



Development and validation of the intuitive exercise scale



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ABSTRACT

Up to 80% of individuals with eating disorders engage in dysfunctional exercise, which is characterized by exercising in excessive quantities often past the point of pain as well as compulsive feelings and negative affect when exercise is disrupted (Cook, Hausenblas, Crosby, Cao, & Wonderlich, 2015). Intuitive exercise involves an awareness of the senses while moving and attending to one's bodily cues for when to start and stop exercise, rather than feeling compelled to adhere to a rigid program (Reel, 2015). The purpose of this study was to design a measurement tool to evaluate the construct of intuitive exercise in research, treatment, and prevention settings. The 14-item Intuitive Exercise Scale (IEXS) was developed and validated in the current study with completed surveys from 518 female and male adult participants. Exploratory factor analysis was used to identify four latent constructs, including emotional exercise, exercise rigidity, body trust, and mindful exercise, which were supported via confirmatory factor analysis (CFI = 0.96; SRMR = 0.06). The IEXS demonstrated configural, metric, and scalar invariance across women and men. Correlations with measures of intuitive eating, exercise dependence, and exercise motivation supported convergent and discriminant validity.

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1. Introduction

Dysfunctional exercise, which is defined as excessive and compulsive patterns of physical activity (Cook et al., 2015), can increase risk for injury, fatigue, and depression (Hill, Robson, & Stamp, 2015). Thirty-three to 80% of people with eating disorders exhibit dysfunctional exercise patterns that are considered pathological (Costa, Hausenblas, Olivia, Cuzzocrea, & Larcán, 2013). One step to address this dysfunctional form of exercise is to promote a positive approach to exercise behaviors (i.e., intuitive exercise; Reel, 2015). *Intuitive exercise* involves making decisions based on physical cues versus feeling obligated to engage in rigid routines (Reel & Miyairi, 2012) and represents an integral part of eating disorder treatment and recovery (Reel, Lee, & Bellows, 2016). The extant literature has emphasized the negative aspects of exercise (e.g., not exercising enough or too much) and has been devoid of validated measures that focus on adaptive exercise patterns. Therefore, the purpose of this study was to develop and validate the Intuitive Exercise Scale (IEXS) to measure individuals' positive relationship with

exercise, including the ability to attend to bodily cues, be mindful during movement, and use diverse movement patterns.

2. Methods

2.1. Participants

Recruitment yielded 706 participants; 514 participants (336 women, 178 men, $M_{age} = 25.17$ years, $SD = 8.36$) provided complete data. The sample was randomly divided into two equal parts for split-half analysis. Sample 1 included 248 participants (166 women, 82 men, $M_{age} = 25.18$ years, $SD = 8.25$). The majority identified as White/Non-Hispanic (71%; $n = 176$), followed by Hispanic (7.7%; $n = 19$), Asian American/Polynesian (6.9%; $n = 17$), mixed race (5.6%; $n = 14$), American Indian (1.2%; $n = 3$), and Black/Non-Hispanic (0.4%; $n = 1$). The remainder did not report their race (5.6%; $n = 14$) or selected "other" (1.6%; $n = 4$).

Sample 2 included 266 participants (170 women, 95 men, $M_{age} = 25.16$ years, $SD = 8.47$). The majority identified as White/Non-Hispanic (74.1%; $n = 197$), followed by Hispanic (9%; $n = 24$), Asian American/Polynesian (7.1%; $n = 19$), mixed race (4.9%; $n = 13$), American Indian (1.1%; $n = 3$), and Black/Non-Hispanic (0.8%; $n = 2$). The remainder did not report their race (2.3%; $n = 6$) or selected "other" (0.8%; $n = 2$).

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2.2. Measures

We developed the intuitive exercise scale (IEXS) for the purpose of this study. Existing intuitive eating scales (Hawks, Merrill, & Madanat, 2004; Tylka, 2006) and exercise constructs (e.g., exercise dependency, obligatory exercise, and exercise motives) informed the development of themes (i.e., unconditional permission to regulate exercising, exercising for health or other positive reasons, reliance on internal body cues, and mindful exercising), and 32 initial items measured on a 5-point scale (i.e., *Strongly Disagree* to *Strongly Agree*). An interdisciplinary expert panel reviewed and recommended modifying 16, dropping three, and adding 21 items. These 50 items were piloted prior to conducting a national validation study using demographic questions (e.g., age, sex, weight, height, race/ethnicity, college student status, eating disorder treatment status) and the following measures.

The 13-item Body Appreciation Scale (BAS), which has strong psychometric properties, examined body acceptance using a 5-point Likert scale (*never to always*) to calculate a total score by averaging the scores across items (Avalos, Tylka, & Wood-Barcalow, 2005). This sample's alpha coefficient was 0.94.

The 21-item Exercise Dependence Scale-Revised (EDS-R) examined exercise dependence using a 6-point Likert scale (*never to always*). Subscales include withdrawal, continuance, tolerance, lack of control, reduction in other, time, and intention effects. The EDS-R has demonstrated strong reliability and validity (Cook et al., 2015). Alpha coefficients ranged from 0.77 (reduction in other activities) to 0.94 (intention) for this study.

