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### Authors

Tynan, Mara

Afari, Niloofar

Roesch, Scott

et al.



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# Psychometric Properties of the Weight Loss Readiness Test in Active Duty Military Personnel Enrolled in a Weight Management Trial

*Mara Tynan, MS*[*]; Niloofar Afari, PhD*[†,‡,§]; Scott Roesch, PhD*[‖]; Matthew S. Herbert, PhD*[†,‡,§]

**ABSTRACT**

**Introduction:**

The Weight Loss Readiness Test (WLRT) was developed to encourage consideration of factors influencing readiness to engage in weight loss. The WLRT is used clinically, most notably to assess motivation before initiating Navy weight management programs, yet little is known about its psychometric properties.

**Materials and Methods:**

This study examined the reliability, convergent and predictive validity, and factor structure of the WLRT in a sample of active duty service members enrolling in a Navy-based weight management program ($N = 178$, identified as female = 61%, mean age = 29.7 years, mean baseline body mass index = 33.1 kg/m$^2$). All procedures were approved by the respective Institutional Review Boards and research committees.

**Results:**

Exploratory factor analysis revealed a 5-factor structure explaining 52% of the variance that best fit the data with low to moderate correlations between factors: (1) Motivation, (2) Exercise-Related Confidence, (3) Non-Exercise Confidence, (4) Cues, and (5) Anticipated Satisfaction. Internal reliability of subscales was acceptable to good ($\alpha = 0.755$-$0.903$). Generally, convergent validity was found between the identified subscales and other measures of motivation, confidence, and disinhibited eating in expected directions. No relationships were found between the subscales and predictive validity outcomes (weight change, program attendance).

**Conclusions:**

Results indicate adequate structural and convergent validity in the WLRT, but that weight loss readiness, as measured by the WLRT, does not provide predictive validity regarding weight loss or attendance outcomes in this sample. Nonetheless, this measure offers clinical utility in fostering thoughtful conversations about weight loss. The WLRT uniquely focuses on long-term maintenance of behavior change and differentiates between exercise-related and non-exercise confidence. Future studies should further probe the utility of this measure in other populations and the contexts in which it is being used.

## INTRODUCTION

Overweight/obesity is an increasingly severe and costly problem in the United States[1,2] Rates of overweight/obesity have been steadily increasing in active duty military populations and this impacts service members' health, quality of life, and readiness.[3,4] Weight loss interventions have shown variable results in both civilian and military populations,[5–7] with weight loss maintenance being particularly difficult.[8] Readiness and motivation surrounding behavior change have received considerable research attention to better understand and predict weight loss and maintenance. Motivation is conceptualized as a key aspect of readiness-to-change.[9,10] Poor motivation has been identified as a barrier to behavior change in overweight/obesity,[11] and self-motivation has been identified as a perceived facilitator of weight loss in women.[12] Additionally, motivation level and readiness-to-change may relate to adherence and success of behavioral interventions.[13–15] Therefore, motivation and readiness-to-change are important factors for patients and clinicians to consider when deciding to pursue weight loss and/or commit to a weight loss program and long-term behavioral change. Active duty military personnel endorse various motivations for weight loss including passing the military physical test.[16]

[*]San Diego Joint Doctoral Program in Clinical Psychology, San Diego State University, University of California, San Diego, CA 92120, USA

[†]VA San Diego Healthcare System, San Diego, CA 92161, USA

[‡]Department of Psychiatry, University of California San Diego, La Jolla, CA 92093, USA

[§]VA San Diego Center of Excellent for Stress and Mental Health, San Diego, CA 92161, USA

[‖]Department of Psychology, San Diego State University, San Diego, CA 92182, USA

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Corresponding author: Matthew S. Herbert, PhD, USA (m1herbert@health.ucsd.edu).

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### Measures of Weight Loss Readiness

Most measures relevant to weight loss and behavior change are based on the transtheoretical model (TTM), which posits that intentional behavior change is dependent upon one's stage-of-change and progression through the stages of precontemplation, contemplation, preparation, action, maintenance, and termination.[9,17] Research on the TTM in weight loss is mixed. Although there is a lack of high-quality evidence to support the use of the TTM in weight loss interventions,[18] interventions that match participants to their stage-of-change have demonstrated improvements in recruitment and retention.[9] Therefore, stage-of-change is important to assess clinically.

