested	.824** .000	.901** .000	<i>n</i> =15	
Indifferent/enthusiased	.583** .000	.775** .0010	.682** .005	<i>n</i> =15

Table 17

Inter Item correlations ETS COMPLIANT *n*=37

Correlations	embarrassed/not embarrassed	misunderstood/agree with	rejected/belonging	insecure/secure
embarrassed/not embarrassed	<i>n</i> =37			
misunderstood/agree with	.620** .000	<i>n</i> =37		
rejected/belonging	.775** .000	.743** .000	<i>n</i> =37	
insecure/secure	.706** .000	.896** .000	.758** .000	<i>n</i> =37

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)

Table 18

Inter Item correlations ETS DEFIANT <i>n</i> =18				
correlations	trapped/free	held back/released	caught/unrestr icted	limited /unlim ited
trapped/free	<i>n</i> =18			
held back/released	.682** .002	<i>n</i> =18		
caught/unrestricted	.705** .000	.860** .000	<i>n</i> =18	
limited/unlimited	.578* .012	.847** .000	.889** .000	<i>n</i> =18

Table 19

Inter Item correlations ETS MASTERY AUTIC <i>n</i> =12				
correlations	notincontrol/i ncontrol	shamed/proud	weak/sturdy	disresp ected/r espect ed
notincontrol/incontr ol	<i>n</i> =12			
shamed/proud	.832** .001	<i>n</i> =12		
weak/sturdy	.849** .000	.924** .000	<i>n</i> =12	
disrespected/respect ed	.925** .000	.880** .000	.829** .000	<i>n</i> =12

Table 20

Inter Item correlations ETS MASTERY ALLOIC <i>n</i> =6				
correlations	notvalued/val ued	notcaredfor/care dfor	resentful/grate ful	hurt/lo ved
notvalued/valued	<i>n</i> =6			
notcaredfor/caredfo r	.959** .003	<i>n</i> =6		
resentful/grateful	.795 .059	.891* .017	<i>n</i> =6	
hurt/loved	.673 .143	.733 .097	.567 .240	<i>n</i> =6

Table 21

Inter Item correlations ETS SYMPATHY AUTIC *n*=10

Correlations	notstandingupforothers/ others/ stoodupforothers	lettingothers down/ beingthere for others	useless/us eful	disloy al/loya l
notstandingupforothers/ stoodupforothers	<i>n</i> =10			
Lettingothersdown/ beingthere for others	.921**	<i>n</i> =10		
useless/useful	.864**	.883**	<i>n</i> =10	
	.000	.001		
Lettingothersdown/ disloyal/loyal	.910**	.964**	.913**	<i>n</i> =10
	.000	.000	.000	

Table 22

Inter Item correlations ETS SYMPATHY ALLOIC *n*=28

Correlations	guilty/generous	Anxious/rel axed badaboutmy self/ goodaboutm yself	selfish/giv ing	notwor thy/wor thy
guilty/generous	<i>n</i> =28			
badaboutmyself/ goodaboutmyself	.745**	<i>n</i> =28		
selfish/giving	.809**	.739**	<i>n</i> =28	
	.000	.000		
Notworthy/worthy	.769**	.904**	.860**	<i>n</i> =28
	.000	.000	.000	

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)

Table 23

Inter Item correlations Feelings Tension Scale (FTS) TELIC <i>n</i> =48				
correlations	unsettled/settled	anxious/relaxed	worried/notworried	nervous/calm
unsettled/settled	<i>n</i> =48			
anxious/relaxed	.833** .000	<i>n</i> =48		
worried/notworried	.821** .000	.874* .000	<i>n</i> =48	
nervous/calm	.727** .000	.752** .000	.796** .000	<i>n</i> =48

Table 24

Inter Item correlations FTS PARATELIC <i>n</i> =7				
correlations	bored/excited	unstimulated/stimulated	uninterested/interested	indifferent/enthusiased
bored/excited	<i>n</i> =7			
unstimulated/stimulated	.766 .076	<i>n</i> =7		
uninterested/interested	.225 .668	.715 .071	<i>n</i> =7	
indifferent/enthusiased	.496 .317	.933** .007	.835* 038	<i>n</i> =7

Table 25

Inter Item correlations FTS COMPLIANT <i>n</i> =47				
correlations	embarrassed/not embarrassed	misunderstood/agreewith	rejected/belonging	insecure/secure
embarrassed/not embarrassed	<i>n</i> =47			
misunderstood/agreewith	.437** .002	<i>n</i> =47		
rejected/belonging	.424** .0023	.723** .000	<i>n</i> =47	
insecure/secure	.515** .000	.820** .000	.835** .000	<i>n</i> =47

** Correlation is significant at the 0.01 level (2-tailed)

Table 26

Inter Item correlations FTS DEFIANT *n*=8

Correlations	trapped/free	held back/release d	caught/unre stricted	limited/un limited
trapped/free	<i>n</i> =8			
held back/released	.812* .014	<i>n</i> =8		
caught/unrestricted	.814* .014	.616 .104	<i>n</i> =8	
limited/unlimited	.584 .129	.692 .057	.664 .072	<i>n</i> =8

Table 27

Inter Item correlations FTS MASTERY AUTIC *n*=18

Correlations	notincontrol/i ncontrol	shamed/pro ud	weak/sturdy	disrespect ed/respect ed
notincontrol/incontrol	<i>n</i> =18			
shamed/proud	.483* .042	<i>n</i> =18		
weak/sturdy	.621** .006	.738** .000	<i>n</i> =18	
disrespected/respecte d	.486* .041	.518* .027	.289 .244	<i>n</i> =18

Table 28

Inter Item correlations FTS MASTERY ALLOIC *n*=3

Correlations	notvalued/val ued	notcaredfor/ caredfor	resentful/gra teful	hurt/loved
notvalued/valued	<i>n</i> =3			
notcaredfor/caredfor	.976 .139	<i>n</i> =3		
resentful/grateful	.000 .1000	-.217 .861	<i>n</i> =3	
hurt/loved	.836 .370	.691 .509	.549 .630	<i>n</i> =3

Table 29

Inter Item correlations FTS SYMPATHY AUTIC *n*=9

correlations	notstandingupfo rothers/ stoodupforother s	lettingothersdo wn/ beingthere for others	useless/useful	disloyal/ loyal
notstandingupfo thers/ stoodupforothers	<i>n</i> =9			
lettingothersdown / beingthere for others	.953** .000	<i>n</i> =9		
useless/useful	.837** .005	.805** .009	<i>n</i> =9	
lettingothersdown / disloyal/loyal	.777* .014	.802** .009	.972** .000	<i>n</i> =9

Table 30

Inter Item correlations FTS SYMPATHY ALLOIC *n*=24

correlations	guilty/generous	Anxious/relaxe d badaboutmyself / goodaboutmyse lf	selfish/giving	notwort hy/wort hy
guilty/generous	<i>n</i> =24			
badaboutmyself/ goodaboutmyself	.677** .000	<i>n</i> =24		
selfish/giving	.737** .000	.910** .000	<i>n</i> =24	
Notworthy/worth y	.773** .000	.815** .000	.871** .000	<i>n</i> =24

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)

Table 31

OTS subscale correlations $n=54$

Correlations Of subscales with negatives removed	Telic/ Paratelic	Compliant/ Defiant	Master Autic/ Master Alloic/ Sympathy Autic/ Sympathy Alloic
Telic/ Paratelic	$n=54$		
Compliant/ Defiant	.697** .000	$n=54$	
Master Autic/ Master Alloic/ Sympathy Autic/ Sympathy Alloic	.704** .000	.845** .000	$n=54$

Table 32

ETS subscale correlations $n=56$

Correlations Of subscales with negatives removed	Telic/ Paratelic	Compliant/ Defiant	Master Autic/ Master Alloic/ Sympathy Autic/ Sympathy Alloic
Telic/ Paratelic	$n=56$		
Compliant/ Defiant	.483** .000	$n=56$	
Master Autic/ Master Alloic/ Sympathy Autic/ Sympathy Alloic	.567** .000	.675** .000	$n=56$

Table 33

FTS subscale correlations $n=54$

Correlations Of subscales with negatives removed	Telic/ Paratelic	Compliant/ Defiant	Master Autic/ Master Alloic/ Sympathy Autic/ Sympathy Alloic
Telic/ Paratelic	$n=54$		
Compliant/ Defiant	.680** .000	$n=54$	
Master Autic/ Master Alloic/ Sympathy Autic/ Sympathy Alloic	.680** .000	.789** .000	$n=54$

Table 34

Tension States Selected by BMI for Normal, Overweight, and Obese Weight

Scale and State	Body mass index Freq. (%) <i>N=54</i>	Normal weight Freq. (%) <i>n=13</i>	Obese weight Freq. (%) <i>n=38</i>
OTS			
Telic	13 (24)	4 (30)	9 (22)
Paratelic	42 (78)	9 (70)	32 (80)
Compliant	42 (78)	12 (92)	29 (75)
Defiant	11 (20)	1 (8)	10 (25)
Mastery Autic	7 (13)	3 (23)	4 (10)
Mastery Alloic	25 (46)	0	16 (40)
Sympathy Autic	18 (33)	2 (15)	3 (8)
Sympathy Alloic	3 (6)	8 (61)	17 (42)
ETS			
Telic	41 (73)	8 (62)	30 (79)
Paratelic	15 (27)	5 (38)	8 (21)
Compliant	38 (68)	8 (62)	28 (74)
Defiant	18 (32)	5 (83)	10 (26)
Mastery Autic	12 (21)	3 (23)	8 (21)
Mastery Alloic	6 (11)	4 (31)	3 (8)
Sympathy Autic	10 (18)	1 (8)	6 (16)
Sympathy Alloic	29 (52)	5 (39)	21 (55)
FTS			
Telic	48 (89)	12 (92)	33 (87)
Paratelic	6 (11)	1 (8)	5 (13)
Compliant	46 (85)	13 (100)	31 (81)
Defiant	8 (15)	0	7 (19)
Mastery Autic	18 (34)	4 (31)	12 (32)
Mastery Alloic	3 (6)	0	2 (5)
Sympathy Autic	9 (17)	3 (23)	6 (16)
Sympathy Alloic	24 (44)	6 (46)	18 (47)

Table 35
Content Validity Indices S-CVI/Ave

Reversal Theory States		R 1	R 2	R 3	R 4	Item	State CVI	Alpha	
TELIC Round 3	FEELING WORDS								
	Serious	4	4	4	4	1			
	Have an important goal	4	4	4	4	1			
	Planning ahead	3	4	4	4	1			
	Trying to accomplish something important	4	4	4	4	1			
	Care about future outcomes	4	4	4		1		1	
	High tension words								
	1 Unsettled	3	3	4	3	1			
	2 Anxious	4	4	4	4	1			
	3 Worried	4	3	4	4	1			
	4 Nervous	4	4	3	4	1			
	Low tension words								
	1 Settled	4	3	4	2	0	developers	decision to leave	
	2 Relaxed	4	4	4	3	1			
	3 Not worried	4	3	4	3	1			
	4 Calm	4	4	4	4	1	0.875		
	ParaTelic								
	FEELING WORDS		R 1	R 2	R 3	R 4	Item	State CVI	
	State	Playful	4	4	4	4	1		
		Spontaneous	4	4	4	4	1		
Looking to have a good time		4	3	4		1			
Looking to have fun		3	4	4	3	1			
Focusing on the here and now		4	4	4	3	1		1	
High tension words									
1 Bored		4	4	4	4	1			
2 Unstimulated		4	4	4	4	1			
3 Uninterested		N R	3	4	3	1			
4 Indifferent		N R	3	3	3	1			

	Low tension words						
1	Excited	4	4	4	4	1	
2	Stimulated	4	4	4	4	1	
3	Interested	4	3	3	3	1	
4	Enthused	4	4	4	4	1	1
Conformist	FEELING WORDS	R	R	R	R		
		1	2	3	4	Item	State CVI
State	Following the rules	4	4	4	3	1	
	Not "making waves"	4	3	4	3	1	
	Worrying if I broke a rule	4	4	4	4	1	
	Looking to fit in	4	4	4	3	1	
	Trying to stay in line	4	4	3	4	1	
	Trying to be the same as others	4	3	4		1	
	Worrying about what others thought	3	4	4	4	1	1
	High tension words						
1	Embarrassed	4	3	3	4	1	
2	Misunderstood	3	3	3		1	
3	Rejected	3	3	3	3	1	
4	Insecure	3	3	3	3	1	
	Low tension words						
1	Not embarrassed	3	3	3	3	1	
2	Agreed with	2	3	4		0	
3	Belonging	3	3	4	4	1	
4	Secure	3	3	3	3	1	0.875
Negativistic	FEELING WORDS	R	R	R	R		
		1	2	3	4	Item	State CVI
State	Standing up for what I thought	3	4	4	3	1	
	Bending the rules	4	4	4	3	1	
	Angry	4	4	3	4	1	
	Stubborn	4	3	3	4	1	
	Disobedient	4	4	4	3	1	
	Looking to be difficult	4	3	4	4	1	
	Looking to do my own	3	4	4	4	1	1

	thing						
1	High tension words						
2	Trapped	4	3	4	4	1	
3	Held back	4	3	4	4	1	
4	Caught	3	3	3	3	1	
	Limited	3	3	3	4	1	
	Low tension words						
1	Free	4	3	4	4	1	
2	Released	4	3	4	3	1	
3	Unrestricted	4	3	4		1	
4	Unlimited	3	3	4	3	1	1
Mastery	FEELING WORDS	R	R	R	R	Item	State CVI
		1	2	3	4		
Autic	Doing my best	3	4	4	3	1	
State	Giving it my all	3	4	4	3	1	
	Not showing tender feelings	2	4	4		0	
	Being tough	4	4	4		1	
	Feeling competitive	4	4	4	4	1	0.875
	High tension words						
1	Not in control	4	4	4			
2	Shamed	4	3	3	4	1	
3	Weak	4	4	3	4	1	
4	Disrespected	4	4	4	4	1	
	Low tension words						
1	In control	4	4	4	4	1	
2	Proud	4	4	4	4	1	
3	Sturdy	4	4	3	4	1	
4	Respected	4	4	4	4	1	1
Sympathy	FEELING WORDS	R	R	R	R	Item	State CVI
		1	2	3	4		
Autic	Looking for closeness with others	3	4	4	3	1	
State	Looking for help	3	4	4	4	1	
	Feeling I deserved a treat	4	4	4	4	1	
	Showing caring feelings	4	4	4	3	1	
	Looking to feel cared for	4	4	4	4	1	1

		High tension words					
	1	Not valued	3	4	4	3	1
	2	Not cared for	4	4	4	4	1
	3	Resentful	4	4	4	4	1
	4	Hurt	4	4	4	3	1
		Low tension words					
	1	Valued	4	4	4	4	1
	2	Cared for	4	4	4	4	1
	3	Grateful	4	4	4	4	1
	4	Loved	4	4	4	3	1
Mastery		FEELING WORDS	R	R	R	R	
			1	2	3	4	Item State CVI
Alloic		Letting others win	3	4	4	4	1
State		Helping others profit	3	4	4	4	1
		Helping others succeed	3	4	4	4	1
		Letting others be in charge	3	4	4	4	1
		Giving self to a cause	4	4	4	4	1
		High tension words					
	1	Not standing up for others	4	4	4		1
	2	Letting others down	4	4	4	3	1
	3	Useless	3	3	3	3	1
	4	Disloyal	4	3	4	3	1
		Low tension words					
	1	Stood up for others	4	4	4		1
	2	Being there for others	4	4	3		1
	3	Useful	3	3	3	4	1
	4	Loyal	4	3	4	4	1
Sympathy		FEELING WORDS	R	R	R	R	
			1	2	3	4	Item State CVI
Alloic		Looking to make others feel good	4	4	4	4	1
State		Putting others needs before my own	4	4	4		1
		Giving up something to help someone else	4	4	4		1
		Being kind to others	4	4	4		1

	Putting other's needs before my own	4	4	4	4	1	
	High tension words						
1	Guilty	4	4	4	4	1	
2	Bad about myself	4	3	4	4	1	
3	Selfish	4	4	4	4	1	
4	Not worthy	4	4	3		1	
	Low tension words						
1	Generous	3	4	4	3	1	
2	Good about myself	4	3	4	4	1	
3	Giving	3	4	4	4	1	
4	Worthy	4	4	4	4	1	
	S-CVI/ Ave Total				106/	9	0.972

-  Not accepted by all experts
-  missing
-  Subscale CVI

Table 36

Progression of changes to Tension scales

TELIC FEELING WORDS	Literacy changes to 5th grade reading level	Round one changes by Theory Experts	Round two changes by Theory Experts	Round three changes by Theory Experts
Serious minded	Serious	Serious		
Goal oriented	Had a goal	Had a goal	Have an important goal	
Planning ahead	Planned ahead	Planning ahead		
Trying to accomplish something	Tried to accomplish something	Trying to accomplish something	Trying to accomplish something important	
Future-oriented	Looked to the future	Looked to the future	Aware of future outcomes	Care about future outcomes
High tension words				
Unsettled		Unsettled		
Uneasy		Uneasy	Anxious	
Anxious	Worried	Worried		
Nervous		Nervous		
Low tension words				
Settled		Settled	Settled**	
At ease		At ease	Relaxed	
Calm	Not worried	Not worried		
Composed	Calm	Calm		
PARATELIC FEELING WORDS				
Playful		Playful		
Spontaneous	Spur-of-the-moment	Spur-of-the-moment	Spontaneous	
Emphasizing good feelings	Enjoyed good feelings	Enjoying good feelings	Looking to feel good	Looking to have a good time
Having fun for fun's sake	Had fun	Had fun	Looking to have fun	
Present-	Focused on	Focused on the		

oriented	the here and now	here and now		
High tension words				
Bored		Bored		
Unstimulated		Unstimulated		
Uninterested		Uninterested		
Indifferent		Indifferent		
Low tension words				
Excited		Excited		
Stimulated		Stimulated		
Interested		Interested		
Enthusiastic	Enthused	Enthused		
Conformist FEELING WORDS				
Following the rules	Followed the rules	Following the rules		
Not “making waves” or disagreeing with others	Did not make waves	Did not make waves	Not “making waves”	
Feeling concerned if I broke a rule	Worried if I broke a rule	Worrying if I broke a rule		
Feeling compliant and agreeable	Felt agreeable	Felt agreeable	Looking to fit in	
Trying to stay in line	Tried to stay in line	Trying to stay in line		
Doing what others did	Followed others	Followed others	Looking to do the same as others	Trying to be the same as others
Concerned about what others thought	Worried about what others thought	Worrying about what others thought		
High tension words				
Embarrassed		Embarrassed		
Foolish		Foolish	Stupid	Misunderstood
Isolate	Alone	Alone	Rejected	