The 51-item Exercise Motivation Inventory-2 (EMI-2) investigated 14 exercise motives on a 6-point Likert scale (*not at all true for me to very true for me*): stress management, revitalization, enjoyment, challenge, social recognition, affiliation, competition, health pressures, ill-health avoidance, positive health, weight management, appearance, strength and endurance, and nimbleness. The EMI-2 has demonstrated internal consistency (Markland & Ingledew, 1997). This sample's alpha coefficients ranged from 0.58 (health pressures) to 0.94 (competition).

The 21-item Intuitive Eating Scale (IES) assessed three components of intuitive eating: unconditional permission to eat, eating for physical rather than emotional reasons, and reliance on internal hunger and satiety cues using a 5-point Likert scale (*strongly disagree to strongly agree*; Tylka, 2006). The IES demonstrates strong psychometric properties, and this sample's alpha coefficient was 0.72. Subscale alpha coefficients ranged from 0.74 (eating for physical versus emotional reasons) to 0.77 (unconditional permission to eat).

The Godin Leisure-Time Exercise Questionnaire (GLTEQ) assessed level of physical activity in two sections: (a) individuals' leisure time

exercise including the frequency of mild, moderate, and strenuous exercise at 15 min or more per session over a typical week; and (b) frequency of physical activity engagement that increases heart beats rapidly. The GLTEQ has demonstrated test-retest reliability scores for different levels of physical activity over a 2-week recall ranging from light ($r = 0.48$) to strenuous ($r = 0.94$; Godin & Shephard, 1985).

The 11-item Social Desirability Scale measured discriminant validity. This sample's alpha coefficient ($\alpha = 0.65$) was consistent with previously reported estimates (Crowne & Marlowe, 1960).

2.3. Procedures

Adults were recruited for voluntary participation using flyers, university classes, and social media. Most surveys were completed electronically; however, 40 participants opted to use the paper format.

2.4. Data analysis

The dataset was randomly split into approximately equal halves for exploratory factor analysis (EFA) and subsequent confirmatory factor analysis (CFA) to examine resultant factor structure using AMOS version 20 (Arbuckle, 2011; Jöreskog, 1993). To assess reliability we computed Raykov's (1998) composite reliability (CR) for each latent factor.

3. Results

3.1. Sample 1 – exploratory factor analysis

For sample 1 data, the EFA was conducted with all 50 items, and upon inspection, the single item with the poorest loading pattern was removed until 14 items, each with strong loadings on only one of the four factors, remained. Principal axis factor analysis supported four factors explaining 70.45% of the variance (see Table 1).

The first factor, *emotional exercise* (5 items; "I find myself exercising when I am lonely, even when I do not feel like exercising;" $CR = 0.86$), measures the use of exercise to manage unpleasant emotions. The second factor, *body trust* (3 items; "I trust my body to tell me how much exercise to do;" $CR = 0.82$), assesses the reliance on internal bodily cues to guide exercise type, frequency, and intensity. The third factor, *exercise rigidity* (3 items; "I enjoy different types of physical activities when I exercise;" $CR = 0.88$), measures exercise variety. The fourth factor, *mindful exercise* (3 items; "I stop exercising when I feel pain;" $CR = 0.74$), measures awareness of physiological cues to discontinue a bout of exercise. Factor intercorrelations ranged from 0.02 to -0.26 .

Table 1
EFA (Sample 1; $N = 248$) and CFA (Sample 2; $N = 266$) factor loadings for four-factor solution.

Item	Description	1	2	3	4	CFA
1	I find myself exercising when I'm feeling negative emotions (for example, anxious, depressed, or sad) even when I don't feel like exercising.	0.80	−0.09	−0.04	0.12	(0.77)
2	I find myself exercising when I am lonely, even when I do not feel like exercising.	0.62	0.14	0.05	−0.14	(0.70)
3	I use exercise to help soothe my negative emotions.	0.70	0.01	−0.14	0.05	(0.74)
4	I find myself exercising when I'm stressed out, even when I've already exercised.	0.62	0.04	0.05	−0.14	(0.78)
5	I use exercise to distract myself from or avoid negative emotions.	0.77	−0.07	0.03	−0.02	(0.72)
6	I trust my body to tell me when to exercise.	−0.04	0.84	−0.03	0.01	(0.79)
7	I trust my body to tell me what type of exercise to do.	−0.03	0.91	0.01	−0.08	(0.82)
8	I trust my body to tell me how much exercise to do.	0.12	0.55	−0.05	0.26	(0.70)
9	I incorporate a variety of physical activities into my exercise plan.	−0.11	0.14	−0.76	−0.08	(0.78)
10	I enjoy different types of physical activities when I exercise.	0.11	−0.02	−0.74	0.04	(0.92)
11	I engage in a variety of different types of exercise.	0.02	−0.08	−0.92	−0.01	(0.80)
12	I stop exercising when I feel pain.	−0.05	0.02	0.06	0.58	(0.56)
13	I stop exercising when I am fatigued.	0.02	−0.03	−0.04	0.81	(0.72)
14	When my body feels tired, I stop exercising.	−0.04	0.08	0.04	0.81	(0.81)
	Eigenvalues	3.68	2.92	1.78	1.49	
	% of variance	26.27	20.86	12.69	10.63	

Note: Factor 1 – emotional exercise; Factor 2 – body trust; Factor 3 – exercise rigidity; Factor 4 – mindful exercise. Boldfaced loadings represent significant loadings on that factor. CFA factor loadings were on the same factors as established in the EFA.

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