Existing measures assessing readiness in weight loss contexts include the University of Rhode Island Change Assessment (URICA), Decisional Balance Inventory (DBI), and S-Weight and P-Weight.[19] The URICA has 4 subscales reflecting 4 of the stages-of-change: precontemplation, contemplation, action, and maintenance, and results in a single readiness-to-change score.[20] The URICA has acceptable psychometric properties and predictive validity for treatment attendance, but is not specific to weight loss readiness.

The DBI evaluates motivation for change by comparing the positive and negative aspects of weight loss, resulting in 2 subscale scores (pros and cons) and 1 decisional balance score.[21] The DBI has adequate structural validity, internal consistency, and construct validity,[19] but focuses solely on pros and cons of weight loss and does not explicitly evaluate processes of change.

The S-Weight assesses which stage-of-change the respondent is in with 5 mutually exclusive items from which participants select their current state-of-change (i.e., precontemplation, contemplation, preparation, action, and maintenance). The P-Weight assesses the processes of change, or factors that result in transitions from 1 stage to another in the context of weight loss.[22] The P-Weight has adequate psychometric properties, including structural validity, good to excellent internal reliability for its subscales, and content validity,[23] but obtaining the processes of change score in the context of the individual's stage-of-change requires complex data analyses,[19] barring quick clinical interpretation. Taken together, these existing measures of weight loss readiness have limitations, highlighting the need for additional improvement.

### Development and Clinical Application of the Weight Loss Readiness Test

The Weight Loss Readiness Test (WLRT-II), originally the Dieting Readiness Test (DRT),[10] was developed as a clinical tool to encourage clinicians and patients to consider the reality of influences on weight loss readiness. Specifically, the measure aimed to assess if the timing is right to attempt weight loss based on one's circumstances at the time of administration.[10,24] The original DRT, later renamed the WLRT-I, was developed based on clinical experience and consisted of 23 items representing 6 subscales: goals and attitudes, hunger and eating cues, control over eating, binge eating and purging, emotional eating, and exercise patterns and attitudes.[25] Several studies have used the DRT to predict weight loss program success,[25–27] with the most recent published in 2002.[27] Most relevant to the current study, Fontaine et al.[25] examined the psychometric properties and predictive validity of the DRT in a sample of 410 adults with obesity before participation in a weight management program. Using principal components analysis, the authors found a 5-factor solution with low to moderate correlations across subscales with acceptable to good internal consistency. The subscales were: Bingeing and Eating Cues (7 items), Exercise Patterns and Attitudes (4 items), Commitment and Expectations (4 items; originally Goals and Attitudes), Control Over Eating (3 items; same as original), and Purging (2 items). Regarding predictive validity, the Bingeing and Eating cues scale alone was associated with program attendance, but no subscale was found to predict weight loss. However, the authors indicated that the DRT could be useful in helping patients make more informed decisions about beginning a weight loss program given their current circumstances.[28] Additionally, Carlson et al.[26] examined if the DRT was predictive of characteristics that predispose individuals to weight loss and program completion. In 48 participants (12 men; mean age = 45.3 years) who enrolled in a hospital weight loss program, the emotional eating subscale was found to account for 14% of the variance of program noncompletion and less emotional eating was associated with greater program completion. No relationships were noted with the other DRT subscales. Finally, Teixeira et al.[27] examined the DRT among other psychosocial predictors of success in behavioral weight loss among 112 middle-aged women. They found poor internal reliability ($\alpha = 0.58$) and predictive utility. No studies to our knowledge have been published using the DRT under the updated name of the WLRT-I.

The DRT was updated to the WLRT-II which has 27 items and a total of 6 subscales, 3 the same (Hunger and Eating Cues, Binge Eating and Purging, and Emotional Eating) and 3 different (Motivation, Expectations, and Confidence).[29] Broadly, the items in the motivation and confidence subscales were adapted to be more specific by asking about eating, physical activity, and program attendance and tracking behaviors in separate questions. The new items in the expectations subscale inquire about perceived satisfaction and quality of life if weight loss is achieved. The WLRT-II also includes items that assess confidence to sustain future behavior change, eliciting consideration of readiness for long-term behavior change as well as maintenance of the changed behavior beyond initial weight loss. The WLRT-II is used in clinical contexts including "ShipShape," the Navy's nation-wide weight management program,[30,31] and has been used by England's National Health System.[32]