Uncomfortable		Uncomfortable	Insecure	
Low tension words				
Not embarrassed		Not embarrassed		
Sensible	Wise	Wise	Smart	Agreed with**
Belonging		Belonging		
Comfortable		Comfortable	Secure	
Negativistic FEELING WORDS				
Sticking up for what I thought	Stood for what I thought	Standing up for what I thought		
Bending/ breaking the rule	Bent the rules	Bending the rules		
Angry		Angry		
Stubborn		Stubborn		
Rebellious/ defiant	Disobedient	Disobedient		
Wanting to be difficult	Wanted to be difficult	Looking to be difficult		
Doing my own thing	Wanted to do my own thing	Looking to do my own thing		
High tension words				
Trapped		Trapped		
Held back		Held back		
Caught		Caught		
Restricted	Limited	Limited		
Low tension words				
Free		Free		
Released		Released		
Liberated	Freed	Freed	Loose	Unrestricted
Unrestricted	Unlimited	Unlimited		
Mastery Autic FEELING WORDS				

Doing my best		Doing my best		
Giving it my all		Giving it my all		
Being strong and not showing tender feelings		Being strong and not showing tender feelings	Being strong and not showing tender feelings	Not showing tender feelings**
Being tough with myself and others		Being tough with myself and others	Being tough with myself and others	Being tough with myself
Feeling competitive		Feeling competitive		
High tension words				
Out of control		Out of control	Losing control	Not in control
Humiliated	Shamed	Shamed		
Wimpy		Wimpy	Weak	
Disrespected		Disrespected		
Low tension words				
In control		In control		
Proud		Proud		
Sturdy		Sturdy		
Respected		Respected		
Sympathy Autic FEELING WORDS				
Wanting to be in harmony with others	Wanting to be in agreement with others	Wanting to be in agreement with others	Looking for closeness with others	
Looking to others for sympathy for help	Looking for help	Looking for help		
Feeling I deserved a reward/treat	Feeling I deserved a treat	Feeling I deserved a treat		
Showing tender	Showing caring	Showing caring feelings	Looking to others for	

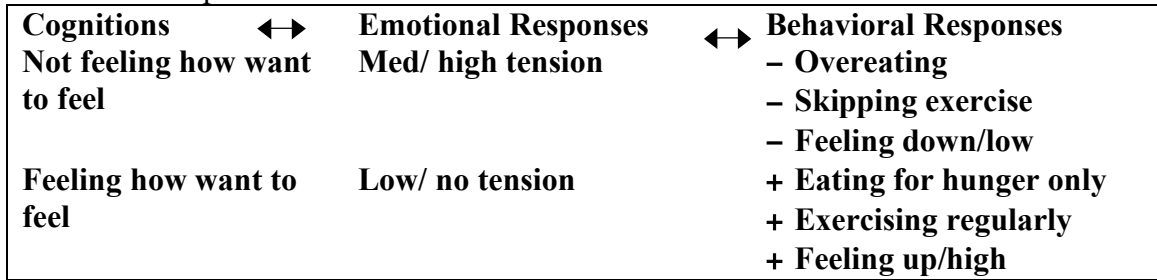
feelings	feelings		tenderness	
Wanting to feel cared for	Wanting to feel cared for	Looking to feel cared for		
High tension words				
Resentful	Not valued	Not valued		
Deprived	Not cared for	Not cared for		
Offended	Not grateful	Not grateful	Resentful	
Hurt		Hurt		
Low tension words				
Appreciative	Valued	Valued		
Cared for		Cared for		
Grateful		Grateful		
Pleased		Pleased	Loved	
Mastery Alloic FEELING WORDS				
Letting others win		Letting others win		
Helping others profit		Helping other profit		
Helping others succeed		Helping other succeed		
Letting others be in charge		Letting others be in charge		
Giving self to a cause		Giving self to a cause		
High tension words				
Ashamed		Ashamed	Ashamed	Not standing up for others
Dishonorable	Not proper	Not proper	Letting others down	
Burdensome	A burden	A burden	Useless	
Disloyal		Disloyal		
Low tension words				
Satisfied		Satisfied	Satisfied with myself	Stood up for others
Honorable	Proper	Proper	Not letting other	Being there

			down	for others
Useful		Useful		
Loyal		Loyal		
Sympathy Alloic FEELING WORDS				
Wanted to make others feel good	Wanting to make others feel good	Looking to make others feel good		
Put self out for others	Putting others before myself	Putting other before myself	Putting others before myself	Putting others needs before my own
Gave up something of mine to give to others	Giving up something of mine to someone else	Giving up something of mine to someone else	Giving up something of mine to help someone else	Giving up something to help someone else
Being nice/ kind to others		Being nice/kind to others	Being nice/ kind to others	Being kind to others
Putting other's needs before my own		Putting other's needs before my own		
High tension words				
Guilty		Guilty		
Bad about myself		Bad about myself		
Heavy conscience	Selfish	Selfish		
Blameworthy		Blameworthy	Blameworthy	Not worthy
Low tension words				
Virtuous	Righteous	Righteous	Generous	
Good about myself		Good about myself		
Clear conscience	Giving	Giving		
Worthy	Worthy	Worthy		

** Items not accepted by all experts

Figure 1

Theoretical Framework for Overweight Individuals' Tension, Emotional, and Behavioral Responses



Appendix A

Subject Procedure Forms

- A1. Tension According to Reversal Theory
- A2. Telephone Script for Recruitment
- A3. Procedural Completions Checklist Version One,
Procedural Completions Checklist Version Two,
Procedural Completions Checklist Version Three,
Slosson Readability Test,
NHLBI Body Mass Index Scoring
- A4. Expert Readability Checklist
- A5. Expert Content Validity Checklist
- A6. Expert Usability and Human-computer Interaction Checklist
- A7. System Usability Scale
- A8. Participant Opinion Survey
- A9. Performance Record

Tension According to Reversal Theory*

(Apter's Reversal Theory Metamotivational State Pairs, Tension, and Self Statements)

<u>SERIOUS – WORK-ORIENTED</u>	<u>PLAYFUL – PLAY-ORIENTED</u>
<p>No/Low Tension Calm, settled, at ease, composed “I don’t care how tedious this work is; I feel it is really worth it.”</p> <p>Medium/High Tension Anxious, unsettled, uneasy, nervous “I am worried sick; what happens if all goes wrong?”</p>	<p>No/Low Tension Excited, stimulated, interested, enthusiastic “This is fantastic! I don’t know when I have ever had such fun.”</p> <p>Medium/High Tension Bored, unstimulated, uninterested, indifferent “”This job is terribly monotonous. I have to keep doing the same thing over and over and over.”</p>
<p><u>COMPLIANT – FOLLOW RULES</u></p> <p>No/Low Tension Not embarrassed, sensible, belonging, comfortable “I am as sure as I could be that I have done the right thing.”</p> <p>Medium/High Tension Embarrassed, foolish, isolated, uncomfortable “I want to do the right thing. Everybody is looking at me. Help!</p>	<p><u>DEFIANT – BREAK RULES</u></p> <p>No/Low Tension Free, released, liberated, unrestricted “I think you are totally wrong, and here are the reasons.”</p> <p>Medium/High Tension Trapped, held back, caught, restricted “”If I can’t say what I really think I shall explode in a minute!”</p>
<p><u>MASTERY – BEING TOUGH</u></p> <p>No/Low Tension In control, proud, sturdy, respected “I am in charge around here—and don’t forget it!</p> <p>Medium/High Tension Out of control, humiliated, wimpy, disrespected “I know I came last in the race. There is no need to rub it in.”</p>	<p><u>SYMPATHY – BEING TENDER</u></p> <p>No/Low Tension Satisfied, honorable, useful, loyal “I am glad we were able to have this chat and get to know each other better.”</p> <p>Medium/High Tension Ashamed, dishonorable, burdensome, disloyal “”You seem so distant these days. Have I done anything to upset you?”</p>
<p><u>OTHER-ORIENTED</u></p> <p>No/Low Tension Appreciative, cared for, grateful, pleased “I feel that I have become part of something bigger than myself.”</p>	<p><u>SELF-ORIENTED</u></p> <p>No/Low Tension Virtuous, good about self, clear conscience, praiseworthy “For once, I am going to put myself first.”</p>

Medium/High Tension

Guilty, bad about self, heavy conscience, blameworthy
“I did not realize I had caused you so much

trouble. I feel terrible.”

Medium/High Tension

Resentful, deprived, offended, hurt

“I am tired of having to look after other
people all
the time.”

* Dotted line represents reversibility between state pairs

From Apter, M.(2005). *Personality Dynamics: Key Concepts in Reversal Theory*. Manassas, VA: Apter International Ltd.

Appendix A2

Telephone Script for Recruitment

Please return each call within 24-48 hours. If you cannot call everyone in the 24-48 hour period, Please call them to acknowledge their call and say you will call them back. If you leave a voice mail, ask them when (and where) in the next few days it would be convenience for you to call them to discuss the study. Below is the script that I would like for you to follow carefully so no details are left out. I have put *suggested verbatim script in italics* and the rest are notes to you in regular print.

MESSAGE TO FAMILY MEMBER: *“May I leave her the message to call back (Your name and clinic phone number) with 2 or 3 times when we could call her at home or work?”* (confirm telephone numbers you have)

RECORD MESSAGE: *“This is (your name) returning your call about the Computer Questionnaire Study. Could you call me back at (give your number) with 2 or 3 times when I can call you back at your home or work numbers? (confirm other number). I have (#) for your (place) number.*

PERSON ANSWERS THE PHONE: *“Hi name. This is (your name) returning your call about the Computer Questionnaire Study. Is this a good time for you to talk? I’m a research assistant and I’d like to first ask you a few questions to see if you would qualify for the study.*

- A. First of all, how did you hear about the study? (If newspaper ad, Telehealth communications)
- B. Purpose: The purpose of this proposal is to test measures on the computer that will later be used to evaluate the effectiveness of interventions that have been provided through the KU telehealth program.
- C. Your participation would involve **attending one 45 - 60 minute sessions** at the Horton Kansas Clinic (for Phase one) or at the Pittsburg Kansas Clinic (for Phase 2). These sessions will involve taking your height and weight, and completing several short questionnaires on a computer. You do not have to have experience with the computer because a research assistant will be there to help you.
- D. Study Entry Criteria:
Before I go into more detail, let me ask you a few more questions to be sure you meet the requirements for the study.

1. Are you between the ages of **21 and 60**?
2. Do you speak, read and write in English?
3. What year of school did you complete?
Confirm: Must be at a 5th grade level or higher.
4. Are you pregnant?
5. Have you ever been **diagnosed** as having any eating disorder or other mental illness (anorexia, bulimia, psychosis)?
6. Do you **take medication** that would affect your psychological perceptions (steroids, insulin, anti-psychotics)?
7. With the help of an assistant, are you able to complete 8 questionnaires on the computer lasting 45-60 minutes?

IF INDIVIDUAL DEFINITELY DOES NOT MEET CRITERIA: If you are confident that this individual does **NOT** meet criteria, say something like this:

“I’m sorry that we’re not able to take persons whom (reiterate which criterion and why we are delimiting that criterion). We really appreciate your interest in the study and hope that if you know of friends/family who might be interested in participating, you will share my name and number with them. My number again is (#). Thank you.

IF YOU QUESTION WHETHER THE INDIVIDUAL MEETS A CRITERION: If there is a question in your mind about whether they meets a criterion, but you think its only a slight deviation, go ahead and sign her up for an interview appointment; however, tell her that you will need to consult with investigators to be sure they meet all the criteria.

IF THE INDIVIDUAL DEFINITELY MEETS CRITERIA: *“Great! It looks like you meet all of the qualifications to participate in the study. Are there any questions I can answer for you at this time? Let’s set up an appointment time!*

Appendix A3
Study Completion Checklist

Participant ID

- Study information given? 1
- Entry criteria reviewed? 2
1. Between ages of 21-60? 3
2. If female, not pregnant? 4
3. Any diagnosis of eating disorders or mental illness that affects participant's weight? 5
4. Are they taking medications that affect their weight? 6
5. Did they pass the Slossen (20/40 to pass) 7
- 8
- 9

Slossen score

Height

Weight

Body mass Index

Did they complete the eight measures?

Tax information given with card?

Start and Stop time?

Version one

General Tension Measure (TESI-OVEREATING)

General Feelings Questionnaire (Rosenberg)

Overeating Tension Scale

Overeating Scale (BULIT)

Exercise Tension Scale

Personal Relationships Scale (Marlowe-Crown)

Feelings Tension Scale

Physical Activity Questionnaire (IPAQ)

Procedural Checklist (Demographics)

Study Completion Checklist

Participant ID

- Study information given? 1
- Entry criteria reviewed? 2
- 1. Between ages of 21-60? 3
- 2. If female, not pregnant? 4
- 3. Any diagnosis of eating disorders or mental illness that affects participant's weight? 5
- 4. Are they taking medications that affect their weight? 6
- 5. Did they pass the Slossen (20/40 to pass) 7

Slossen score

Height

Weight

Body mass Index

Did they complete the eight measures?

Tax information given with card?

Start and Stop time?

Version Two

- 1 **Exercise Tension Scale**
- 2 **Physical Activity Questionnaire (IPAQ)**
- 3 **General Tension Measure (TESI-EXERCISE)**
- 4 **Personal Relationships Scale (Marlowe-Crown)**
- 5 **Overeating Tension Scale**
- 6 **Overeating Scale (BULIT)**
- 7 **General Feelings Questionnaire (Rosenberg)**
- 8 **Feelings Tension Scale**
- 9 **Procedural Checklist (Demographics)**

Appendix A3
Study Completion Checklist

Participant ID

- Study information given? 1
- Entry criteria reviewed? 2
- 1. Between ages of 21-60? 3
- 2. If female, not pregnant? 4
- 3. Any diagnosis of eating disorders or mental illness that affects participant's weight? 5
- 4. Are they taking medications that affect their weight? 6
- 5. Did they pass the Slossen (20/40 to pass) 7

Slossen score

Height

Weight

Body mass Index

Did they complete the eight measures?

Tax information given with card?

Start and Stop time?