Two articles to our knowledge have published data from the WLRT-II. One used the Motivation subscale (first 5 items)

as an indicator of motivation to change in a sample of active duty Navy personnel enrolled in ShipShape.[30] Motivation to change was associated with both body mass index (BMI) and receipt of care adherent to clinical practice guidelines for overweight/obesity management (termed "obesity care"). Individuals categorized as obese had higher motivation to change relative to individuals categorized as normal weight, and the correlation between BMI and motivation to change was significant for individuals with obese and normal weight BMI, but not with overweight BMI. There was a small association between higher reported obesity care and higher motivation to change. A second article used the WLRT-II to examine the baseline characteristics, including weight loss readiness, and their associations with body composition in active duty service members enrolled in ShipShape.[31] Individuals with higher BMI and weight reported higher weight loss confidence. Further, weight loss confidence accounted for significant variance in body composition.

### The Present Study

Taken together, despite the use of the WLRT-II in weight loss contexts, particularly in the Navy's nation-wide weight management program, it has not been sufficiently examined in its newest form. Thus, this study examined the factor structure, reliability, and validity of the WLRT-II in a weight loss-seeking sample of active duty military personnel. Given the dearth of psychometric research conducted with the complete WLRT-II, exploratory factor analysis (EFA) was chosen for the current analyses. However, based on the existing literature using the DRT and the theory underlying the development of the measure, we expected stable, theoretically relevant factors to emerge generally in line with the proposed subscales. In addition, we expected the WLRT-II factors to relate to measures of eating pathology and to predict weight change and session attendance.

## METHODS

### Participants and Procedures

Participants ($N = 178$) were adult active duty military personnel (98.3% Navy, 1.7% Marine) who failed or were at risk of failing the Navy's physical fitness assessment and/or whose BMI was classified as overweight/obese (BMI $\geq$25 kg/m$^2$).[2] Data were from baseline questionnaires collected after enrollment but before beginning a randomized controlled trial comparing the Navy's standard weight management program (ShipShape) to a version enhanced with acceptance and commitment therapy, a cognitive-behavioral therapy that promotes acceptance of unpleasant thoughts, emotions, and body sensations in the service of engaging with personal values.[33] All procedures were approved by the respective Institutional Review Boards and research committees. All participants provided informed consent. Detailed information about the trial protocol is available elsewhere.[34]

### Measures

#### Sociodemographics

Participants self-reported demographic characteristics including age, gender, race/ethnicity, paygrade, and marital status. Body mass index was calculated using baseline height and weight. Paygrade was assessed according to rank (i.e., Enlisted, Officer) and corresponding paygrade (e.g., Enlisted 1-9).

#### Weight loss readiness

The WLRT-II was used to assess weight loss readiness.[29] Participants responded to 27 items that make up 6 subscales: Motivation, Expectations, Confidence, Hunger and Eating Cues, Binge Eating and Purging, and Emotional Eating. The binge eating and purging subscale uses branching logic such that participants answer 1 binary yes/no question about the presence of binge episodes and purge episodes and, if affirmative, answer an additional question each about frequency of these episodes over the last year on a 3-point scale. Because the Binge Eating and Purging items are only answered if participants endorse binge episodes, only the 5 other subscales were used in current analyses. Response options for the utilized subscales were on a 5-point scale from "Not at all" to "Extremely" and varied slightly depending on which subscale the item corresponded (e.g., "Not at all motivated," "Not at all confident"). Items were summed to obtain subscale scores with higher scores indicating higher readiness in the respective domain. See Supplemental Material for a copy of the complete WLRT-II.

#### Eating behavior

The Three-Factor Eating Questionnaire-R18 (TFEQ-R18) was used to assess eating behavior.[35] This is a shortened version of the original 51-item questionnaire.[36] Participants responded to 18 items reflecting 3 aspects of eating behavior: cognitive restraint, uncontrolled eating, and emotional eating. This measure has been shown to have good to excellent internal reliability ($\alpha = 0.78$-$0.94$).[35] Response options were on a 4-point scale from "definitely true" to "definitely false." Responses were summed to create subscale scores with higher scores indicating higher problematic eating behavior in the respective domain.

#### Motivation and confidence

Participants responded to single-item indicators of motivation and confidence, answering the following 2 questions on a 0 to 10 scale from "Not at all" to "Extremely": (1) "How motivated are you to participate in a structured weight management/fitness program?" and (2) "How confident are you in your ability to complete a structured weight management/fitness program?." These items were chosen because they were already being utilized in all ShipShape cohorts by the facilitator of the program.

### Weight change

Weight was collected at baseline, post-treatment (8 weeks), 3 months follow-up, and 6 months follow-up by study personnel or self-reported using study provided scales (the latter occurred when the randomized controlled trial shifted to virtual delivery following the onset of the COVID-19 pandemic). Variables reflecting weight change from baseline to each of these other timepoints were created using change scores.

### Attendance

The number of sessions attended over the course of the 8-week intervention were collected.

## *Statistical Analyses*

### Preliminary analyses

Item distributions were evaluated for normality and outliers, and multicollinearity among items and subscales using the variance inflation factor (VIF < |5|).[37] *T*-tests and chi-square tests were used to compare sample means across sociodemographic characteristics.

### Exploratory factor analysis

Exploratory factor analysis (EFA) was conducted using R and the psych package[38] and all other analyses were conducted using IBM SPSS Statistics for Macintosh, version 27. Less than 5% of the data were missing and were determined to be missing at random. Mean replacement was used to account for missing data points on measures without specified missing estimation procedures.

Exploratory factor analysis with a robust maximum likelihood estimator and direct oblimin rotation were used because of the theoretical correlation between factors and to adjust for any non-normality within the variables. The number of factors extracted was guided using parallel analysis[39] and the plausibility of the factor structure was determined by the variance accounted for by the solution, variance accounted for by each individual component, and interpretability of the factors. Items were considered reflective of a given factor if their factor loadings, or the relationship between the factor and the observed variable,[40] exceeded 0.45 on that factor.[41]

### Internal reliability, convergent validity, and predictive validity

Subscales identified by the EFA were used for internal reliability and convergent validity analyses. Cronbach's alpha was used to examine the internal reliability of each subscale. Pearson's correlation coefficients were used to examine convergent validity of these subscales with single-item measures of motivation and confidence and with the subscales of the TFEQ-18: cognitive restraint, uncontrolled eating, and emotional eating. Pearson's correlation coefficients were also used to examine the predictive validity of these subscales with 2 outcome measures, weight change and number of sessions attended.

**TABLE I.** Sample Descriptive Statistics

| Demographic characteristic | Total ($N = 178$) |
|---|---|
| Age, M (SD) | 29.15 (6.93) |
| Female | 61.8% female |
| Paygrade (%) | |
| E1-E4 | 48.3 |
| E5-E9 | 45.0 |
| O1-O6 | 6.7 |
| Ethnicity (%) | |
| White | 59.6 |
| Hispanic | 28.7 |
| Black | 24.7 |
| Asian | 7.3 |
| American Indian | 4.5 |
| Pacific Islander | 2.8 |
| Branch (%) | |
| Navy | 98.3 |
| Marines | 1.7 |
| BMI, M (SD) | 33.13 (3.89) |
| Current MH treatment (%) | |
| Yes | 39.9 |
| No | 60.1 |

Note. M = Mean; E = Enlisted; O = Officer; MH = Mental Health.

## RESULTS

Table I presents sample descriptive statistics. Participants ($N = 178$) were primarily female (61.8%), White (59.6%), and in a significant relationship/partnership (70.8%) and the sample had a mean age of 29.15 years (SD = 6.93). Detailed sample characteristics are described elsewhere.[31]

## *Factor Structure*

EF and parallel analysis of the WLRT-II items indicated a 5-factor solution that explained 52% of the variance, with each factor individually explaining between 6% and 14% of the variance. The factors were labeled based on the content of the items loading onto each factor and overlap with the originally named subscales. Figure 1 shows that overall, factors were correlated ($r$'s = 0.171 to 0.62, $P$'s < .05). The 5 factors were labeled: (1) Motivation (5 items), (2) Exercise-Related Confidence (3 items), (3) Non-Exercise Confidence (6 items), (4) Cues (hunger and emotional eating; 6 items), and (5) Anticipated Satisfaction (3 items). Three items (6, 11, and 19) did not exhibit a strong factor loading (>0.45) on any of the 5 factors and were placed on the most conceptually relevant factor (6 and 11 on Non-Exercise Confidence and 19 on Cues). All other standardized factor loadings were large (Fig. 1): Motivation loadings ranged from 0.71 to 0.86, Exercise-Related Confidence loadings ranged from 0.67 to 0.86, Non-Exercise Confidence loadings ranged from 0.35 to 0.73, Cues loadings ranged from 0.63 to 0.87, and Anticipated Satisfaction loadings ranged from 0.79 to 0.98. Items 10, 12, 13, 14, 16, and 17 displayed secondary loadings between 0.30 and 0.36. See Supplemental Material for a list of the WLRT-II items and corresponding subscale as determined by EFA.