Version Three

- Feelings Tension Scale**
- Overeating Scale (BULIT)**
- Exercise Tension Scale**
- Physical Activity Questionnaire (IPAQ)**
- General Tension Measure (TESI-FEELINGS)**
- General Feelings Questionnaire (Rosenberg)**
- Overeating Tension Scale**
- Personal Relationships Scale (Marlowe-Crown)**
- Procedural Checklist (Demographics)**

(Slosson Reading Test Fifth Grade Level)

Participant Verbal Reading List

Please read aloud to the investigator the following words:

- | | |
|----------------|------------------|
| 1. cushion | 21. installed |
| 2. generally | 22. importance |
| 3. extended | 23. medicine |
| 4. custom | 24. rebellion |
| 5. tailor | 25. infected |
| 6. haze | 26. responsible |
| 7. gracious | 27. liquid |
| 8. dignity | 28. tremendous |
| 9. terrace | 29. customary |
| 10. applause | 30. malicious |
| 11. jungle | 31. spectacular |
| 12. fragrant | 32. inventory |
| 13. interfere | 33. yearning |
| 14. marriage | 34. imaginary |
| 15. profitable | 35. consequently |
| 16. define | 36. excellence |
| 17. obedient | 37. dungeon |
| 18. ambition | 38. detained |
| 19. presence | 39. abundant |
| 20. merchant | 40. compliments |

BMI TABLE

Body Mass Index Table																																				
	Normal					Overweight					Obese					Extreme Obesity																				
BMI	19	20	21	22	23	24	26	28	27	28	28	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	61	62	63	64
Height (inches)	Body Weight (pounds)																																			
58	91	96	100	105	110	115	119	124	129	134	138	143	148	153	158	162	167	172	177	181	186	191	196	201	205	210	215	220	224	229	234	238	244	248	253	258
59	94	99	104	109	114	119	124	128	133	138	143	148	153	158	163	168	173	178	183	188	193	198	203	208	212	217	222	227	232	237	242	247	252	257	262	267
60	97	102	107	112	118	123	128	133	138	143	148	153	158	163	168	174	179	184	189	194	199	204	209	215	220	225	230	235	240	245	250	255	261	266	271	276
61	100	106	111	116	122	127	132	137	143	148	153	158	164	169	174	180	185	190	195	201	206	211	217	222	227	232	238	243	248	254	259	264	269	275	280	285
62	104	109	115	120	126	131	136	142	147	153	158	164	169	175	180	186	191	196	202	207	213	218	224	229	235	240	246	251	256	262	267	273	279	284	289	295
63	107	113	118	124	130	135	141	146	152	158	163	169	175	180	186	191	197	203	208	214	220	225	231	237	242	248	254	259	265	270	276	282	287	293	299	304
64	110	116	122	128	134	140	145	151	157	163	169	174	180	186	192	197	204	209	215	221	227	232	238	244	250	256	262	267	273	279	285	291	296	302	308	314
65	114	120	126	132	138	144	150	156	162	168	174	180	186	192	198	204	210	216	222	228	234	240	246	252	258	264	270	276	282	288	294	300	306	312	318	324
66	118	124	130	136	142	148	155	161	167	173	179	185	192	198	204	210	216	223	229	235	241	247	253	260	266	272	278	284	291	297	303	309	315	322	328	334
67	121	127	134	140	146	153	159	166	172	178	185	191	198	204	211	217	223	230	236	242	249	255	261	268	274	280	287	293	299	306	312	319	325	331	338	344
68	125	131	138	144	151	158	164	171	177	184	190	197	203	210	216	223	230	236	243	249	256	262	269	276	282	289	295	302	308	315	322	328	335	341	348	354
69	128	135	142	149	155	162	169	176	182	189	196	203	209	216	223	230	236	243	250	257	263	270	277	284	291	297	304	311	318	324	331	338	345	351	358	365
70	132	139	146	153	160	167	174	181	188	195	202	209	216	222	229	236	243	250	257	264	271	278	285	292	299	306	313	320	327	334	341	348	355	362	369	376
71	136	143	150	157	165	172	179	186	193	200	208	215	222	229	236	243	250	257	265	272	279	286	293	301	308	315	322	329	338	343	351	358	365	372	379	386
72	140	147	154	162	169	177	184	191	199	206	213	221	228	235	242	250	258	265	272	279	287	294	302	309	316	324	331	338	346	353	361	368	375	383	390	397
73	144	151	159	166	174	182	189	197	204	212	219	227	235	242	250	257	265	272	280	288	295	302	310	318	325	333	340	348	355	363	371	378	386	393	401	408
74	148	155	163	171	179	186	194	202	210	218	225	233	241	249	256	264	272	280	287	295	303	311	319	326	334	342	350	358	365	373	381	389	396	404	412	420
75	152	160	168	176	184	192	200	208	216	224	232	240	248	256	264	272	279	287	295	303	311	319	327	335	343	351	359	367	375	383	391	399	407	415	423	431
76	156	164	172	180	189	197	205	213	221	230	238	246	254	263	271	279	287	295	304	312	320	328	336	344	353	361	369	377	385	394	402	410	418	426	435	443

Source: Adapted from Clinical Guidelines on the Identification, Evaluation, and Treatment of Overweight and Obesity in Adults: The Evidence Report.



Readability Checklist

Overeating Tension, Exercise Tension & Esteem Tension Scales

To assess the 5th grade reading level of the Tension scales mark “**Yes**” if the content of the scale is at or below a 5th grade reading level and “**No**” if the content is higher than a fifth grade reading level. Please suggest new terms for all “No’s”.

Readability at a 5 th grade level or less	Yes	No	Comments and suggestions for new terms
<p>Page 1 Directions</p> <p>Left box Serious-minded</p> <p>Seriou s state Goal oriented</p> <p>Planning ahead</p> <p>Trying to accomplish something</p> <p>Future-oriented</p> <p>High tension feeling words</p> <p>Unsettled</p> <p>Uneasy</p> <p>Anxious</p> <p>Nervous</p> <p>Low tension felling words</p> <p>Settled</p> <p>At ease</p> <p>Calm</p> <p>Composed</p> <p>Right box Playful</p> <p>Playfu l state Spontaneous</p> <p>Emphasizing good feelings</p> <p>Having fun for fun’s sake</p> <p>Present-oriented</p> <p>High tension feeling words</p> <p>Bored</p> <p>Unstimulated</p> <p>Uninterested</p> <p>Indifferent</p> <p>Low tension felling words</p>			

Excited Stimulated Interested Enthusiastic		
---	--	--

Readability at a 5 th grade level or less		Yes	NO	Comments and suggestions for new terms
Page 2	Directions			
Left box	Following the rules			
Compliant state	Not “making waves” or disagreeing with others Felling concerned if I broke a rule Felling compliant and agreeable Trying to stay in line Doing what others did Concerned about what others thought			
	High tension feeling words Embarrassed Foolish Isolate Uncomfortable			
	Low tension felling words Not embarrassed Sensible Belonging Comfortable			
Right box	Sticking up for what I thought			
Defiant state	Bending/ breaking the rules Angry Stubborn Rebellious/defiant Wanting to be difficult			

Doing my own thing High tension feeling words Trapped Held back Caught Restricted Low tension feeling words Free Released Liberated Unrestricted		
--	--	--

Readability at a 5th grade level or less	Yes	No	Comments and suggestions for new terms
Page 3 Left box Mastery state Directions Doing my best Giving it may all Being strong and not showing tender feelings Being tough with myself and others Felling competitive High tension feeling words Out of control Humiliated Wimpy Disrespected Low tension feeling words In control Proud Sturdy Respected Right box Wanting to be in harmony with others			

Sym Looking to others for sympathy or help
path
y

state Feeling I deserved a reward/treat
Showing tender feelings
Wanting to feel nurtured/indulgent

High tension feeling words

Resentful

Deprived

Offended

Hurt

Low tension feeling words

Appreciative

Cared for

Grateful

Pleased

Left Letting others win

Box

Othe Helping others profit

r-

Orie Helping others succeed

nted

State Letting others be in charge

Giving self to a cause

High tension feeling words

Ashamed

Dishonorable

Burdensome

Disloyal

Low tension feeling words

Satisfied

Honorable

Useful

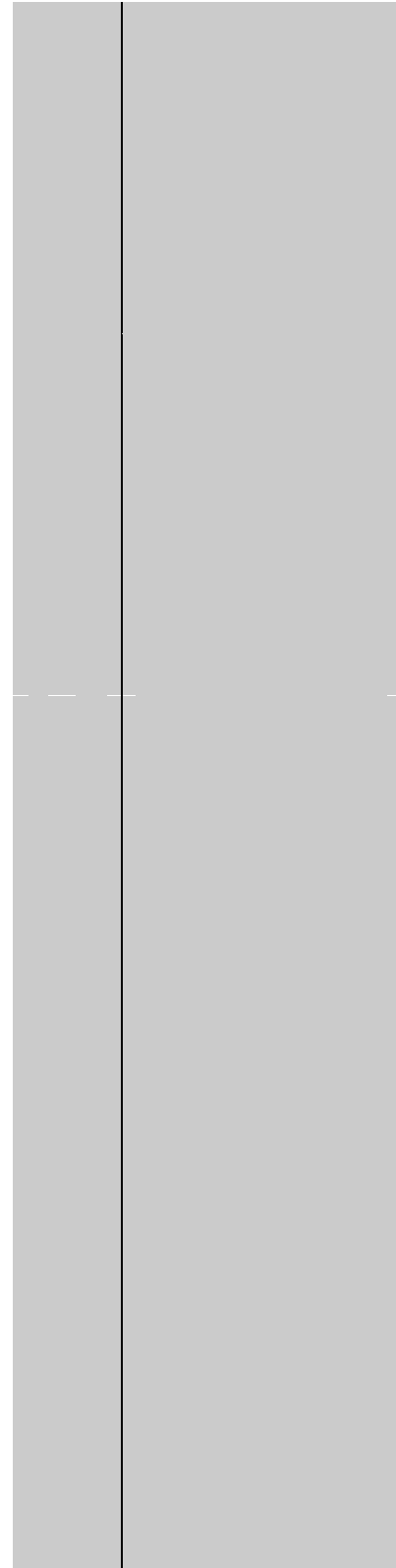
Loyal

Righ Wanting to make others feel good

t

Box

Self- Putting self out for others



Orie nted state	Giving up something of mine to give to others Being nice/king to others Putting other's needs before my own High tension feeling words Guilty Bad about myself Heavy conscience Blameworthy Low tension felling words Virtuous Good about myself Clear conscience Praise worthy		
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Appendix A5



Content Validity Checklist

Circle Scale: Overeating Tension, Exercise Tension & Esteem Tension Scales

Content Judge _____

This generic evaluation form will be used for each of the Tension scales. **Please rate the Accuracy of each term for consistency with Reversal Theory by typing a “1” for the least, “2” for somewhat, “3” for quite a lot, and “4” for the most** in the Accuracy column. For ratings of 1 and 2, please suggest different words to replace those that are inadequate in the comments and suggestions column. Then at the end, answer the three questions, save the form and email it to kkramer3@kumc.edu. Thank you!!!

Reversal Theory Content		Accuracy 4=most, 3=quite a lot, 2=somewhat, 1=least	Comments and suggestions for new terms
Telic State	Feeling words		
	Serious		
	Had a goal		
	Planned ahead		
	Tried to accomplish something		
	Looked to the future		
	High tension words		
	1 Unsettled		
	2 Uneasy		
	3 Worried		
	4 Nervous		
	Low tension words		
	1 Settled		
	2 At ease		
3 Not worried			
4 Calm			
ParaTelic State	Feeling words		
	Playful		
	Spur-of-the-moment		
	Enjoyed good feelings		

	Had fun		
	Focused on the here and now		
	High tension words		
1	Bored		
2	Unstimulated		
3	Uninterested		
4	Indifferent		
	Low tension words		
1	Excited		
2	Stimulated		
3	Interested		
4	Enthused		

Reversal Theory Content		Accuracy 4=most, 3=quite a lot, 2=somewhat, 1=least	Comments and suggestions for new terms
Conformist	Feeling words		
State	Followed the rules		
	Did not make waves		
	Worried if I broke a rule		
	Felt agreeable		
	Tried to stay in line		
	Followed others		
	Worried about what others thought		
	High tension words		
1	Embarrassed		
2	Foolish		
3	Alone		
4	Uncomfortable		
	Low tension words		
1	Not embarrassed		
2	Wise		
3	Belonging		

4	Comfortable		
Negativistic State	Feeling words	4=most, 3=quite a lot, 2=somewhat, 1=least	Comments and suggestions for new terms
	Stood for what I thought		
	Bent the rules		
	Angry		
	Stubborn		
	Disobedient		
	Wanted to be difficult		
	Wanted to do my own thing		
	High tension words		
1	Trapped		
2	Held back		
3	Caught		
4	Limited		
	Low tension words		
1	Free		
2	Released		
3	Freed		
4	Unlimited		

Reversal Theory Content		Accuracy 4=most, 3=quite a lot, 2=somewhat, 1=least	Comments and suggestions for new terms
Mastery	Feeling words		
Autic State	Doing my best		
	Giving it may all		
	Being strong and not showing tender feelings		
	Being tough with myself and others		
	Felling competitive		
	High tension words		
1	Out of control		

2	Shamed		
3	Wimpy		
4	Disrespected		
	Low tension words		
1	In control		
2	Proud		
3	Sturdy		
4	Respected		
Sympathy	Feeling words		
Autic State	Wanting to be in agreement with others		
	Looking for help		
	Feeling I deserved a treat		
	Showing caring feelings		
	Wanting to feel cared for		
	High tension words		
1	Not valued		
2	Not cared for		
3	Not grateful		
4	Hurt		
	Low tension words		
1	Valued		
2	Cared for		
3	Grateful		
4	Pleased		
Mastery	Feeling words	4=most, 3=quite a lot, 2=somewhat, 1=least	Comments and suggestions for new terms
Alloic State	Letting others win		
	Helping others profit		
	Helping others succeed		
	Letting others be in charge		
	Giving self to a cause		
	High tension words		
1	Ashamed		

2	Not proper		
3	A burden		
4	Disloyal		
	Low tension words		
1	Satisfied		
2	Proper		
3	Useful		
4	Loyal		
Sympathy	Feeling words		
Alloic	Wanted to make others feel good		
State	Put others before myself		
	Gave up something of mine to someone else		
	Being nice/ kind to others		
	Putting other's needs before my own		
	High tension words		
1	Guilty		
2	Bad about myself		
3	Selfish		
4	Blameworthy		
	Low tension words		
1	Righteous		
2	Good about myself		
3	Giving		
4	Worthy		

Thanks you for evaluating this generic Tension form used for the Over-eating Tension, Esteem Tension, and Esteem Tension scales. Please answer the following questions about whether each scale is consistent with Reversal Theory.

1. **The Overeating Tension scale is consistent with Reversal Theory?**
 Yes If no, please explain below.
2. **The Exercise Tension scale is consistent with Reversal Theory?**
 Yes If no, please explain below.
3. **The Esteem Tension scale is consistent with Reversal Theory?**
 Yes If no, please explain below.

Appendix A6



Usability and Human-computer Interaction Checklist
 Overeating Tension, Exercise Tension & Esteem Tension Scales

Content Judge _____ Date ___/___/___

Please assess the usability and human-computer interaction of the Tension scales. Mark “Yes” if the content of the scale meets the guidelines below and “No” if the content of the scale do not meet the guidelines. Please use the comments section below to explain a rating of “No”.

Usability and Human-computer Interaction Criteria	Overeating Tension Scale		Exercise Tension Scale		Esteem Tension Scale	
Optimizing the user experience						
1) Procedures allowed users to perform tasks in the same sequence and manner across similar conditions. (Consistency).	Y	N	Y	N	Y	N
2) Did not require users to remember information from scale to scale or measure to measure. (Reduce short term memory load).	Y	N	Y	N	Y	N
Accessibility						
3) Titles were provided that facilitated identification and navigation (reduce error).	Y	N	Y	N	Y	N
4) Design procedures did not cause the screen to flicker with a frequency greater than 2 Hz and lower than 55 Hz.	Y	N	Y	N	Y	N
Page layout						
5) Important items were at the top center of the scales to facilitate users’ finding the information.	Y	N	Y	N	Y	N

6)	Clickable items were in the same locations, and closer to the top of the page, where their location can be better estimated (error reduction).	Y	N	Y	N	Y	N
7)	Page elements were visually aligned either vertically or horizontally.	Y	N	Y	N	Y	N
8)	Shorter line lengths (fifty characters per line) were used to create greater acceptance of the scale.	Y	N	Y	N	Y	N
Page layout continued		Overeating Tension Scale		Exercise Tension scale		Esteem Tension scale	
9)	Location of heading and other page elements does not create the illusion that users have reached the top or bottom of a page when they have not (yields closure).	Y	N	Y	N	Y	N
Navigation							
10)	1) Feedback is provided to let users know where they are in the process. (Offer informative feedback).	Y	N	Y	N	Y	N
11)	1) Navigation elements are placed in a consistent and easy to find place on each page (consistency).	Y	N	Y	N	Y	N
12)	1) Labels are clearly descriptive of their function or destination.	Y	N	Y	N	Y	N
13)	1) Navigation elements are provided to reverse a decisions i.e. a back button or undue button (permit	Y	N	Y	N	Y	N

	easy reversal of actions).					
	Scrolling and paging					
1	Page layout eliminates the	Y	N	Y	N	Y N
4)	need for users to scroll horizontally.					
1	Longer scrolling pages are	Y	N	Y	N	Y N
5)	used for reading for comprehension.					
1	Specific information is	Y	N	Y	N	Y N
6)	broken up into smaller portions (shorter pages).					
	Headings, titles and labels					
1	Headings are unique from	Y	N	Y	N	Y N
7)	one another and conceptually related to the content they describe.					
1	Data tables have clear,	Y	N	Y	N	Y N
8)	concise, and accurate row and column headings.					
	Headings, titles and labels continued	Overeating Tension Scale		Exercise Tension scale		Esteem Tension scale
2	Important page items are	Y	N	Y	N	Y N
0)	visually distinguished.					
	Text appearance					
2	Black text on a plain high-	Y	N	Y	N	Y N
1)	contrast or non-patterned background is used					
2	Visual scale elements are	Y	N	Y	N	Y N
2)	consistency within and between other pages.					

2 3)	Format of the common items is consistent from one page to another.	Y	N	Y	N	Y	N
2 4)	A familiar font is used to achieve the best possible reading speed.	Y	N	Y	N	Y	N
2 5)	The font characteristics are changed to emphasize the importance of a word or short phrase.	Y	N	Y	N	Y	N
2 6)	Attention is drawn to specific parts of a scales page with an appropriate (but limited) use of brightly-colored items, and varying font characteristics.	Y	N	Y	N	Y	N
Lists							
2 7)	Lists and tasks are arranged in an order that best facilitates efficient and successful user performance.	Y	N	Y	N	Y	N
2 8)	Related items are displayed in a vertical list rather than a continuous text.	Y	N	Y	N	Y	N
2 9)	Introductory heading (i.e. word or phrase) are provided at the top of each list.	Y	N	Y	N	Y	N
3 0)	Lists are easy to scan and understand.	Y	N	Y	N	Y	N
3 1)	Numbered items start the numbering sequence at “one” rather than ‘zero’.	Y	N	Y	N	Y	N

Lists continued		Overeating Tension Scale		Exercise Tension scale		Esteem Tension scale	
3 2)	Lists have the most important items at the top.	Y	N	Y	N	Y	N
3 3)	Bullet lists are used to present items of equal status or values, and numbered lists are used if a particular order to the items is warranted.	Y	N	Y	N	Y	N
Screen-based controls (widgets)							
3 4)	The computer is used to detect errors made by users (prevention of error).	Y	N	Y	N	Y	N
3 5)	The user is not required to enter the same information more than once.	Y	N	Y	N	Y	N
3 6)	Data entry fields are appropriately labeled to help users understand what entries are desired (error prevention).	Y	N	Y	N	Y	N
3 7)	Labels are close enough to their associated data entry fields so that users will recognize the label as describing the data entry.	Y	N	Y	N	Y	N
3 8)	Radio button label clearly indicates its actions (yield closure).	Y	N	Y	N	Y	N
3 9)	Data entry labels are worded consistently, so that	Y	N	Y	N	Y	N

	the same data item is given the same label if it appears on different pages (consistency).				
4 0)	One radio button is not used alone.	Y	N	Y	N
4 1)	Radio buttons are used when there is a need to choose one response from a list of mutually exclusive options.	Y	N	Y	N
4 2)	Widgets are used that are familiar to your users and they are employed in their commonly used manner (locus of control).	Y	N	Y	N
	Screen-based controls (widgets) continued	Overeating Tension Scale		Exercise Tension scale	
4 3)	Design data entry transactions so that users can stay with one entry method as long as possible (consistency).	Y	N	Y	N
4 4)	Long data items are partitioned into shorter sections for data entry (reduce short term memory load).	Y	N	Y	N
4 5)	Double-clicking on a link does not cause undesirable or confusing results (reduce errors).	Y	N	Y	N
	Content organization				
4 6)	Page content is constructed to facilitate scanning. Clear, well-located headings; short	Y	N	Y	N

<p>phrases and sentences; and small readable paragraphs are used.</p> <p>4 7) All needed information is available and displayed on the page where and when it is needed (reduce short-term memory load).</p>	<p>Y N</p>	<p>Y N</p>	<p>Y N</p>
<p>4 8) Any Comments:</p>			

Appendix A7



System Usability Scale Questionnaire
Overeating Tension, Exercise Tension & Esteem Tension scales

This survey asks how easy the computer was to use to complete the three questionnaires. Please circle a rating from “1” for “Strongly Disagree” to “5” for Strongly Agree.