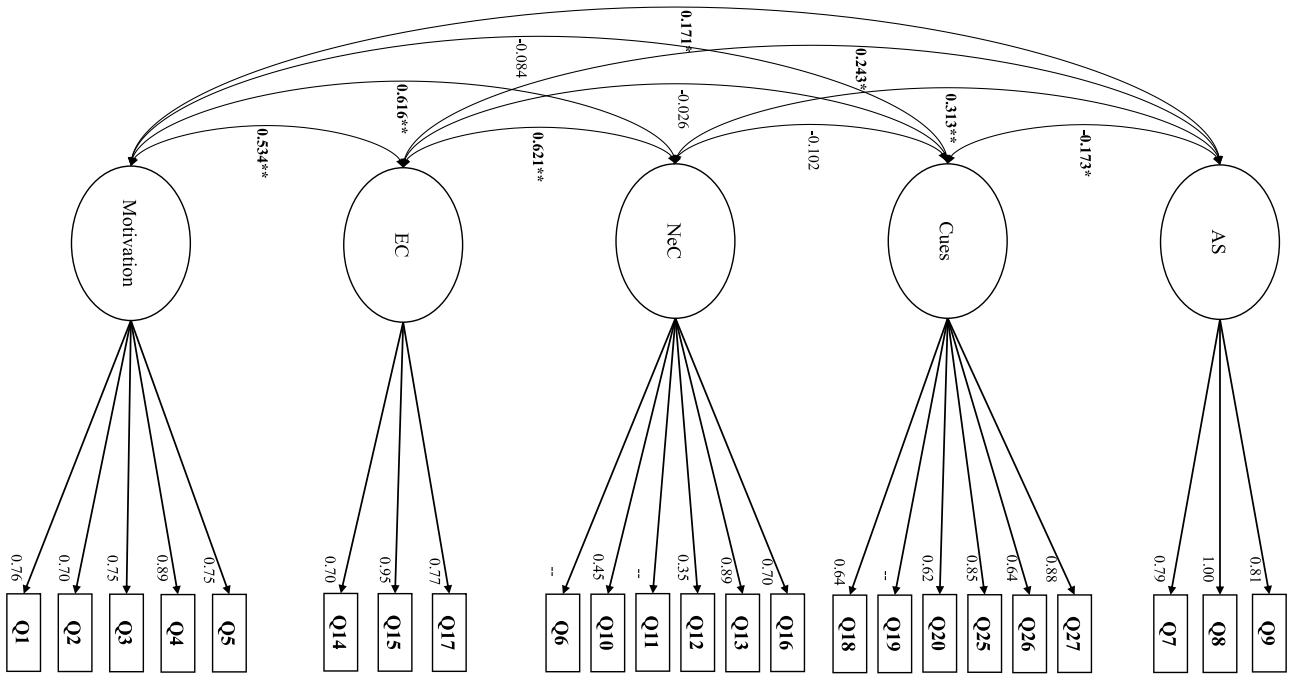


**FIGURE 1.** Factor structure and standardized loadings of the WLRT-II. EC = Exercise-Related Confidence; NeC = Non-Exercise Confidence; AS = Anticipated Satisfaction; **P*'s < .05, ***P*'s < .01.

**TABLE II.** Correlations between EFA-Derived WLRT Subscale Scores and Convergent Validity Measures

| Subscale | $\alpha$ | Motivation (single item) | Confidence (single item) | Uncontrolled Eating (TFEQ) | Cognitive Restraint (TFEQ) | Emotional Eating (TFEQ) |
|---|---|---|---|---|---|---|
| Motivation | 0.903 | 0.576** | 0.525** | −0.058 | 0.225** | −0.133 |
| Exercise-Related Confidence | 0.883 | 0.362** | 0.367** | −0.034 | 0.119 | −0.063 |
| Non-Exercise Confidence | 0.755 | 0.385** | 0.467** | −0.150* | 0.195** | −0.172* |
| Cues | 0.775 | −0.010 | −0.114 | 0.695** | −0.259** | 0.700** |
| Anticipated Satisfaction | 0.901 | 0.030 | 0.085 | −0.122 | −0.005 | −0.219** |

WLRT = Weight Loss Readiness Test; TFEQ = Three Factor Eating Questionnaire.
**p*'s< .05
***p*'s < .01.

### *Internal Reliability, Convergent Validity, and Predictive Validity*

Internal reliability was acceptable to good for each of the subscales (Motivation, $\alpha = 0.903$; Exercise-Related Confidence, $\alpha = 0.883$; Non-Exercise Confidence, $\alpha = 0.755$; Cues, $\alpha = 0.775$; Anticipated Satisfaction, $\alpha = 0.901$). Correlations between the subscale scores and convergent validity measures are presented in Table II. The WLRT-II Motivation subscale exhibited moderate relationships with single-item, face-valid indicators of motivation and confidence ($r = 0.576$ and 0.525, respectively) and a weak relationship with TFEQ cognitive restraint ($r = 0.225$). The WLRT-II Exercise-Related Confidence subscale exhibited moderate relationships with the single-item motivation and confidence indicators ($r = 0.362$ and 0.367, respectively). The WLRT-II Non-Exercise Confidence subscale exhibited moderate relationships with the motivation and confidence indicators ($r = 0.385$ and 0.467, respectively) and a weak relationship with TFEQ cognitive restraint subscale ($r = 0.195$). The Cues subscale exhibited moderate positive relationships with 2 of the 3 TFEQ subscales (uncontrolled eating, $r = 0.695$ and emotional eating, $r = 0.700$), and a weak negative relationship with the TFEQ cognitive restraint subscale ($r = -0.259$). The Anticipated Satisfaction subscale showed 1 weak and negative, but significant relationship with the TFEQ Emotional Eating subscale ($r = -0.219$).

Participants exhibited an average change in weight of −2.29 pounds (SD = 5.79, $n = 138$) at post-treatment, −2.39 (SD = 8.37, $n = 129$) at 3-month follow-up, and −1.08 (SD = 11.39, $n = 116$) at 6-month follow-up. On average, participants attended 6.08 (76%, SD = 1.98) of the 8 sessions. The WLRT-II subscales did not exhibit any significant correlations with the predictive validity outcome measures of weight change and session attendance (Table III).

**TABLE III.** Correlations between EFA-Derived WLRT Subscale Scores and Predictive Validity Measures

| Outcome | Motivation | Exercise-Related Confidence | Non-Exercise Confidence | Cues | Anticipated Satisfaction |
|---|---|---|---|---|---|
| **Weight change** | | | | | |
| Post | 0.063 | 0.083 | −0.019 | −0.035 | 0.023 |
| 3 Month FU | 0.007 | −0.038 | −0.083 | 0.094 | 0.052 |
| 6 Month FU | 0.018 | 0.135 | 0.034 | 0.020 | 0.171 |
| Attendance | 0.109 | 0.092 | −0.027 | 0.058 | 0.050 |

no $p$'s< .05.

## DISCUSSION

The WLRT-II was developed as a clinical tool to encourage greater consideration of factors influencing readiness to engage in weight loss.[10,24] This study sought to examine the factor structure, reliability, and validity of this measure in a sample of weight loss-seeking active duty military personnel. Results generally indicate adequate psychometric properties as evidenced by acceptable internal reliability and convergent validity in expected directions with related measures, but a lack of predictive validity.

This study identified 5 factors in this sample: (1) Motivation, (2) Exercise-Related Confidence, (3) Non-Exercise Confidence, (4) Cues, and (5) Anticipated Satisfaction, which overlap with 4 of the 5 original subscales (i.e., Motivation, Expectations, Confidence, and Hunger, and Eating Cues). Results from this study indicate a distinction between exercise-related and nonexercise-related confidence and generally found hunger and eating cues and emotional eating items to load onto the same factor. Although most of the factor loadings were strong, 5 items did not load well onto any of the factors. These were item 6, "Think honestly about how much weight you hope to lose and how quickly you hope to lose it. Figuring a weight loss of one to two pounds per week, how realistic is your expectation?," item 10, "People who want to achieve long-term weight control need to spend time every day trying to change their eating, exercise, and thinking habits. You probably know the time and commitment necessary for you to be successful. How confident are you that you can devote this amount of effort, both now and over the next few months?," item 11, "How confident are you that you will be able to attend program meetings regularly or (if you're not in a formal program) follow your own program regularly?," item 12, "How confident are you that you will be able to record everything you eat and drink, and your exercise, most days of the week?," and item 19, "How often do you eat because of physical hunger?."