System Usability Scale Questionnaire							
	Strongly Disagree	1	2	3	4	5	Strongly Agree
1) I think I would like to use this system frequently.	1	2	3	4	5		
2) I found this system unnecessarily complex.	1	2	3	4	5		
3) I thought the system was easy to use.	1	2	3	4	5		
4) I think that I would need the support of a technical person to be able to use the system.	1	2	3	4	5		
5) I found the various functions in the system were well integrated.	1	2	3	4	5		
6) I thought there was too much inconsistency in the system.	1	2	3	4	5		
7) I would imagine that most people would learn to use the system very quickly.	1	2	3	4	5		
8) I found the system very cumbersome to use.	1	2	3	4	5		
9) I felt very confident using the system.	1	2	3	4	5		
10) I need to learn a lot of things before I could get going with the system.	1	2	3	4	5		
Comments:							

Appendix A8



Participant Opinion Survey

Overeating Tension, Exercise Tension & Esteem Tension Scales

Participant ID Number _____ Date __/__/__

This survey asks your opinion about the Overeating, Exercise & Esteem scales. Please circle **“1”** for **Not at all**, **“2”** for **somewhat**, **“3”** for **quite a lot**, and **“4”** for **the most**.

Please use the comments section below to explain your rating further, especially any **“1”** or **“2”** responses.

1=Not at all, 2=somewhat, 3=quite a lot, 4=most

Opinion of scales	Overeating Tension	Exercise Tension	Esteem Tension
Clarity	1 2 3 4	1 2 3 4	1 2 3 4
1. Were they scales clear to you?	1 2 3 4	1 2 3 4	1 2 3 4
2. Was the content easy to read?	1 2 3 4	1 2 3 4	1 2 3 4
3. Was the overall meaning clear?	1 2 3 4	1 2 3 4	1 2 3 4
4. Did the scales make sense to you?	1 2 3 4	1 2 3 4	1 2 3 4
Importance			
5. Could you apply the scales to a recent situation in your life?	1 2 3 4	1 2 3 4	1 2 3 4
Ease of Completing			
6. Was the computer easy to use?	1 2 3 4	1 2 3 4	1 2 3 4
7. Was mouse easy to use?	1 2 3 4	1 2 3 4	1 2 3 4
8. Was completing the scales on the computer was easy?			
Timing			
9. Was there enough time to complete the scales?	1 2 3 4	1 2 3 4	1 2 3 4
Comments?			

Circle the number below to show your overall rating of:

a. Getting in to the study was

easy 1-----2-----3-----4-----5-----6-----7-----8-----9-----10 difficult

b. Working with study staff was

easy 1-----2-----3-----4-----5-----6-----7-----8-----9-----10 difficult



Performance Record

Participant Identification number _____

Scale	Time	Comments
Overeating Tension Scale	Start:	Comments and questions asked by participants:
	Stop:	
	Total:	Observed problems with the completion of the scales:

Exercise Tension Scale	Start:	Comments and questions asked by participants:
	Stop:	
	Total:	Observed problems with the completion of the scales:

Esteem Tension Scale	Start:	Comments and questions asked by participants:
	Stop:	
	Total:	Observed problems with the completion of the scales:

BULIT	Start:	Comments and questions asked by participants:
	Stop:	
	Total:	Observed problems with the completion of the scales:

IPAQ	Start:	Comments and questions asked by participants:
	Stop:	
	Total:	Observed problems with the completion of the scales:

Rosenberg Esteem Scale	Start:	Comments and questions asked by participants:
	Stop:	
	Total:	Observed problems with the completion of the scales:

TESI	Start:	Comments and questions asked by participants:
	Stop:	
	Total:	Observed problems with the completion of the scales:

Marlowe-Crowne Scale	Start:	Comments and questions asked by participants:
	Stop:	
	Total:	Observed problems with the completion of the scales:

Appendix B

Eight Questionnaires

B1. Overeating Tension Scale (OTS)

B2. Exercise Tension Scale (ETS)

B3. Feelings Tension Scale (FTS)

B4. Bulimia Scale (BULIT)

B5. International Physical Activity Questionnaire (IPAQ)

B6. Rosenberg Self-Esteem Scale (RSES)

B7. Tension Emotion Stress Inventory (TESI-0; Overeating Situation),
Tension Emotion Stress Inventory (TESI-E; Exercise Situation),
Tension Emotion Stress Inventory (TESI-F; Feelings Situation)

B8. Marlowe-Crowne 2(10) Social Desirability Scale

Appendix B1-1. The Overeating Tension Scale

Description

The Overeating Tension Scale is comprised of 32 items (4 bipolar terms for 8 motivational states) derived directly from reversal theory (Popkess-Vawter, et al.). Content experts attested to the scale's content validity, accuracy in representing the theory (Apter, 1989) and understanding at the eighth grade level; in this study, the investigator sought to lower reading level to fifth grade as suggested by current psychometric experts (Gottlieb & Rogers, 2004) to more appropriately target rural populations. The Overeating Tension Scale is unique in focus on measuring tension *before* overeating (rather than focusing on situations and eating behaviors themselves) and motivation-specific feelings preceding overeating.

Validity and reliability studies for development of the overeating tension scale were reported in the Theoretical Framework section. Convergent validity was tested for the computer-administered version of the Overeating Tension Scale comparing the TESI specific to an overeating situation. Since both are state measures of tension it was anticipated that their total score correlations would be moderately correlated, between .30 to .60, but not highly correlated as two instruments for the exact same variable would be (Waltz, Strickland & Lenz, 2005).

Scoring of the three Tension Scales is explained here as performed on paper and pencil scales; computerized scoring is automatically programmed in the same manner. On the 10-point continuum, participants mark an "X" for "how they were feeling just before overeating, skipping exercise, and feeling down or low; they mark an "O" for "how they wanted to feel"; this format was adapted from the Sherwood Inventory of the Self-concept (Robinson & Shaver, 1970). Unpleasant feeling words are on the left, lower end of the 10-point continuum (unsettled, uneasy, anxious, nervous) and pleasant feeling words are at the upper end (e.g., settled, at ease, calm, composed). The highest value of 10 corresponds with the strongest of pleasant feelings (no/low tension) and the lowest value of 1 corresponds with the strongest of unpleasant feelings (medium/high tension). The difference between the values marked for actual feelings (X) and desired feelings (O) provides a discrepancy score (D) that matches the theoretical definition of tension ($O-X=D$). Total overeating tension scores were summed for the three subscales to provide an overall tension score ranging from 0-108 (highest discrepancy scores of $9 \times 4 \text{ items} \times 3 \text{ subscales} = 108$). Motivation-specific tension subscale scores ranging from 0-36 (highest discrepancy scores of $9 \times 4 \text{ items} = 36$) were compared to detect which motivation carries the most tension (highest discrepancy score).

Popkess-Vawter, S., Gerkovich, M. M., & Wendel, S. (2000). Reliability and

Validity of the Overeating Tension Scale. *Journal of Nursing Measurement*, 8(2), 145-160.

Appendix B1-2. Coding of the Overeating Tension Scales

Variable	Labels
Telic	Telic state
Paratelic	Paratelic state
Compliant	Conformist
Defiant	Negativistic state
MAutic	Mastery-autic state
MAlloic	Mastery alloic state
SAutic	Sympathy-autic state
SAlloic	Sympathy-alloic state

Telic feeling words	Telic high tension	Telic low tension
Serious	Unsettled	Settled
Have an important goal	Anxious	Relaxed
Planning ahead	Worried	Not worried
Trying to accomplish something important	Nervous	Calm
Care about future outcomes		

Tq1 Felt unsettled-settled
 Tq3 Felt anxious-relaxed
 Tq5 Felt worried-not worried
 Tq7 Felt nervous-calm

Tq2 Wanted to feel unsettled-settled
 Tq4 Wanted to feel anxious-relaxed
 Tq6 Wanted to feel worried-not worried
 Tq8 Wanted to feel nervous-calm

Tq2q1 Discrepancy unsettled-settled
 Tq4q3 Discrepancy anxious-relaxed
 Tq6q5 Discrepancy worried-not worried
 Tq8q7 Discrepancy nervous-calm
 Telictot Total discrepancy Telic

Paratelic feeling words	Paratelic high tension	Paratelic low tension
Playful	Bored	Excited
Spontaneous	Unstimulated	Stimulated
Looking to have a good time	Uninterested	Interested
Looking to have fun	Indifferent	Enthused
Focused on the here and now		

- P1 Felt bored-excited
- P3 Felt unstimulated-stimulated
- P5 Felt uninterested-interested
- P7 Felt indifferent-enthused

- P2 Wanted to feel bored-excited
- P4 Wanted to feel unstimulated-stimulated
- P6 Wanted to feel uninterested-interested
- P8 Wanted to feel indifferent-enthused

- Pq2q1 Discrepancy bored-excited
- Pq4q3 Discrepancy unstimulated-stimulated
- Pq6q5 Discrepancy uninterested-interested
- Pq8q7 Discrepancy indifferent-enthused
- Paratelic tot Total discrepancy Paratelic

Conformist feeling words	Conformist high tension	Conformist low tension
Following the rules	Embarrassed	Not embarrassed
Not “making waves”	Misunderstood	Agreed with
Worrying if I broke a rule	Rejected	Belonging
Looking to fit in	Insecure	Secure
Trying to stay in line		
Trying to be the same as others		
Worrying about what others thought		

- Cq1 Felt embarrassed-not embarrassed
- Cq3 Felt misunderstood-agreed with
- Cq5 Felt rejected-belonging
- Cq7 Felt insecure-secure

- Cq2 Wanted to feel embarrassed-not embarrassed
- Cq4 Wanted to feel misunderstood-agreed with
- Cq6 Wanted to feel rejected-belonging
- Cq8 Wanted to feel insecure-secure

- Cq2q1 Discrepancy embarrassed-not embarrassed
- Cq4q3 Discrepancy misunderstood-agreed with
- Cq6q5 Discrepancy rejected-belonging
- Cq8q9 Discrepancy insecure-secure

Compliantot Total discrepancy Conformist

Negativistic feeling words	Negativistic high tension	Negativistic low tension
Standing up for what I thought	Trapped	Free
Bending the rules	Held back	Released
Angry	Caught	Unrestricted
Stubborn	Limited	Unlimited
Disobedient		
Looking to be difficult		
Looking to do my own thing		

Dq1 Felt trapped-free
 Dq3 Felt held back-released
 Dq5 Felt caught-unrestricted
 Dq7 Felt limited-unlimited

Dq2 Wanted to feel trapped-free
 Dq4 Wanted to feel held back-released
 Dq6 Wanted to feel caught-unrestricted
 Dq8 Wanted to feel limited-unlimited

Dq2q1 Discrepancy trapped-free
 Dq4q3 Discrepancy back-released
 Dq6q5 Discrepancy caught-unrestricted
 Dq8q7 Discrepancy limited-unlimited
 Defianttot Total discrepancy Negativistic

Mastery Autic feeling words	Mastery Autic high tension	Mastery Autic low tension
Doing my best	Not in control	In control
Giving it my all	Shamed	Proud
Not showing tender feelings	Weak	Sturdy
Being tough	Disrespected	Respected
Feeling competitive		

MAq1 Felt not in control-in control
 MAq3 Felt shamed-proud
 MAq5 Felt weak-sturdy
 MAq7 Felt disrespected-respected

MAq2 Wanted to feel not in control-in control
 MAq4 Wanted to feel shamed-proud
 MAq6 Wanted to feel weak-sturdy
 MAq8 Wanted to feel disrespected-respected

MAq2q1 Discrepancy not in control-in control
 MAq4q3 Discrepancy shamed-proud
 MAq6q5 Discrepancy weak-sturdy
 MAq8q7 Discrepancy disrespected-respected
 MAutictot Total Discrepancy Mastery Autic

Sympathy Autic feeling words	Sympathy Autic high tension	Sympathy Autic low tension
Looking for closeness with others	Not valued	Valued
Looking for help	Not cared for	Cared for
Feeling I deserve a treat	Resentful	Grateful
Looking to others for tenderness	Hurt	Loved
Looking to feel cared for		

SAq1 Felt not valued-valued
 SAq3 Felt not cared for-cared for
 SAq5 Felt resentful-grateful
 SAq7 Felt hurt-loved

SAq2 Wanted to feel not valued-valued
 SAq4 Wanted to feel not cared for-cared for
 SAq6 Wanted to feel resentful-grateful
 SAq8 Wanted to feel hurt-loved

SAq2q1 Discrepancy not valued-valued
 SAq4q3 Discrepancy not cared for-cared for
 SAq6q5 Discrepancy resentful-grateful
 SAq8q7 Discrepancy hurt-loved
 SAutictot Total discrepancy Sympathy Autic

Mastery Alloic feeling words	Mastery Alloic high tension	Mastery Alloic low tension
Letting others win	Not standing up for others	Stood up for others
Helping others profit	Letting others down	Being there for others
Helping others succeed	Useless	Useful
Letting others be in charge	Disloyal	Loyal
Giving self to a cause		

MAllq1 Felt not standing up for others-stood up for others
 MAllq3 Felt letting others down-being there for others
 MAllq5 Felt useless-useful
 MAllq7 Felt disloyal-loyal

MAllq2 Wanted to feel not standing up for others- stood up for others
 MAllq4 Wanted to feel letting others down- being there for others
 MAllq6 Wanted to feel useless-useful
 MAllq8 Wanted to feel disloyal-loyal

MAllq2q1 Discrepancy not standing up for others-stood up for others
 MAllq4q3 Discrepancy letting others down-being there for others
 MAllq6q5 Discrepancy useless-useful
 MAllq8q7 Discrepancy disloyal-loyal
 MAlloictot Total discrepancy Mastery Alloic

Sympathy Alloic feeling	Sympathy Alloic high tension	Sympathy Alloic low tension
Looking to make others feel good	Guilty	Generous
Putting others needs before my own	Bad about myself	Good about myself
Giving up something to help someone else	Selfish	Giving
Being kind to others	Not worthy	Worthy
Putting other's needs before my own		

SAllq1 Felt guilty-generous
 SAllq3 Felt bad about myself-good about myself
 SAllq5 Felt selfish-giving
 SAllq7 Felt not worthy-worthy

SAllq2 Wanted to feel guilty- generous

SAllq4 Wanted to feel bad about myself-good about myself

SAllq6 Wanted to feel selfish-giving

SAllq8 Wanted to feel not worthy-worthy

SAllq2q1 Discrepancy guilty-generous

SAllq4q3 Discrepancy bad about myself-good about myself

SAllq6q5 Discrepancy selfish-giving

SAllq8q7 Discrepancy not worthy-worthy

SAlloictot Total discrepancy Sympathy Alloic

Overeating Tension Scale

Below is a space. In this space describe a situation in the last month when you ate too much. Please give details like who, what, when, and where:

Part 1:

Below is a pair of boxes. Choose the box that best describes how you felt in the situation last month just before you ate too much.

<input type="checkbox"/> <i>Before eating too much I was:</i> <ul style="list-style-type: none">• Serious• Have an important goal• Planning ahead• Trying to accomplish something important• Care about future outcomes

<input type="checkbox"/> <i>Before eating too much I was:</i> <ul style="list-style-type: none">• Playful• Spontaneous• Looking to have a good time• Looking to have fun • Focusing on the here and now

Continue to Part 2



Overeating Tension Scale

Part 2 A:

You will see circles below. They show a range. Select the circle near or far from a word that shows how you felt before you ate too much. Then select the circle near or far from a word that shows how you wanted to feel.

I felt before I ate too much:

Unsettled O O O O O O O O O O Settled

I wanted to feel:

Unsettled O O O O O O O O O O Settled

I felt before I ate too much:

Anxious O O O O O O O O O O Relaxed

I wanted to feel:

Anxious O O O O O O O O O O Relaxed

I felt before I ate too much:

Worried O O O O O O O O O O Not
Worried

I wanted to feel:

Worried O O O O O O O O O O Not
Worried

I felt before I ate too much:

Nervous O O O O O O O O O O Calm

I wanted to feel:

Nervous O O O O O O O O O O Calm

• Continue



Overeating Tension Scale

Part 2 B:

You will see circles below. They show a range. Select the circle near or far from a word that shows how you felt before you ate too much. Then select the circle near or far from a word that shows how you wanted to feel.