When items do not load well in factor analysis, this indicates that the variable does not strongly influence the factor.[42] Conceptually, item 6 belongs on the Non-Exercise Confidence subscale. This item involves future projection and a somewhat advanced understanding of realistic rates of weight loss. Thus, participants could be misunderstanding this question, interpreting it differently from one another, or how participants answer it may not be related to one's confidence or anticipated satisfaction with their projected weight loss. As a result, future users of this measure could consider discarding this question or could use it clinically as a discussion point to help individuals understand healthy and realistic rates of weight loss and relation to weight loss goals. Items 10, 11, and 12 also conceptually belong on the Non-Exercise Confidence subscale. Many elements may affect one's ability to attend program meetings, commit a specific amount of time and effort, and track their consumption and exercise besides weight loss-related confidence (e.g., work/family commitments). Specific to item 11, participants were expected, but not mandated, to attend all 8 sessions. Therefore, it is possible that one's confidence in their ability to attend program meetings is not strongly related to their confidence in other elements of weight loss-related behavior change. Notably, only 2 items loaded well onto the Non-Exercise Confidence subscale, and these ask about confidence in changing eating habits and maintaining them for at least a year. Therefore, this subscale may better reflect confidence specific to changing eating habits. Item 19 is most conceptually related to the Cues subscale. This item's weak loading could indicate that the degree to which individuals eat in response to physical hunger is not strongly related to other eating cues such as emotional eating cues. In other words, individuals who engage in emotional eating or eat when they are not hungry may or may not also eat in response to physical hunger. Given that people tend to eat in large part in response to external or contextual cues (e.g., time of day, others' eating behavior) despite conflict with physical hunger, and generally are not aware of this tendency,[43,44] participants' misattribution of their eating cues could also contribute to this item's poor factor loading.

As would be expected, motivation and both exercise- and nonexercise-related confidence showed moderate relationships with single-item face valid indicators of motivation and confidence, indicating that WLRT-measured motivation and confidence are related to self-report, but still somewhat distinct. As measured by the WLRT-II, motivation, nonexercise-related confidence, and cues were all weakly related to cognitive restraint, defined as the conscious restriction of food intake to control body weight or to promote weight loss.[45] Prior research has found that higher initial BMI is associated with and precedes increased cognitive restraint, indicating that cognitive restraint may arise as a weight control response.[45,46] Therefore, given the current weight

loss-seeking sample, it makes sense that cognitive restraint would be related to motivation and eating-related constructs, but not exercise-related constructs or anticipated satisfaction. Additionally, Cues exhibited moderate positive relationships with uncontrolled and emotional eating, indicating that this subscale taps into various facets of eating behavior; given these correlations' magnitude, this also indicates that the Cues subscale may primarily be measuring uncontrolled and emotional eating more than eating cues more broadly. Anticipated satisfaction was weakly and inversely related to emotional eating, perhaps indicating that individuals who engage in emotional eating do not anticipate being as satisfied with weight loss. Exercise-related confidence exhibited no significant relationships with the eating-related variables, indicating that exercise-related and non-exercise-related confidences are distinct aspects of weight loss readiness. Of note, the current sample consisted of active duty military personnel with overweight/obese BMI, which differs from the civilian population in several ways, including the expectation for active duty military personnel to meet mandatory physical readiness requirements and to participate in structured physical training. Thus, these relationships could differ in a civilian sample that is not mandated to engage in regimented physical activity.

These results may indicate that weight loss readiness, as measured by the WLRT-II, does not provide predictive validity regarding weight loss or attendance outcomes. This is in line with inconclusive support identified for the TTM in weight loss contexts[18] and with prior research on the DRT that found a lack of predictive validity of this construct regarding weight loss[25,27] and program completion,[25,26] further calling into question the utility of readiness in predicting weight management program outcomes. However, it should be considered that weight loss achieved during this intervention was modest and results could differ in a sample that exhibited greater weight change or in a civilian sample.

Despite this, the WLRT was developed as clinical tool to foster deeper patient-clinician discussion about weight loss behavior change. The WLRT-II, especially with the identified factor structure, is unique in its focus on long-term confidence in behavior change maintenance, asking individuals to project a year or more into the future, and in its differentiation between exercise- and nonexercise-related confidence. Individuals' confidence in their ability to change and maintain exercise-related behaviors versus behaviors related to eating, attendance, tracking, and effort may vary for various reasons. For example, some may have a greater proclivity for physical activity, already regularly exercise, or have previously engaged in athletics while others may find exercise daunting. Also, the WLRT-II specifically assesses confidence in ability to exercise at least 5 days per week, most weeks. This prescription may present a markedly steep increase in exercise and may seem more or less achievable than changing eating habits or tracking. Such specificity and distinction regarding the different required behavior changes could spur deeper reflection within the individual at this pre-intervention stage, helping to address unforeseen barriers to weight loss-related behavior change. Therefore, the WLRT-II can be an important clinical tool to instigate fruitful discussion between patients and clinicians in a variety of weight loss contexts including behavioral interventions, physical activity programs, bariatric surgery, and even pharmacological interventions, such as the use of Glucago-like peptide-1 agonists, which have the best health outcomes when coupled with appropriate behavior change.[47–49]

### *Strengths and Limitations*

The current study is the first to examine the psychometric properties of the WLRT-II, a measure already being used in weight loss contexts. It is strengthened using EFA and inclusion of convergent and predictive validity, making it a thorough psychometric examination. This study is strengthened by the active duty sample participating in ShipShape given the Navy's use of the WRLT-II in this program. The current study also has limitations. The sample size was relatively modest ($N = 178$), which may produce less reliable correlation coefficients. However, for solutions with higher loading variables (>0.60-0.80) smaller sample sizes are sufficient[42,50] and previous studies have conducted EFA with similar sample sizes and variable saturation.[51,52] Since the WLRT-II was only administered at baseline, test-retest validity could not be examined. Overall, the amount of weight change was minimal and a greater magnitude of weight change, and more variability in weight change could have increased the likelihood of observing predictive validity of the WLRT-II with weight loss. The data were from a pragmatic clinical trial and participants were not formally recruited, which may impact motivation to participate and complete all study measures. Finally, the active duty sample is also a limitation as the results may not generalize to civilian populations. Future studies should further probe the WLRT-II's utility in other populations and the contexts in which it is used.

## CONCLUSIONS

The WLRT-II is a clinically focused measure of weight loss readiness. The current study examined the factor structure, internal reliability, and convergent and predictive validity of the WLRT-II in a sample of active duty military personnel enrolled in a weight management program. Results indicate a 5-factor structure that diverged from the originally designated subscales and appropriate internal consistency and convergent validity, but that the WLRT-II lacked predictive validity regarding weight change and program attendance. Nonetheless, the WLRT-II is unique in its emphasis on long-term confidence in behavior change maintenance and in its differentiation between exercise- and nonexercise-related confidence, making it a tool that clinicians can use with patients to have deeper conversations about weight loss and behavior change readiness.

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## CLINICAL TRIAL REGISTRATION

Not applicable.

## INSTITUTIONAL REVIEW BOARD (HUMAN SUBJECTS)

All procedures were approved by the respective Institutional Review Boards and research committees. Informed consent was obtained from all individual participants included in the study.

## INSTITUTIONAL ANIMAL CARE AND USE COMMITTEE (IACUC)

Not applicable.

## INDIVIDUAL AUTHOR CONTRIBUTION STATEMENT

All authors contributed to the study conception and design. Material preparation and data collection were performed by M.H., N.A., and M.T. Data analyses were performed by M.T. and S.R. The first draft of the manuscript was written by M.T. and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

## INSTITUTIONAL CLEARANCE

Not applicable.

## SUPPLEMENTARY MATERIAL

Supplementary material is available at *Military Medicine* online.

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## CONFLICT OF INTEREST STATEMENT

The authors declare that they have no competing interests.

## DATA AVAILABILITY

The data underlying this article will be shared on reasonable request to the corresponding author.

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