I felt before I ate too much:

Bored Excited

I wanted to feel:

Bored Excited

I felt before I ate too much:

Unstimulated Stimulated

I wanted to feel:

Unstimulated Stimulated

I felt before I ate too much:

Uninterested Interested

I wanted to feel:

Uninterested Interested

I felt before I ate too much:

Indifferent Enthused

I wanted to feel:

Indifferent Enthused

• Continue



Overeating Tension Scale

Part 3:

Below is a pair of boxes. Choose the box that best describes how you felt in the situation last month just **before** you ate too much.

<p><i>Before eating too much I was:</i></p> <ul style="list-style-type: none">• Following the rules• Not “making waves”• Worrying if I broke a rule• Looking to fit in• Trying to stay in line• Wanting to be the same as others• Worrying about what others thought
--

<p><i>Before eating too much I was:</i></p> <ul style="list-style-type: none">• Standing up for what I thought• Bending the rules• Angry• Stubborn• Disobedient• Looking to be difficult • Looking to do my own thing

Continue to Part 4



Overeating Tension Scale

Part 4 C:

You will see circles below. They show a range. Select the circle near or far from a word that shows how you felt before you ate too much. Then select the circle near or far from a word that shows how you wanted to feel.

I felt before I ate too much:

Embarrassed Not Embarrassed

I wanted to feel:

Embarrassed Not Embarrassed

I felt before I ate too much:

Misunderstood Agreed with

I wanted to feel:

Misunderstood Agreed with

I felt before I ate too much:

Rejected Belonging

I wanted to feel:

Rejected Belonging

I felt before I ate too much:

Insecure Secure

I wanted to feel:

Insecure Secure



Overeating Tension Scale

Part 4 D:

You will see circles below. They show a range. Select the circle near or far from a word that shows how you felt before you ate too much. Then select the circle near or far from a word that shows how you wanted to feel.

I felt before I ate too much:

Trapped Free

I wanted to feel:

Trapped Free

I felt before I ate too much:

Held Back Released

I wanted to feel:

Held Back Released

I felt before I ate too much:

Caught Unrestricted

I wanted to feel:

Caught Unrestricted

I felt before I ate too much:

Limited Unlimited

I wanted to feel:

Limited Unlimited



Overeating Tension Scale

Part 5:

Below are four boxes. Choose the one that best describes how you felt in the situation last month just **before** you ate too much.

<p><i>Before eating too much I was:</i></p> <ul style="list-style-type: none">• Doing my best• Giving it my all• Not showing tender feelings• Being tough• Feeling competitive
--

<p><i>Before eating too much I was:</i></p> <ul style="list-style-type: none">• Looking for closeness with others• Looking for help• Feeling I deserved a treat• Showing caring feelings• Looking to feel cared for

<p><i>Before eating too much I was:</i></p> <ul style="list-style-type: none">• Letting others win, helping others profit• Helping others profit• Helping others succeed• Letting others be in charge• Giving self to a cause

<p><i>Before eating too much I was:</i></p> <ul style="list-style-type: none">• Looking to make others feel good• Putting other's needs before my own• Giving up something to help someone else• Being kind to others• Putting other's needs before my own
--

Continue to part 6



Overeating Tension Scale

Part 6 E:

You will see circles below. They show a range. Select the circle near or far from a word that shows how you felt before you ate too much. Then select the circle near or far from a word that shows how you wanted to feel.

I felt before I ate too much:

Not in control In Control

I wanted to feel:

Not in control In Control

I felt before I ate too much:

Shamed Proud

I wanted to feel:

Shamed Proud

I felt before I ate too much:

Weak Sturdy

I wanted to feel:

Weak Sturdy

I felt before I ate too much:

Disrespected Respected

I wanted to feel:

Disrespected Respected

• Continue



Overeating Tension Scale

Part 6 F:

You will see circles below. They show a range. Select the circle near or far from a word that shows how you felt before you ate too much. Then select the circle near or far from a word that shows how you wanted to feel.

I felt before I ate too much:

Not Valued Valued

I wanted to feel:

Not Valued Valued

I felt before I ate too much:

Not Cared for Cared for

I wanted to feel:

Not Cared for Cared for

I felt before I ate too much:

Resentful Grateful

I wanted to feel:

Resentful Grateful

I felt before I ate too much:

Hurt Loved

I wanted to feel:

Hurt Loved



Overeating Tension Scale

Part 6 G:

You will see circles below. They show a range. Select the circle near or far from a word that shows how you felt before you ate too much. Then select the circle near or far from a word that shows how you wanted to feel.

I felt before I ate too much:

Not standing up for others ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ Stood up for others

I wanted to feel:

Not standing up for others ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ Stood up for others

I felt before I ate too much:

Letting others down ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ Being there for others

I wanted to feel:

Letting others down ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ Being there for others

I felt before I ate too much:

Useless ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ Useful

I wanted to feel:

Useless ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ Useful

I felt before I ate too much:

Disloyal ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ Loyal

I wanted to feel:

Disloyal O O O O O O O O O O O Loyal

• Continue



Overeating Tension Scale

Part 6 H:

You will see circles below. They show a range. Select the circle near or far from a word that shows how you felt before you ate too much. Then select the circle near or far from a word that shows how you wanted to feel.

I felt before I ate too much:

Guilty Generous

I wanted to feel:

Guilty Generous

I felt before I ate too much:

Bad About Myself Good About Myself

I wanted to feel:

Bad About Myself Good About Myself

I felt before I ate too much:

Selfish Giving

I wanted to feel:

Selfish Giving

I felt before I ate too much:

Not worthy Worthy

I wanted to feel:

Not worthy Worthy

Appendix B2-1. Exercise Tension Scales

The Exercise Tension Scale measures the discrepancy between the way individuals felt and the way they wanted to feel before skipping planned exercise. Exercise is self-defined by participants as regular, repeated bodily exertion to maintain physical fitness. Administration procedures of the three scales are explained in the procedures section. Scoring of the three Tension Scales is explained here as performed on paper and pencil scales; computerized scoring is automatically programmed in the same manner. On the 10-point continuum, participants mark an “X” for “how they were feeling just before overeating, skipping exercise, and feeling down or low; they mark an “O” for “how they wanted to feel”; this format was adapted from the Sherwood Inventory of the Self-concept (Robinson & Shaver, 1970). Unpleasant feeling words are on the left, lower end of the 10-point continuum (unsettled, uneasy, anxious, nervous) and pleasant feeling words are at the upper end (e.g., settled, at ease, calm, composed). The highest value of 10 corresponds with the strongest of pleasant feelings (no/low tension) and the lowest value of 1 corresponds with the strongest of unpleasant feelings (medium/high tension). The difference between the values marked for actual feelings (X) and desired feelings (O) provides a discrepancy score (D) that matches the theoretical definition of tension ($O - X = D$). Total overeating tension scores were summed for the three subscales to provide an overall tension score ranging from 0-108 (highest discrepancy scores of 9 X 4 items X 3 subscales = 108). Motivation-specific tension subscale scores ranging from 0-36 (highest discrepancy scores of 9 X 4 items = 36) were compared to detect which motivation carries the most tension (highest discrepancy score).

Appendix B2-2. Exercise Tension Scale Coding

Variable	Labels
Telic	Telic state
Paratelic	Paratelic state
Compliant	Conformist
Defiant	Negativistic state
MAutic	Mastery-autic state
MAlloic	Mastery alloic state
SAutic	Sympathy-autic state
SAlloic	Sympathy-alloic state

Telic feeling words	Telic high tension	Telic low tension
Serious	Unsettled	Settled
Have an important goal	Anxious	Relaxed
Planning ahead	Worried	Not worried
Trying to accomplish something important	Nervous	Calm
Care about future outcomes		

Tq1 Felt unsettled-settled
 Tq3 Felt anxious-relaxed
 Tq5 Felt worried-not worried
 Tq7 Felt nervous-calm

Tq2 Wanted to feel unsettled-settled
 Tq4 Wanted to feel anxious-relaxed
 Tq6 Wanted to feel worried-not worried
 Tq8 Wanted to feel nervous-calm

Tq2q1 Discrepancy unsettled-settled
 Tq4q3 Discrepancy anxious-relaxed
 Tq6q5 Discrepancy worried-not worried
 Tq8q7 Discrepancy nervous-calm
 Telictot Total discrepancy Telic

Paratelic feeling words	Paratelic high tension	Paratelic low tension
Playful	Bored	Excited
Spontaneous	Unstimulated	Stimulated
Looking to have a good time	Uninterested	Interested
Looking to have fun	Indifferent	Enthused
Focused on the here and now		

- P1 Felt bored-excited
- P3 Felt unstimulated-stimulated
- P5 Felt uninterested-interested
- P7 Felt indifferent-enthused

- P2 Wanted to feel bored-excited
- P4 Wanted to feel unstimulated-stimulated
- P6 Wanted to feel uninterested-interested
- P8 Wanted to feel indifferent-enthused

- Pq2q1 Discrepancy bored-excited
- Pq4q3 Discrepancy unstimulated-stimulated
- Pq6q5 Discrepancy uninterested-interested
- Pq8q7 Discrepancy indifferent-enthused
- Paratelic tot Total discrepancy Paratelic

Conformist feeling words	Conformist high tension	Conformist low tension
Following the rules	Embarrassed	Not embarrassed
Not “making waves”	Misunderstood	Agreed with
Worrying if I broke a rule	Rejected	Belonging
Looking to fit in	Insecure	Secure
Trying to stay in line		
Trying to be the same as others		
Worrying about what others thought		

- Cq1 Felt embarrassed-not embarrassed
- Cq3 Felt misunderstood-agreed with
- Cq5 Felt rejected-belonging
- Cq7 Felt insecure-secure

- Cq2 Wanted to feel embarrassed-not embarrassed
- Cq4 Wanted to feel misunderstood-agreed with
- Cq6 Wanted to feel rejected-belonging
- Cq8 Wanted to feel insecure-secure

- Cq2q1 Discrepancy embarrassed-not embarrassed
- Cq4q3 Discrepancy misunderstood-agreed with
- Cq6q5 Discrepancy rejected-belonging
- Cq8q9 Discrepancy insecure-secure

Compliantot Total discrepancy Conformist

Negativistic feeling words	Negativistic high tension	Negativistic low tension
Standing up for what I thought	Trapped	Free
Bending the rules	Held back	Released
Angry	Caught	Unrestricted
Stubborn	Limited	Unlimited
Disobedient		
Looking to be difficult		
Looking to do my own thing		

Dq1 Felt trapped-free
 Dq3 Felt held back-released
 Dq5 Felt caught-unrestricted
 Dq7 Felt limited-unlimited

Dq2 Wanted to feel trapped-free
 Dq4 Wanted to feel held back-released
 Dq6 Wanted to feel caught-unrestricted
 Dq8 Wanted to feel limited-unlimited

Dq2q1 Discrepancy trapped-free
 Dq4q3 Discrepancy back-released
 Dq6q5 Discrepancy caught-unrestricted
 Dq8q7 Discrepancy limited-unlimited
 Defianttot Total discrepancy Negativistic

Mastery Autic feeling words	Mastery Autic high tension	Mastery Autic low tension
Doing my best	Not in control	In control
Giving it my all	Shamed	Proud
Not showing tender feelings	Weak	Sturdy
Being tough	Disrespected	Respected
Feeling competitive		

MAq1 Felt not in control-in control
 MAq3 Felt shamed-proud
 MAq5 Felt weak-sturdy
 MAq7 Felt disrespected-respected

MAq2 Wanted to feel not in control-in control
 MAq4 Wanted to feel shamed-proud
 MAq6 Wanted to feel weak-sturdy
 MAq8 Wanted to feel disrespected-respected

MAq2q1 Discrepancy not in control-in control
 MAq4q3 Discrepancy shamed-proud
 MAq6q5 Discrepancy weak-sturdy
 MAq8q7 Discrepancy disrespected-respected
 MAutictot Total Discrepancy Mastery Autic

Sympathy Autic feeling words	Sympathy Autic high tension	Sympathy Autic low tension
Looking for closeness with others	Not valued	Valued
Looking for help	Not cared for	Cared for
Feeling I deserve a treat	Resentful	Grateful
Looking to others for tenderness	Hurt	Loved
Looking to feel cared for		

SAq1 Felt not valued-valued
 SAq3 Felt not cared for-cared for
 SAq5 Felt resentful-grateful
 SAq7 Felt hurt-loved

SAq2 Wanted to feel not valued-valued
 SAq4 Wanted to feel not cared for-cared for
 SAq6 Wanted to feel resentful-grateful
 SAq8 Wanted to feel hurt-loved

SAq2q1 Discrepancy not valued-valued
 SAq4q3 Discrepancy not cared for-cared for
 SAq6q5 Discrepancy resentful-grateful
 SAq8q7 Discrepancy hurt-loved
 SAutictot Total discrepancy Sympathy Autic

Mastery Alloic feeling words	Mastery Alloic high tension	Mastery Alloic low tension
Letting others win	Not standing up for others	Stood up for others
Helping others profit	Letting others down	Being there for others
Helping others succeed	Useless	Useful
Letting others be in charge	Disloyal	Loyal
Giving self to a cause		

MAllq1 Felt not standing up for others-stood up for others
 MAllq3 Felt letting others down-being there for others
 MAllq5 Felt useless-useful
 MAllq7 Felt disloyal-loyal

MAllq2 Wanted to feel not standing up for others- stood up for others
 MAllq4 Wanted to feel letting others down- being there for others
 MAllq6 Wanted to feel useless-useful
 MAllq8 Wanted to feel disloyal-loyal

MAllq2q1 Discrepancy not standing up for others-stood up for others
 MAllq4q3 Discrepancy letting others down-being there for others
 MAllq6q5 Discrepancy useless-useful
 MAllq8q7 Discrepancy disloyal-loyal
 MAlloictot Total discrepancy Mastery Alloic

Sympathy Alloic feeling	Sympathy Alloic high tension	Sympathy Alloic low tension
Looking to make others feel good	Guilty	Generous
Putting others needs before my own	Bad about myself	Good about myself
Giving up something to help someone else	Selfish	Giving
Being kind to others	Not worthy	Worthy
Putting other's needs before my own		

SAllq1 Felt guilty-generous
 SAllq3 Felt bad about myself-good about myself
 SAllq5 Felt selfish-giving
 SAllq7 Felt not worthy-worthy

SAllq2 Wanted to feel guilty- generous

SAllq4 Wanted to feel bad about myself-good about myself

SAllq6 Wanted to feel selfish-giving

SAllq8 Wanted to feel not worthy-worthy

SAllq2q1 Discrepancy guilty-generous

SAllq4q3 Discrepancy bad about myself-good about myself

SAllq6q5 Discrepancy selfish-giving

SAllq8q7 Discrepancy not worthy-worthy

SAlloictot Total discrepancy Sympathy Alloic



Exercise Tension Scale

Below is a space. In this space describe a situation in the last month when you skipped exercise. Please give details like who, what, when and where:

Part 1:

Below is a pair of boxes. Choose the box that best describes how you felt in the situation last month just before you skipped exercise.

	<p><i>Before I skipped exercise I was:</i></p> <ul style="list-style-type: none">• Serious• Have an important goal• Planning ahead• Trying to accomplish something important• Care about future outcomes
--	--

	<p><i>Before I skipped exercise I was:</i></p> <ul style="list-style-type: none">• Playful• Spontaneous• Looking to have a good time• Looking to have fun • Focusing on the here and now
--	--

Continue to Part 2



Exercise Tension Scale

Part 2 A:

You will see circles below. They show a range. Select the circle near or far from a word that shows how you felt before you skipped exercise. Then select the circle near or far from a word that shows how you wanted to feel.

I felt before I skipped exercise:

Unsettled Settled

I wanted to feel:

Unsettled Settled

I felt before I skipped exercise:

Anxious Relaxed

I wanted to feel:

Anxious Relaxed

I felt before I skipped exercise:

Worried Not
Worried

I wanted to feel:

Worried Not
Worried

I felt before I skipped exercise:

Nervous Calm

I wanted to feel:

Nervous Calm

• Continue



Exercise Tension Scale

Part 2 B:

You will see circles below. They show a range. Select the circle near or far from a word that shows how you felt before you skipped exercise. Then select the circle near or far from a word that shows how you wanted to feel.

I felt before I skipped exercise:

Bored Excited

I wanted to feel:

Bored Excited

I felt before I skipped exercise:

Unstimulated Stimulated

I wanted to feel:

Unstimulated Stimulated

I felt before I skipped exercise:

Uninterested Interested

I wanted to feel:

Uninterested Interested

I felt before I skipped exercise:

Indifferent Enthused

I wanted to feel:

Indifferent Enthused

• Continue



Exercise Tension Scale

Part 3:

Below is a pair of boxes. Choose the box that best describes how you felt in the situation last month just before you skipped exercise.

<p><i>Before I skipped exercise I was:</i></p> <ul style="list-style-type: none">• Following the rules• Not “making waves”• Worrying if I broke a rule• Looking to fit in• Trying to stay in line• Wanting to be the same as others• Worrying about what others thought

<p><i>Before I skipped exercise I was:</i></p> <ul style="list-style-type: none">• Standing up for what I thought• Bending the rules• Angry• Stubborn• Disobedient• Looking to be difficult • Looking to do my own thing
--

Continue to Part 4



Exercise Tension Scale

Part 4 C:

You will see circles below. They show a range. Select the circle near or far from a word that shows how you felt before you skipped exercise. Then select the circle near or far from a word that shows how you wanted to feel.

I felt before I skipped exercise:

Embarrassed Not Embarrassed

I wanted to feel:

Embarrassed Not Embarrassed

I felt before I skipped exercise:

Misunderstood Agreed with

I wanted to feel:

Misunderstood Agreed with

I felt before I skipped exercise:

Rejected Belonging

I wanted to feel:

Rejected Belonging

I felt before I skipped exercise:

Insecure Secure

I wanted to feel:

Insecure Secure



Exercise Tension Scale

Part 4 D:

You will see circles below. They show a range. Select the circle near or far from a word that shows how you felt before you skipped exercise. Then select the circle near or far from a word that shows how you wanted to feel.

I felt before I skipped exercise:

Trapped Free

I wanted to feel:

Trapped Free

I felt before I skipped exercise:

Held Back Released

I wanted to feel:

Held Back Released

I felt before I skipped exercise:

Caught Unrestricted

I wanted to feel:

Caught Unrestricted

I felt before I skipped exercise:

Limited Unlimited

I wanted to feel:

Limited Unlimited



Exercise Tension Scale

Part 5:

Below are four boxes. Choose the box that best describes how you felt in the situation last month just before you skipped exercise.

<input type="checkbox"/> <i>Before I skipped exercise I was:</i> <ul style="list-style-type: none">• Doing my best• Giving it my all• Not showing tender feelings• Being tough• Feeling competitive

<input type="checkbox"/> <i>Before I skipped exercise I was:</i> <ul style="list-style-type: none">• Looking for closeness with others• Looking for help• Feeling I deserved a treat• Showing caring feelings• Looking to feel cared for
--

<input type="checkbox"/> <i>Before I skipped exercise I was:</i> <ul style="list-style-type: none">• Letting others win, helping others profit• Helping others profit• Helping others succeed• Letting others be in charge• Giving self to a cause
--

<input type="checkbox"/> <i>Before I skipped exercise I was:</i> <ul style="list-style-type: none">• Looking to make others feel good• Putting other's needs before my own• Giving up something to help someone else• Being kind to others• Putting other's needs before my own

Continue to part 6



Exercise Tension Scale

Part 6 E:

You will see circles below. They show a range. Select the circle near or far from a word that shows how you felt before you skipped exercise. Then select the circle near or far from a word that shows how you wanted to feel.

I felt before I skipped exercise:

Not in control In Control

I wanted to feel:

Not in control In Control

I felt before I skipped exercise:

Shamed Proud

I wanted to feel:

Shamed Proud

I felt before I skipped exercise:

Weak Study

I wanted to feel:

Weak Sturdy

I felt before I skipped exercise:

Disrespected Respected

I wanted to feel:

Disrespected Respected

• Continue



Exercise Tension Scale

Part 6 F:

You will see circles below. They show a range. Select the circle near or far from a word that shows how you felt before you skipped exercise. Then select the circle near or far from a word that shows how you wanted to feel.

I felt before I skipped exercise:

Not Valued Valued

I wanted to feel:

Not Valued Valued

I felt before I skipped exercise:

Not Cared for Cared for

I wanted to feel:

Not Cared for Cared for

I felt before I skipped exercise:

Resentful Grateful

I wanted to feel:

Resentful Grateful

I felt before I skipped exercise:

Hurt Loved

I wanted to feel:

Hurt Loved



Exercise Tension Scale

Part 6 G:

You will see circles below. They show a range. Select the circle near or far from a word that shows how you felt before you skipped exercise. Then select the circle near or far from a word that shows how you wanted to feel.

I felt before I skipped exercise:

Not standing up for others Stood up for others

I wanted to feel:

Not standing up for others Stood up for others

I felt before I skipped exercise:

Letting others down Being there for others

I wanted to feel:

Letting others down Being there for others

I felt before I skipped exercise:

Useless Useful

I wanted to feel:

Useless Useful

I felt before I skipped exercise:

Disloyal O O O O O O O O O O Loyal

I wanted to feel:

Disloyal O O O O O O O O O O Loyal

• Continue



Exercise Tension Scale

Part 6 H:

You will see circles below. They show a range. Select the circle near or far from a word that shows how you felt before you skipped exercise. Then select the circle near or far from a word that shows how you wanted to feel.

I felt before I skipped exercise:

Guilty Generous

I wanted to feel:

Guilty Generous

I felt before I skipped exercise:

Bad About Myself Good About Myself

I wanted to feel:

Bad About Myself Good About Myself

I felt before I skipped exercise:

Selfish Giving

I wanted to feel:

Selfish Giving

I felt before I skipped exercise:

Not worthy Worthy

I wanted to feel:

Not worthy Worthy

Appendix B3-1. Feeling Tension Scales

The Feelings Tension Scale measures the discrepancy between the way individuals felt and the way they wanted to feel before recognizing they were down or low. Administration procedures of the three scales are explained in the procedures section. Scoring of the three Tension Scales is explained here as performed on paper and pencil scales; computerized scoring is automatically programmed in the same manner. On the 10-point continuum, participants mark an “X” for “how they were feeling just before overeating, skipping exercise, and feeling down or low; they mark an “O” for “how they wanted to feel”; this format was adapted from the Sherwood Inventory of the Self-concept (Robinson & Shaver, 1970). Unpleasant feeling words are on the left, lower end of the 10-point continuum (unsettled, uneasy, anxious, nervous) and pleasant feeling words are at the upper end (e.g., settled, at ease, calm, composed). The highest value of 10 corresponds with the strongest of pleasant feelings (no/low tension) and the lowest value of 1 corresponds with the strongest of unpleasant feelings (medium/high tension). The difference between the values marked for actual feelings (X) and desired feelings (O) provides a discrepancy score (D) that matches the theoretical definition of tension ($O-X=D$). Total overeating tension scores were summed for the three subscales to provide an overall tension score ranging from 0-108 (highest discrepancy scores of 9×4 items \times 3 subscales = 108). Motivation-specific tension subscale scores ranging from 0-36 (highest discrepancy scores of 9×4 items = 36) were compared to detect which motivation carries the most tension (highest discrepancy score).

Appendix B2-2. Feelings Tension Scale Coding

Variable	Labels
Telic	Telic state
Paratelic	Paratelic state
Compliant	Conformist
Defiant	Negativistic state
MAutic	Mastery-autic state
MAlloic	Mastery alloic state
SAutic	Sympathy-autic state
SAlloic	Sympathy-alloic state

Telic feeling words	Telic high tension	Telic low tension
Serious	Unsettled	Settled
Have an important goal	Anxious	Relaxed
Planning ahead	Worried	Not worried
Trying to accomplish something important	Nervous	Calm
Care about future outcomes		

Tq1 Felt unsettled-settled
 Tq3 Felt anxious-relaxed
 Tq5 Felt worried-not worried
 Tq7 Felt nervous-calm

Tq2 Wanted to feel unsettled-settled
 Tq4 Wanted to feel anxious-relaxed
 Tq6 Wanted to feel worried-not worried
 Tq8 Wanted to feel nervous-calm

Tq2q1 Discrepancy unsettled-settled
 Tq4q3 Discrepancy anxious-relaxed
 Tq6q5 Discrepancy worried-not worried
 Tq8q7 Discrepancy nervous-calm
 Telictot Total discrepancy Telic

Paratelic feeling words	Paratelic high tension	Paratelic low tension
Playful	Bored	Excited
Spontaneous	Unstimulated	Stimulated
Looking to have a good time	Uninterested	Interested
Looking to have fun	Indifferent	Enthused
Focused on the here and now		

- P1 Felt bored-excited
- P3 Felt unstimulated-stimulated
- P5 Felt uninterested-interested
- P7 Felt indifferent-enthused

- P2 Wanted to feel bored-excited
- P4 Wanted to feel unstimulated-stimulated
- P6 Wanted to feel uninterested-interested
- P8 Wanted to feel indifferent-enthused

- Pq2q1 Discrepancy bored-excited
- Pq4q3 Discrepancy unstimulated-stimulated
- Pq6q5 Discrepancy uninterested-interested
- Pq8q7 Discrepancy indifferent-enthused
- Paratelic tot Total discrepancy Paratelic

Conformist feeling words	Conformist high tension	Conformist low tension
Following the rules	Embarrassed	Not embarrassed
Not “making waves”	Misunderstood	Agreed with
Worrying if I broke a rule	Rejected	Belonging
Looking to fit in	Insecure	Secure
Trying to stay in line		
Trying to be the same as others		
Worrying about what others thought		

- Cq1 Felt embarrassed-not embarrassed
- Cq3 Felt misunderstood-agreed with
- Cq5 Felt rejected-belonging
- Cq7 Felt insecure-secure

- Cq2 Wanted to feel embarrassed-not embarrassed
- Cq4 Wanted to feel misunderstood-agreed with
- Cq6 Wanted to feel rejected-belonging
- Cq8 Wanted to feel insecure-secure

- Cq2q1 Discrepancy embarrassed-not embarrassed
- Cq4q3 Discrepancy misunderstood-agreed with
- Cq6q5 Discrepancy rejected-belonging
- Cq8q9 Discrepancy insecure-secure

Compliantot Total discrepancy Conformist

Negativistic feeling words	Negativistic high tension	Negativistic low tension
Standing up for what I thought	Trapped	Free
Bending the rules	Held back	Released
Angry	Caught	Unrestricted
Stubborn	Limited	Unlimited
Disobedient		
Looking to be difficult		
Looking to do my own thing		

Dq1 Felt trapped-free
 Dq3 Felt held back-released
 Dq5 Felt caught-unrestricted
 Dq7 Felt limited-unlimited

Dq2 Wanted to feel trapped-free
 Dq4 Wanted to feel held back-released
 Dq6 Wanted to feel caught-unrestricted
 Dq8 Wanted to feel limited-unlimited

Dq2q1 Discrepancy trapped-free
 Dq4q3 Discrepancy back-released
 Dq6q5 Discrepancy caught-unrestricted
 Dq8q7 Discrepancy limited-unlimited
 Defianttot Total discrepancy Negativistic

Mastery Autic feeling words	Mastery Autic high tension	Mastery Autic low tension
Doing my best	Not in control	In control
Giving it my all	Shamed	Proud
Not showing tender feelings	Weak	Sturdy
Being tough	Disrespected	Respected
Feeling competitive		

MAq1 Felt not in control-in control
 MAq3 Felt shamed-proud
 MAq5 Felt weak-sturdy
 MAq7 Felt disrespected-respected

MAq2 Wanted to feel not in control-in control
 MAq4 Wanted to feel shamed-proud
 MAq6 Wanted to feel weak-sturdy
 MAq8 Wanted to feel disrespected-respected

MAq2q1 Discrepancy not in control-in control
 MAq4q3 Discrepancy shamed-proud
 MAq6q5 Discrepancy weak-sturdy
 MAq8q7 Discrepancy disrespected-respected
 MAutictot Total Discrepancy Mastery Autic

Sympathy Autic feeling words	Sympathy Autic high tension	Sympathy Autic low tension
Looking for closeness with others	Not valued	Valued
Looking for help	Not cared for	Cared for
Feeling I deserve a treat	Resentful	Grateful
Looking to others for tenderness	Hurt	Loved
Looking to feel cared for		

SAq1 Felt not valued-valued
 SAq3 Felt not cared for-cared for
 SAq5 Felt resentful-grateful
 SAq7 Felt hurt-loved

SAq2 Wanted to feel not valued-valued
 SAq4 Wanted to feel not cared for-cared for
 SAq6 Wanted to feel resentful-grateful
 SAq8 Wanted to feel hurt-loved

SAq2q1 Discrepancy not valued-valued
 SAq4q3 Discrepancy not cared for-cared for
 SAq6q5 Discrepancy resentful-grateful
 SAq8q7 Discrepancy hurt-loved
 SAutictot Total discrepancy Sympathy Autic

Mastery Alloic feeling words	Mastery Alloic high tension	Mastery Alloic low tension
Letting others win	Not standing up for others	Stood up for others
Helping others profit	Letting others down	Being there for others
Helping others succeed	Useless	Useful
Letting others be in charge	Disloyal	Loyal
Giving self to a cause		

MAllq1 Felt not standing up for others-stood up for others
 MAllq3 Felt letting others down-being there for others
 MAllq5 Felt useless-useful
 MAllq7 Felt disloyal-loyal

MAllq2 Wanted to feel not standing up for others- stood up for others
 MAllq4 Wanted to feel letting others down- being there for others
 MAllq6 Wanted to feel useless-useful
 MAllq8 Wanted to feel disloyal-loyal

MAllq2q1 Discrepancy not standing up for others-stood up for others
 MAllq4q3 Discrepancy letting others down-being there for others
 MAllq6q5 Discrepancy useless-useful
 MAllq8q7 Discrepancy disloyal-loyal
 MAlloictot Total discrepancy Mastery Alloic

Sympathy Alloic feeling	Sympathy Alloic high tension	Sympathy Alloic low tension
Looking to make others feel good	Guilty	Generous
Putting others needs before my own	Bad about myself	Good about myself
Giving up something to help someone else	Selfish	Giving
Being kind to others	Not worthy	Worthy
Putting other's needs before my own		

SAllq1 Felt guilty-generous
 SAllq3 Felt bad about myself-good about myself
 SAllq5 Felt selfish-giving
 SAllq7 Felt not worthy-worthy

SAllq2 Wanted to feel guilty- generous

SAllq4 Wanted to feel bad about myself-good about myself

SAllq6 Wanted to feel selfish-giving

SAllq8 Wanted to feel not worthy-worthy

SAllq2q1 Discrepancy guilty-generous

SAllq4q3 Discrepancy bad about myself-good about myself

SAllq6q5 Discrepancy selfish-giving

SAllq8q7 Discrepancy not worthy-worthy

SAlloictot Total discrepancy Sympathy Alloic



Feelings Tension Scale

Think of a time in the last month when you felt low or down. In the space BELOW describe the situation just before you were low or down. Please give details like who, what, when, and where:

Part 1:

Below is a pair of boxes. Choose the box that best describes how you felt in the situation last month just before you felt low or down.

<input type="checkbox"/> <i>Before I felt low or down I was:</i> <ul style="list-style-type: none">• Serious• Have an important goal• Planning ahead• Trying to accomplish something important• Care about future outcomes
--

<input type="checkbox"/> <i>Before I felt low or down I was:</i> <ul style="list-style-type: none">• Playful• Spontaneous• Looking to have a good time• Looking to have fun • Focusing on the here and now
--

Continue to Part 2



Overeating Tension Scale

Part 2 A:

You will see circles below. They show a range. Select the circle near or far from a word that shows how you felt before you were low or down. Then select the circle near of far from a word that shows how you wanted to feel.

I felt before I was low or down:

Unsettled Settled

I wanted to feel:

Unsettled Settled

I felt before I was low or down:

Anxious Relaxed

I wanted to feel:

Anxious Relaxed

I felt before I was low or down:

Worried Not
Worried

I wanted to feel:

Worried Not
Worried

I felt before I was low or down:

Nervous Calm

I wanted to feel:

Nervous Calm

• Continue



Feelings Tension Scale

Part 2 B:

You will see circles below. They show a range. Select the circle near or far from a word that shows how you felt before you were low or down. Then select the circle near or far from a word that shows how you wanted to feel.

I felt before I was low or down:

Bored Excited

I wanted to feel:

Bored Excited

I felt before I was low or down:

Unstimulated Stimulated

I wanted to feel:

Unstimulated Stimulated

I felt before I was low or down:

Uninterested Interested

I wanted to feel:

Uninterested Interested

I felt before I was low or down:

Indifferent Enthused

I wanted to feel:

Indifferent Enthused

• Continue



Feelings Tension Scale

Part 3 :

Below is a pair of boxes. Choose the box that best describes how you felt in the situation last month just before you felt low or down.

<p><i>Before I felt low or down I was:</i></p> <ul style="list-style-type: none">• Following the rules• Not “making waves”• Worrying if I broke a rule• Looking to fit in• Trying to stay in line• Wanting to be the same as others• Worrying about what others thought

<p><i>Before I felt low or down I was:</i></p> <ul style="list-style-type: none">• Standing up for what I thought• Bending the rules• Angry• Stubborn• Disobedient• Looking to be difficult • Looking to do my own thing
--

Continue to Part 4



Feeling Tension Scale

Part 4 C:

You will see circles below. They show a range. Select the circle near or far from a word that shows how you felt before you were low or down. Then select the circle near or far from a word that shows how you wanted to feel.

I felt before I was low or down:

Embarrassed Not Embarrassed

I wanted to feel:

Embarrassed Not Embarrassed

I felt before I was low or down:

Misunderstood Agreed with

I wanted to feel:

Misunderstood Agreed with

I felt before I was low or down:

Rejected Belonging

I wanted to feel:

Rejected Belonging

I felt before I was low or down:

Insecure Secure

I wanted to feel:

Insecure Secure



Feelings Tension Scale

Part 4 D:

You will see circles below. They show a range. Select the circle near or far from a word that shows how you felt before you were low or down. Then select the circle near or far from a word that shows how you wanted to feel.

I felt before I was low or down:

Trapped Free

I wanted to feel:

Trapped Free

I felt before I was low or down:

Held Back Released

I wanted to feel:

Held Back Released

I felt before I was low or down:

Caught Unrestricted

I wanted to feel:

Caught Unrestricted

I felt before I was low or down:

Limited Unlimited

I wanted to feel:

Limited Unlimited



Feelings Tension Scale

Part 5:

Below are four boxes. Choose the box that best describes how you felt in the situation last month just before you felt low or down.

<p><i>Before I felt low and down I was:</i></p> <ul style="list-style-type: none">• Doing my best• Giving it my all• Not showing tender feelings• Being tough• Feeling competitive
--

<p><i>Before I felt low and down I was:</i></p> <ul style="list-style-type: none">• Looking for closeness with others• Looking for help• Feeling I deserved a treat• Showing caring feelings• Looking to feel cared for

<p><i>Before I felt low and down I was:</i></p> <ul style="list-style-type: none">• Letting others win, helping others profit• Helping others profit• Helping others succeed• Letting others be in charge• Giving self to a cause

<p><i>Before I felt low and down I was:</i></p> <ul style="list-style-type: none">• Looking to make others feel good• Putting other's needs before my own• Giving up something to help someone else• Being kind to others• Putting other's needs before my own
--

Continue to part 6



Feelings Tension Scale

Part 6 E:

You will see circles below. They show a range. Select the circle near or far from a word that shows how you felt before you were low or down. Then select the circle near or far from a word that shows how you wanted to feel.

I felt before I was low or down:

Not in control In Control

I wanted to feel:

Not in control In Control

I felt before I was low or down:

Shamed Proud

I wanted to feel:

Shamed Proud

I felt before I was low or down:

Weak Study

I wanted to feel:

Weak Sturdy

I felt before I was low or down:

Disrespected Respected

I wanted to feel:

Disrespected Respected

• Continue



Feelings Tension Scale

Part 6 F:

You will see circles below. They show a range. Select the circle near or far from a word that shows how you felt before you felt low or down. Then select the circle near or far from a word that shows how you wanted to feel.

I felt before I was low or down:

Not Valued Valued

I wanted to feel:

Not Valued Valued

I felt before I was low or down:

Not Cared for Cared for

I wanted to feel:

Not Cared for Cared for

I felt before I was low or down:

Resentful Grateful

I wanted to feel:

Resentful Grateful

I felt before I was low or down:

Hurt Loved

I wanted to feel:

Hurt Loved



Feelings Tension Scale

Part 6 G:

You will see circles below. They show a range. Select the circle near or far from a word that shows how you felt before you were low or down. Then select the circle near or far from a word that shows how you wanted to feel.

I felt before I was low or down:

Not standing up for others Stood up for others

I wanted to feel:

Not standing up for others Stood up for others

I felt before I was low or down:

Letting others down Being there for others

I wanted to feel:

Letting others down Being there for others

I felt before I was low or down:

Useless Useful

I wanted to feel:

Useless Useful

I felt before I was low or down:

Disloyal O O O O O O O O O O Loyal

I wanted to feel:

Disloyal O O O O O O O O O O Loyal

• Continue



Feelings Tension Scale

Part 6 H:

You will see circles below. They show a range. Select the circle near or far from a word that shows how you felt before you were low or down. Then select the circle near or far from a word that shows how you wanted to feel.

I felt before I was low or down:

Guilty Generous

I wanted to feel:

Guilty Generous

I felt before I was low or down:

Bad About Myself Good About Myself

I wanted to feel:

Bad About Myself Good About Myself

I felt before I was low or down:

Selfish Giving

I wanted to feel:

Selfish Giving

I felt before I was low or down:

Not worthy Worthy

I wanted to feel:

Not worthy Worthy

Appendix B4-1 BULIT Bulimia Scale

The Bulimia Test (BULIT), a 32 item, self report, five-point multiple choice scale is used to distinguish among individuals with bulimia, those at risk for binge eating, and those with no eating problems. Possible scores range from 32 to 160; individuals who score high (102 and above) are classified as having a probable diagnosis of bulimia. Thelen, McLaughlin-Mann Pruitt, and Smith (1987) reported the BULIT to have positive predictive value of .74, negative predictive value of .84, specificity of .89, and sensitivity of .64 for identifying individuals with bulimia in college populations (Popkess-Vawter, et al., 2000; Popkess-Vawter & Owens, 1999).

Thelen, M.H., McLaughlin-Mann, L., Pruitt, J.& Smith, M. (1987). Bulimia:

Prevalence and component factors in college women. *Journal of Psychosomatic Research*, 31, 73-78.



Overeating Scale (BULIT)

Please answer each question directly by marking the item of your choice. Please respond to each item as honestly as possible; remember, all of the information you provide will be kept strictly confidential.

1. **Do you ever eat uncontrollable to the point of stuffing yourself (ie. going on eating binges)?**

Once a month or less (1)

2-3 times a week (2)

Once or twice a month (3)

3-6 times a week (4)

Once a day or more (5)

2. **I am satisfied with my eating patterns.**

Agree (1)

Neutral (2)

Disagree a little (3)

Disagree (4)

Disagree strongly (5)

3. **Have you ever kept eating till you thought you'd explode?**

Practically every time I eat (5)

Very frequently (4)

Often (3)

Sometimes (2)

Seldom or never (1)

4. **Would you presently call yourself a "binge eater"?**

Yes, absolutely (5)

Yes (4)

Yes, probably (3)

Yes, possibly (2)

No, probably not (1)

5. **I prefer to eat:**

At home alone (5)

At home with others (4)

In a public restaurant (3)

At a friend's house (2)

Doesn't matter (1)

6. **Do you feel you have control over the amount of food you consume?**

Most of the time (1)

A lot of the time (2)

Occasionally (3)

Rarely (4)

Never (5)

7. **I use laxatives or suppositories to help control my weight.**

Once a day or more (5)

3-6 times a week (4)

Once or twice a week (3)

2-3 times a month (2)

Once a month or less (or never) (1)

8. **I eat until I feel too tired to continue.**

At least once a day (5)

3-6 times a week (4)

Once or twice a week (3)

2-3 times a month (2)

Once a month or less (or never) (1)

9. **How often do you prefer eating ice cream, milk shakes, or pudding during a binge?**

Always (5)

- Frequently (4)
- Sometimes (3)
- Seldom or never (2)
- I don't binge (1)

10. **How much are you concerned about your eating binges?**

- I don't binge (1)
- Bothers me a little (2)
- Moderate concern (3)
- Major concern (4)
- Probably the biggest concern in my life (5)

11. **Most people I know would be amazed if they knew how much food I can consume in one sitting.**

- Without a doubt (5)
- Very probably (4)
- Probably (3)
- Possibly (2)
- No (1)

12. **Do you ever eat to the point of feeling sick?**

- Very frequently (5)
- Frequently (4)
- Fairly often (3)
- Occasionally (2)
- Rarely or never (1)

13. **I am afraid to eat anything for fear that I won't be able to stop.**

- Always (5)
- Almost always (4)
- Frequently (3)
- Sometimes (2)

Seldom or never (1)

14. **I don't like myself after I eat too much.**

Always (5)

Frequently (4)

Sometimes (3)

Seldom or never (2)

I don't eat too much (1)

15. **How often do you intentionally vomit after eating?**

2 or more times a week (5)

Once a week (4)

2-3 times a month (3)

Once a month (2)

Less than once a month (or never) (1)

16. **Which of the following describes your feelings after binge eating?**

I don't binge eat (1)

I feel OK (2)

I feel mildly upset with myself (3)

I feel quite upset with myself (4)

I hate myself (5)

17. **I eat a lot of food when I'm not even hungry.**

Very frequently (5)

Frequently (4)

Occasionally (3)

Sometimes (2)

Seldom or never (1)

18. **My eating patterns are different from eating patterns of most people.**

Always (5)

Almost always (4)

Frequently (3)
Sometimes (2)
Seldom or never (1)

19. **I have tried to lose weight by fasting or going on "crash" diets.**

Not in the past year (1)
Once in the past year (2)
2-3 times in the past year (3)
4-5 times in the past year (4)
More than 5 times in the past year (5)

20. **I feel sad or blue after eating more than I'd planned to eat.**

Always (5)
Almost always (4)
Frequently (3)
Sometimes (2)
Seldom, never, or not applicable (1)

21. **When engaged in an eating binge, I tend to eat foods that are high in carbohydrates (sweet and starches).**

Always (5)
Almost always (4)
Frequently (3)
Sometimes (2)
Seldom, or I don't binge (1)

22. **Compared to most people, my ability to control my eating behavior seems to be:**

Greater than others' ability (1)
About the same (2)
Less (3)
Much less (4)
I have absolutely no control (5)

23. **One of your best friends suddenly suggests that you both eat at a new restaurant buffet that night. Although you'd planned on eating something light at home, you go ahead and eat out, eating quite a lot and feeling uncomfortably full. How would you feel about yourself on the way home?**
- Fine, glad I'd tried a new restaurant (1)
 - A little regretful that I'd eaten so much (2)
 - Somewhat disappointed in myself (3)
 - Upset with myself (4)
 - Totally disgusted with myself (5)
24. **I would presently label myself a "compulsive eater" (one who engages in episodes of uncontrolled eating)**
- Absolutely (5)
 - Yes (4)
 - Yes, probably (3)
 - Yes, possible (2)
 - No, probably not (1)
25. **What is the most weight you've ever lost in one month?**
- Over 20 pounds (5)
 - 12-20 pounds (4)
 - 8-11 pounds (3)
 - 4-7 pounds (2)
 - Less than 4 pounds (1)
26. **If I eat too much at night I feel depressed the next morning.**
- Always (5)
 - Frequently (4)
 - Sometimes (3)
 - Seldom or never (2)
 - I don't eat too much at night (1)
27. **Do you believe that it's easier for you to vomit than it is for most people?**
- Yes, it's no problem at all for me (5)

Yes, it's easier (4)

Yes, it's a little easier (3)

About the same (2)

No, it's less easy (1)

28. I feel that food controls my life.

Always (5)

Frequently (4)

Sometimes (3)

Seldom or never (2)

I don't eat too much (1)

29. I feel depressed immediately after I eat too much.

Always (5)

Frequently (4)

Sometimes (3)

Seldom or never (2)

I don't eat too much (1)

30. How often do you vomit after eating in order to lose weight?

Less than once a month (or never) (1)

Once a month (2)

2-3 times a month (3)

Once a week (4)

2 or more times a week (5)

31. When consuming a large quantity of food, at what rate of speed do you usually eat?

More rapidly than most people have ever eaten in their lives (5)

A lot more rapidly than most people (4)

A little more rapidly than most people (3)

About the same rate as most people (2)

More slowly than most people (or not applicable) (1)

32. **What is the most weight you've ever gained in one month?**

Over 20 pounds (5)

12-20 pounds (4)

8-11 pounds (3)

4-7 pounds (2)

Less than 4 pounds (1)

33. **My last menstrual period was:**

Within the past month (5)

Within the past 2 months (4)

Within the past 4 months (3)

Within the past 6 months (2)

Not within the past 6 months (1)

0 Not applicable (0)

34. **I use diuretics (water pills) to help control my weight.**

Once a day or more (5)

3-6 times a week (4)

Once or twice a week (3)

2-3 times a month (2)

Once a month or less (or never) (1)

35. **How do you think your appetite compares with that of most people you know?**

Many times larger than most (5)

Much larger (4)

A little larger (3)

About the same (2)

Smaller than most (1)

36. **My menstrual cycles come once a month:**

Always (1)

Usually (2)

Sometimes (3)

Seldom (4)

Never (5)

0 Not Applicable (0)

Remove items (7, 33, 34, 36)

[Reset Form](#)

[Submit Answers](#)

Scoring 32-160

Not binge eater < 102

Binge eater >102

Appendix B5. IPAQ Questions and Scoring

The International Physical Activity Questionnaire (IPAQ) is a seven-item short-answer measure of physical activity, with established reliability and validity in 12 countries. Test-retest reliability was established with Spearman's Rho clustering around 0.8. Criterion validity was established with a median Rho of .30 against the CSA accelerometer minutes of moderate, vigorous, walking, and sedentary behaviors. The IPAQ instrument has acceptable measurement properties comparable to other established measures (IPAQ, 2002). Internal consistency reliability for the IPAQ was not satisfactory ($\alpha=.58$). Evidence for convergent validity with a significant inverse Pearson's correlation was not met ($r = -.095, p < .535$) between scores on the Exercise Tension Scale and the IPAQ.

Appendix B5-2.

Tension Related With Behavior Physical Activity v1

Please answer each question even if you do not consider yourself to be an active person. Think about the activities you do at work, as part of your house and yard work, to get from place to place, and in your spare time for recreation, exercise or sport. *Vigorous* activities take *hard physical effort*. Vigorous activities make you breathe much harder than normal and may include heavy lifting, digging, aerobics, or fast bicycling. Think only about those physical activities that you did for at least 10 minutes at a time.

2. During the last 7 days, on how many days did you do vigorous physical activities?

The number of days per week:

Q1

3. How much time did you usually spend doing vigorous physical activities on one of those days?

The number of hours in one day:

Q2

5. How much time in total did you spend over the last 7 days doing vigorous physical activities?

The number of minutes per week:

Q3

Now, think about activities which take moderate physical effort that you did in the last 7 days. Moderate physical activities make you breathe somewhat harder than normal and may include carrying light loads, bicycling at a regular pace, or doubles tennis. Do not include walking. Again, think about only those physical activities that you did for at least 10 minutes at a time.

6. During the last 7 days, on how many days did you do moderate physical activities?

Days per week of moderate activities:

Q4

8. How much time did you usually spend doing moderate physical activities on one of those days?

The number of minutes per day:

Q5

10. What is the total amount of time you spent over the last 7 days doing moderate physical activities?

The number of minutes per week:

Q6

Now, think about the time you spent walking in the last 7 days. This includes at work and at home, walking to travel from place to place, and any other walking that you might do solely for recreation, sport, exercise, or leisure.

11. During the last 7 days, on how many days did you walk for at least 10 minutes at a time?

The number of days per week:

Q7

13. How much time did you usually spend walking on one of those days?

The number of minutes per day:

Q8

15. What is the total amount of time you spent walking over the last 7 days?

The number of minutes per week:

Q9

Now, think about the time you spent sitting on week days during the last 7 days. Include time spent at work, at home, while doing course work, and during leisure time. This may include time spent sitting at a desk, visiting friends, reading or sitting or lying down to watch television.

17. During the last 7 days, how much time did you usually spend sitting on a week day?

The number of minutes per weekday:

Q10

19. What is the total amount of time you spent sitting last Wednesday?

Then number of minutes on Wednesday?

Q11

Vigorous (8 METS* Q3)

Moderate (4 METS*Q6)

Walking (3.3METS *Q9)
Total (Vigorous + Moderate +Walking)

Appendix B6. ROSENBERG SELF-ESTEEM SCALE

Rosenberg self-esteem scale (RSES), a 10-item, four-point Likert-type general measure of self-esteem, has been widely used in self-esteem research over the past 30 years ($\alpha = .77-.88$). Self-esteem refers to self-worth, self-acceptance, and self-respect, as well as evaluations of self appearance, academics and athletic abilities (Rosenberg, 1965; Rosenberg, Scholler, Schoenbach, & Rosenberg, 1995). Repeated application of Rosenberg to measure short-term changes has been shown in intervention studies, contrary to past belief, that self-esteem is a stable trait (Crocker & Wolfe, 2001). Internal consistency reliability for the RSES in this study was satisfactory ($\alpha = .875$). Evidence for convergent validity was not met with a significant inverse Pearson's correlation ($r = -.129, p < .351$) between scores on the Feelings Tension Scale and the RSES.

Appendix B6. Rosenberg self-esteem scale scoring

1. To score the items, assign a value to each of the 10 items as follows:

- For items 1,2,4,6,7: Strongly Agree=3, Agree=2, Disagree=1, and Strongly Disagree=0.
- For items 3,5,8,9,10 (which are reversed in valence, and noted with the asterisks** below): Strongly Agree=0, Agree=1, Disagree=2, and Strongly Disagree=3.

The scale ranges from 0-30, with 30 indicating the highest score possible. Other scoring options are possible. For example, you can assign values 1-4 rather than 0-3; then scores will range from 10-40. Some investigators use 5- or 7-point Likert scales, and again, scale ranges would vary based on the addition of "middle" categories of agreement.

BELOW IS A LIST OF STATEMENTS DEALING WITH YOUR GENERAL FEELINGS ABOUT YOURSELF. IF YOU **STRONGLY AGREE**, CIRCLE **SA**. IF YOU **AGREE** WITH THE STATEMENT, CIRCLE **A**. IF YOU **DISAGREE**, CIRCLE **D**. IF YOU **STRONGLY DISAGREE**, CIRCLE **SD**.

		1. STRON GLY AGREE	2 AGREE	3. DISAGRE E	4. STRONGL Y DISAGREE
1.	I feel that I'm a person of worth, at least on an equal plane with others.	SA	A	D	SD
2.	I feel that I have a number of good qualities.	SA	A	D	SD
3.	All in all, I am inclined to feel that I am a failure.**	SA	A	D	SD
4.	I am able to do things as well as most other people.	SA	A	D	SD
5.	I feel I do not have much to be proud of.**	SA	A	D	SD
6.	I take a positive attitude toward myself.	SA	A	D	SD
7.	On the whole, I am satisfied with myself.	SA	A	D	SD
8.	I wish I could have more respect for myself.**	SA	A	D	SD
9.	I certainly feel useless at times.**	SA	A	D	SD
10.	At times I think I am no good at all.**	SA	A	D	SD

Rosenberg, Morris. 1965. *Society and the Adolescent Self-Image*. Princeton, New Jersey: Princeton University Press. (Chapter 2 discusses construct validity.)

Appendix B7-1. Tension and Effort Stress Inventory –O Overeating Situation

The Tension and Effort Stress Inventory (TESI) is a one page, 24-item survey measure of individuals' experiences of stressors, moods, and efforts to cope. The term "tension-stress" refers to "pushing oneself, or the exertion of will power to reduce the tension that is provoked by a stressor" (p195). The TESI state measure estimates the degree of pressure, stress, challenge or demand that you have been exposed to in everyday life over that last thirty days due to: work, family, finance, and one's own body. The first four items deal with stressors and are on a 7-point scale rated from "no pressure" to "Very much". The same labeling format is given for the next 4 items that examine efforts invested to cope. The last 16 items on moods are presented with a 7-point scale rate from "Not at all" to "Very much". Svebak (1993) reported correlations of stressor and effort-scores positively correlated ($r = .57, p < .0001$), versus effort discrepancy scores positively correlated to overall scores on tension-stress ($r = .65, p < .0001$) confirming basic assumptions about relations between amount of stressors and related efforts to cope. Results from an intervention study validated support of the TESI through hypothesis testing and hierarchical regression analysis (content validity; Svebak, 1993) Convergent validity was examined using Pearson correlation coefficients for the Tension scales and their matched TESI measure (overeating, skipping exercise, feeling low or down) which are similar in concept and expected to be moderately correlated, but not highly correlated. The TESI asks "Estimate the degree of pressure, stress, challenge, or demand that you have been exposed to over the last thirty days as due to: _____". Instead of having the participants fill this inventory out three times, once for overeating, once for skipping exercise, and once for feeling down or low, they only filled out one of these situations. The investigator alternated what version each participant got so that each of the three situation on the TESI were taken equally. This procedure reduced respondent burden from taking three versions of the TESI.

(Reference for the TESI: Svebak, S. (1993). The development of the tension and Effort Stress Inventory (TESI) (pp. 189-204). In J. H. Kerr, S. Murgatroyd & M. J. Apter (Eds.), *Advances in reversal theory*. Amsterdam: Swets & Zeitlinger.)

General Tension Measure (TESI-O)

Below is a space. In this space describe a time in the last month when you ate too much. Please give details like who, what, when and where:

A. Estimate the degree of pressure , stress challenge, or demand that you have been exposed to in your <i>current situation</i> as due to :								
	No pressure							Very much
Work	1	2	3	4	5	6	7	
Family	1	2	3	4	5	6	7	
Financial:	1	2	3	4	5	6	7	
Your own body:	1	2	3	4	5	6	7	
B. Estimate the degree of effort that you have put up over the <i>current situation</i> to cope with pressure etc. from:								
	No effort							Very much
Work	1	2	3	4	5	6	7	
Family	1	2	3	4	5	6	7	
Financial:	1	2	3	4	5	6	7	
Your own body:	1	2	3	4	5	6	7	
C. Estimate here the degree to which you have experienced the following moods or emotions in the <i>current situation</i> :								
	Not at all							Very Much
Relaxation:	1	2	3	4	5	6	7	
Anxiety:	1	2	3	4	5	6	7	
Excitement:	1	2	3	4	5	6	7	
Boredom:	1	2	3	4	5	6	7	
Placidity:	1	2	3	4	5	6	7	
Anger:	1	2	3	4	5	6	7	
Provocativeness:	1	2	3	4	5	6	7	
Sullenness:	1	2	3	4	5	6	7	
Pride:	1	2	3	4	5	6	7	
Humiliation:	1	2	3	4	5	6	7	
Modesty:	1	2	3	4	5	6	7	
Shame:	1	2	3	4	5	6	7	
Gratitude:	1	2	3	4	5	6	7	
Resentment:	1	2	3	4	5	6	7	
Virtue:	1	2	3	4	5	6	7	
Guilt:	1	2	3	4	5	6	7	
								Thank you!
Designed 1987 by Sven Svebak, Department of Somatic Psychology, Arstadveien 21, N-5009 Bergen, Norway.								

Suggestions for scoring the TESI Trait version:

The stress items (sources of stressors: items 1-4 in the A-section)

Each item can be scored separately according to format on the scale

Overall estimate of felt exposure to extrinsic stressors: Sum of scores for items 1, 2, and 3

Estimate of felt exposure to intrinsic stressors is reflected in score on item 4

The effort items (items 1-4 in section B)

Each item can be scored separately according to format of the scale

Overall estimate of efforts invested to cope with extrinsic stressors: Sum of scores for items 1, 2 and 3

Estimate of efforts invested to cope with intrinsic stressors: Score on item 4

Good and bad mood items (items 1-16 in section C)

The sequence alternates between items on good and bad moods

Sum of scores for items 1, 3, 5, 7 etc. provides an overall estimate of good moods

Correspondingly, the sum of scores on items 2, 4, 6, 8 etc. provides an overall estimate of bad moods

Items on moods reflecting pleasant outcomes of interpersonal transactions can also be estimated as:

Sum of scores for items 9, 11, 13 and 15: Pleasant outcomes

Sum of scores for items 10, 12, 14 and 16: Unpleasant outcomes

Appendix B7-1. Tension and Effort Stress Inventory –E Exercise Situation

The Tension and Effort Stress Inventory (TESI) is a one page, 24-item survey measure of individuals' experiences of stressors, moods, and efforts to cope. The term "tension-stress" refers to "pushing oneself, or the exertion of will power to reduce the tension that is provoked by a stressor" (p195). The TESI state measure estimates the degree of pressure, stress, challenge or demand that you have been exposed to in everyday life over that last thirty days due to: work, family, finance, and one's own body. The first four items deal with stressors and are on a 7-point scale rated from "no pressure" to "Very much". The same labeling format is given for the next 4 items that examine efforts invested to cope. The last 16 items on moods are presented with a 7-point scale rate from "Not at all" to "Very much". Svebak (1993) reported correlations of stressor and effort-scores positively correlated ($r = .57, p < .0001$), versus effort discrepancy scores positively correlated to overall scores on tension-stress ($r = .65, p < .0001$) confirming basic assumptions about relations between amount of stressors and related efforts to cope. Results from an intervention study validated support of the TESI through hypothesis testing and hierarchical regression analysis (content validity; Svebak, 1993) Convergent validity was examined using Pearson correlation coefficients for the Tension scales and their matched TESI measure (overeating, skipping exercise, feeling low or down) which are similar in concept and expected to be moderately correlated, but not highly correlated. The TESI asks "Estimate the degree of pressure, stress, challenge, or demand that you have been exposed to over the last thirty days as due to: _____". Instead of having the participants fill this inventory out three times, once for overeating, once for skipping exercise, and once for feeling down or low, they only filled out one of these situations. The investigator alternated what version each participant got so that each of the three situation on the TESI were taken equally. This procedure reduced respondent burden from taking three versions of the TESI.

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General Tension Measure (TESI-E)

Below is a space. In this space describe a time in the last month when you skipped exercise. Please give details like who, what, when and where:

A. Estimate the degree of pressure , stress challenge, or demand that you have been exposed to in your <i>current situation</i> as due to :								
	No pressure							Very much
Work	1	2	3	4	5	6	7	
Family	1	2	3	4	5	6	7	
Financial:	1	2	3	4	5	6	7	
Your own body:	1	2	3	4	5	6	7	
B. Estimate the degree of effort that you have put up over the <i>current situation</i> to cope with pressure etc. from:								
	No effort							Very much
Work	1	2	3	4	5	6	7	
Family	1	2	3	4	5	6	7	
Financial:	1	2	3	4	5	6	7	
Your own body:	1	2	3	4	5	6	7	
C. Estimate here the degree to which you have experienced the following moods or emotions in the <i>current situation</i> :								
	Not at all							Very Much
Relaxation:	1	2	3	4	5	6	7	
Anxiety:	1	2	3	4	5	6	7	
Excitement:	1	2	3	4	5	6	7	
Boredom:	1	2	3	4	5	6	7	
Placidity:	1	2	3	4	5	6	7	
Anger:	1	2	3	4	5	6	7	
Provocativeness:	1	2	3	4	5	6	7	
Sullenness:	1	2	3	4	5	6	7	
Pride:	1	2	3	4	5	6	7	
Humiliation:	1	2	3	4	5	6	7	
Modesty:	1	2	3	4	5	6	7	
Shame:	1	2	3	4	5	6	7	
Gratitude:	1	2	3	4	5	6	7	
Resentment:	1	2	3	4	5	6	7	
Virtue:	1	2	3	4	5	6	7	
Guilt:	1	2	3	4	5	6	7	
								Thank you!
Designed 1987 by Sven Svebak, Department of Somatic Psychology, Arstadveien 21, N-5009 Bergen, Norway.								

Suggestions for scoring the TESI Trait version:

The stress items (sources of stressors: items 1-4 in the A-section)

Each item can be scored separately according to format on the scale

Overall estimate of felt exposure to extrinsic stressors: Sum of scores for items 1, 2, and 3

Estimate of felt exposure to intrinsic stressors is reflected in score on item 4

The effort items (items 1-4 in section B)

Each item can be scored separately according to format of the scale

Overall estimate of efforts invested to cope with extrinsic stressors: Sum of scores for items 1, 2 and 3

Estimate of efforts invested to cope with intrinsic stressors: Score on item 4

Good and bad mood items (items 1-16 in section C)

The sequence alternates between items on good and bad moods

Sum of scores for items 1, 3, 5, 7 etc. provides an overall estimate of good moods

Correspondingly, the sum of scores on items 2, 4, 6, 8 etc. provides an overall estimate of bad moods

Items on moods reflecting pleasant outcomes of interpersonal transactions can also be estimated as:

Sum of scores for items 9, 11, 13 and 15: Pleasant outcomes

Sum of scores for items 10, 12, 14 and 16: Unpleasant outcomes

Appendix B7-3. Tension and Effort Stress Inventory –F Feelings Situation

The Tension and Effort Stress Inventory (TESI) is a one page, 24-item survey measure of individuals' experiences of stressors, moods, and efforts to cope. The term "tension-stress" refers to "pushing oneself, or the exertion of will power to reduce the tension that is provoked by a stressor" (p195). The TESI state measure estimates the degree of pressure, stress, challenge or demand that you have been exposed to in everyday life over that last thirty days due to: work, family, finance, and one's own body. The first four items deal with stressors and are on a 7-point scale rated from "no pressure" to "Very much". The same labeling format is given for the next 4 items that examine efforts invested to cope. The last 16 items on moods are presented with a 7-point scale rate from "Not at all" to "Very much". Svebak (1993) reported correlations of stressor and effort-scores positively correlated ($r = .57, p < .0001$), versus effort discrepancy scores positively correlated to overall scores on tension-stress ($r = .65, p < .0001$) confirming basic assumptions about relations between amount of stressors and related efforts to cope. Results from an intervention study validated support of the TESI through hypothesis testing and hierarchical regression analysis (content validity; Svebak, 1993) Convergent validity was examined using Pearson correlation coefficients for the Tension scales and their matched TESI measure (overeating, skipping exercise, feeling low or down) which are similar in concept and expected to be moderately correlated, but not highly correlated. The TESI asks "Estimate the degree of pressure, stress, challenge, or demand that you have been exposed to over the last thirty days as due to: _____". Instead of having the participants fill this inventory out three times, once for overeating, once for skipping exercise, and once for feeling down or low, they only filled out one of these situations. The investigator alternated what version each participant got so that each of the three situation on the TESI were taken equally. This procedure reduced respondent burden from taking three versions of the TESI.

(Reference for the TESI: Svebak, S. (1993). The development of the tension and Effort Stress Inventory (TESI) (pp. 189-204). In J. H. Kerr, S. Murgatroyd & M. J. Apter (Eds.), *Advances in reversal theory*. Amsterdam: Swets & Zeitlinger.)

General Tension Measure (TESI-F)

Think of a time in the last month when you felt low or down. Below is a space. In this space describe a time **just before** you were low or down. Please give details like who, what, when and where:

A. Estimate the degree of pressure , stress challenge, or demand that you have been exposed to in your <i>current situation</i> as due to :									
	No pressure					Very much			
Work	1	2	3	4	5	6	7		
Family	1	2	3	4	5	6	7		
Financial:	1	2	3	4	5	6	7		
Your own body:	1	2	3	4	5	6	7		
B. Estimate the degree of effort that you have put up over the <i>current situation</i> to cope with pressure etc. from:									
	No effort					Very much			
Work	1	2	3	4	5	6	7		
Family	1	2	3	4	5	6	7		
Financial:	1	2	3	4	5	6	7		
Your own body:	1	2	3	4	5	6	7		
C. Estimate here the degree to which you have experienced the following moods or emotions in the <i>current situation</i> :									
	Not at all					Very Much			
Relaxation:	1	2	3	4	5	6	7		
Anxiety:	1	2	3	4	5	6	7		
Excitement:	1	2	3	4	5	6	7		
Boredom:	1	2	3	4	5	6	7		
Placidity:	1	2	3	4	5	6	7		
Anger:	1	2	3	4	5	6	7		
Provocativeness:	1	2	3	4	5	6	7		
Sullenness:	1	2	3	4	5	6	7		
Pride:	1	2	3	4	5	6	7		
Humiliation:	1	2	3	4	5	6	7		
Modesty:	1	2	3	4	5	6	7		
Shame:	1	2	3	4	5	6	7		
Gratitude:	1	2	3	4	5	6	7		
Resentment:	1	2	3	4	5	6	7		
Virtue:	1	2	3	4	5	6	7		
Guilt:	1	2	3	4	5	6	7		
								Thank you!	
Designed 1987 by Sven Svebak, Department of Somatic Psychology, Arstadveien 21, N-5009 Bergen, Norway.									

Suggestions for scoring the TESI Trait version:

The stress items (sources of stressors: items 1-4 in the A-section)

Each item can be scored separately according to format on the scale

Overall estimate of felt exposure to extrinsic stressors: Sum of scores for items 1, 2, and 3

Estimate of felt exposure to intrinsic stressors is reflected in score on item 4

The effort items (items 1-4 in section B)

Each item can be scored separately according to format of the scale

Overall estimate of efforts invested to cope with extrinsic stressors: Sum of scores for items 1, 2 and 3

Estimate of efforts invested to cope with intrinsic stressors: Score on item 4

Good and bad mood items (items 1-16 in section C)

The sequence alternates between items on good and bad moods

Sum of scores for items 1, 3, 5, 7 etc. provides an overall estimate of good moods

Correspondingly, the sum of scores on items 2, 4, 6, 8 etc. provides an overall estimate of bad moods

Items on moods reflecting pleasant outcomes of interpersonal transactions can also be estimated as:

Sum of scores for items 9, 11, 13 and 15: Pleasant outcomes

Sum of scores for items 10, 12, 14 and 16: Unpleasant outcomes

Appendix B8. Marlowe-Crowne 2(10) Social Desirability Scale

The revised Marlow-Crowne 2 (10) Social Desirability Scale contains 10 true-false items that discriminate between respondents who are and are not willing to report socially undesirable information (Reynolds, 1982). The revised short form was found to have improved psychometric characteristics ($\alpha=.80$), no gender differences, and less administration time than the full 33-item scale (Loo & Thorpe, 2000). The Marlow-Crowne scale was used to detect subjects' use of socially desirable answers that could negatively influence construct validity. Possible scores on the Marlow-Crowne range from zero to ten; zero being low social desirability and ten being high social desirability.

- 2 Reynolds, W.M. (1982). Development of reliable and valid short forms of the Marlowe-Crowne Scale of Social Desirability. *Journal of Clinical Psychology*, 38 (1), 119-125.
- 3 Silverstein, A.B. (1983). Validity of random short forms: II. The Marlowe-Crowne Social Desirability Scale. *Journal of Clinical Psychology*, 39(4), 582-584.
- 4 Zook, A., & Sipps, G.J. (1985). Cross-validation of a short form of the Marlowe-Crowne Social Desirability Scale. *Journal of Clinical Psychology*, 41(2), 236-238.
- 5 Fraboni, M. and Cooper, D. (1989). Further validation of three short forms of the Marlowe-Crowne Scale of Social Desirability. *Psychological Reports*, 65(2), 595-600.



Personal Relationships Scale (MC)

ID # _____

Listed below are a number of statements concerning personal attitudes and traits. Read each item and decide whether the statement is **TRUE (T)** or **FALSE (F)** as it pertains to you personally.

T or F

- _____ 1. I never hesitate to go out of my way to help someone in trouble.
- _____ 2. I have never intensely disliked anyone.
- _____ 3. There have been times when I was quite jealous of the good fortune of others.
- _____ 4. I would never think of letting someone else be punished for my wrong doings.
- _____ 5. I sometimes feel resentful when I don't get my way.
- _____ 6. There have been times when I felt like rebelling against people in authority even though I knew they were right.
- _____ 7. I am always courteous, even to people who are disagreeable.
- _____ 8. When I don't know something I don't at all mind admitting it.
- _____ 9. I can remember "playing sick" to get out of something.
- _____ 10. I am sometimes irritated by people who ask favors of me.

Scoring Algorithm for Marlow-Crowne 2 (10) Social Desirability Scale

1. I never hesitate to go out of my way to help someone in trouble. (T)
2. I have never intensely disliked anyone. (T)
3. There have been times when I was quite jealous of the good fortune of others. (F)
4. I would never think of letting someone else be punished for my wrong doings. (T)
5. I sometimes feel resentful when I don't get my way. (F)
6. There have been times when I felt like rebelling against people in authority even though I knew they were right. (F)
7. I am always courteous, even to people who are disagreeable. (T)
8. When I don't know something I don't at all mind admitting it. (T)
9. I can remember "playing sick" to get out of something. (F)
10. I am sometimes irritated by people who ask favors of me. (F)

For each answer the respondent provides that matches the response given above (i.e., T=T or F=F) assign a value of 1. For each discordant response (i.e., the respondent provides a T in place of an F or an F in place of a T) assign a value of 0. Total score can range from 10 (when all responses "match") to 0 (when no responses "match"). Subjects' questionnaire scores correlated with Marlowe-Crowne ($r \geq .30$) will be described and evaluated for possible exclusion in the data analysis.