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Development of the Negative Attentional Bias during Exercise Measure and the Rumination and Escape Thoughts Measure

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DEVELOPMENT OF THE NEGATIVE ATTENTIONAL BIAS DURING EXERCISE MEASURE AND THE RUMINATION AND ESCAPE THOUGHTS MEASURE

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DEVELOPMENT OF THE NEGATIVE ATTENTIONAL BIAS DURING EXERCISE MEASURE AND THE RUMINATION AND ESCAPE THOUGHTS MEASURE

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DEVELOPMENT OF THE NEGATIVE ATTENTIONAL BIAS DURING EXERCISE MEASURE AND THE RUMINATON AND ESCAPE THOUGHTS MEASURE

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Directed by: Dr. Steven Wininger, Dr. Anthony Paquin, and Dr. Aaron Wichman

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The primary purpose of this study was to develop a measure to assess negative attentional bias toward changes in bodily sensations during exercise and to examine the reliability and validity of that measure. A secondary purpose was to develop a measure to assess tendencies toward rumination about the changes in bodily sensations and tendencies to have escape thoughts with regard to the exercise bout. While global measures of anxiety, rumination, and escape thoughts already exist, the advantage of these newly developed measures is that they are context specific to exercise. Participants in this study consisted of 329 undergraduate students. The mean age for the participants was 19.94. Participants were given, via an online survey, two newly created measures as well as established measures of neuroticism, pessimism, trait anxiety, and current exercise habits. The two newly created measures yielded reliable scores via examination of internal consistency. The results also demonstrated that the newly created context specific measures correlated significantly with global measures of neuroticism, pessimism, and trait anxiety; evidence for convergent validity. Last, the new measures correlated more strongly with current exercise habits than the global measures; evidence for convergent-divergent validity.

Making aerobic exercise a regular part of a daily routine has been shown to have many positive effects on psychological and physiological health (Kilpatrick, Herbert, & Bartholomew, 2005). Positive physiological effects include lowering one's risk of becoming diabetic, having a stroke, and developing heart disease, hypertension, and certain cancers (Miller, Ogletree, & Welshimer, 2002). Positive psychological effects include lower stress levels and depression, higher self-esteem, improved overall well-being, and increased feelings of self-control (Pavone, Burnett, LaPerriere, & Perna, 1998). In addition, exercise raises cognitive function immediately following the exercise session (Ellemberg & St-Louis-Deschênes, 2010; Pesce, Crova, Cereatti, Casella, & Bellucci, 2009).

Despite the plethora of positive benefits accrued from regular participation in exercise, research shows that adherence to exercise programs is quite low (Morey et al., 2003). Morey et al. (2003) stated that one reason people give for not adhering to an exercise program is pain. Anshel & Seipel (2009) identified several additional reasons why adherence to exercise programs is low, including the exerciser's fear of injury, self-consciousness about one's appearance while exercising at a public facility, exercise activity that is overly exerting, not achieving fitness goals quickly, and lacking in ability, time, or social support.

While engaging in aerobic exercise, it is common for the exerciser to feel a variety of bodily sensations related to cardiovascular, respiratory, and muscular activity. Cardiovascular sensations relate to increased heart rate. Respiratory sensations consist of an increased breathing rate, burning sensations in the lungs, and difficulty breathing. Muscle sensations include pain, fatigue, and cramps (Tenenbaum et al., 1999).

A negative interpretation of these common bodily sensations can cause anxiety and a subsequent fear of engaging in aerobic exercise (Aikens, Zvolensky, & Eifert, 2001; Mancuso et al., 2006). Aikens et al. (2001) found that individuals who fear cardiac-related pain have a more acute awareness of changes in bodily sensations during activities such as aerobic exercise. For example, individuals who suffer from asthma tend to reduce, or even avoid, engaging in sports or physical exercise due to a fear of triggering an asthma attack (Mancuso et al., 2006). Furthermore, it has also been found that individuals who have a fear of injuring, or reinjuring themselves will either reduce the intensity or avoid exercise altogether (Ekkekakis & Lind, 2006; Elfving, Anderson, Grooten, 2007; Houben, Leeuw, Vlaeyen, Goubert, & Picavet, 2005).

In sum, excessive focus on negative aspects of exercise, such as pain, discomfort, or injury, can deter individuals from engaging in exercise and/or make their exercise experiences extremely unpleasant. The goal of this study, therefore, is to create a measure to assess the levels of negative attentional bias during exercise.

Review of the literature

There are several theoretical models and constructs that relate to how some individuals feel about exercise and how they interpret past experiences with exercise, as well as how they interpret feelings and bodily sensations while exercising. Two models that are particularly relevant for this paper are the Parallel Processing Model (Leventhal & Everhart, 1979) and the Cognitive-Motivational-Relational Model (Hammermeister & Burton, 2004). These models are of particular importance because they serve as a basis for understanding how individuals filter and cope with various stimuli. The theoretical

constructs relevant for the development of this measure include anxiety, rumination, and escape thoughts. These models and constructs are explained in the following paragraphs.

Parallel Processing Model

Leventhal and Everhart (1979) developed the parallel processing model (PPM) to help explain pain perception. This theoretical framework is used to illustrate how a painful event is interpreted. According to the framework, the painful event is initially processed preconsciously. From there, the painful event is consciously perceived. They also stated that there is a separation between perception and focal awareness. Perception refers to all stimuli to which one is aware and can process, whereas focal awareness refers to the stimuli to which one actually attends. Individuals use filters by which information about the painful event is brought from perception to focal awareness. If an individual has had a past painful experience with exercise then he or she may interpret bodily sensations through a negative filter or schema (Leventhal & Everhart, 1979). Because of these schemas or negative filters, it could be difficult for some individuals to move past a previous injury. These individuals could end up developing anxiety about the changes in their bodily sensations and have a difficult time focusing on anything else, which could ultimately lead to avoidance (Crombez, Vlaeyen, Heuts, & Lysens, 1999).

Cognitive-Motivational-Relational Model

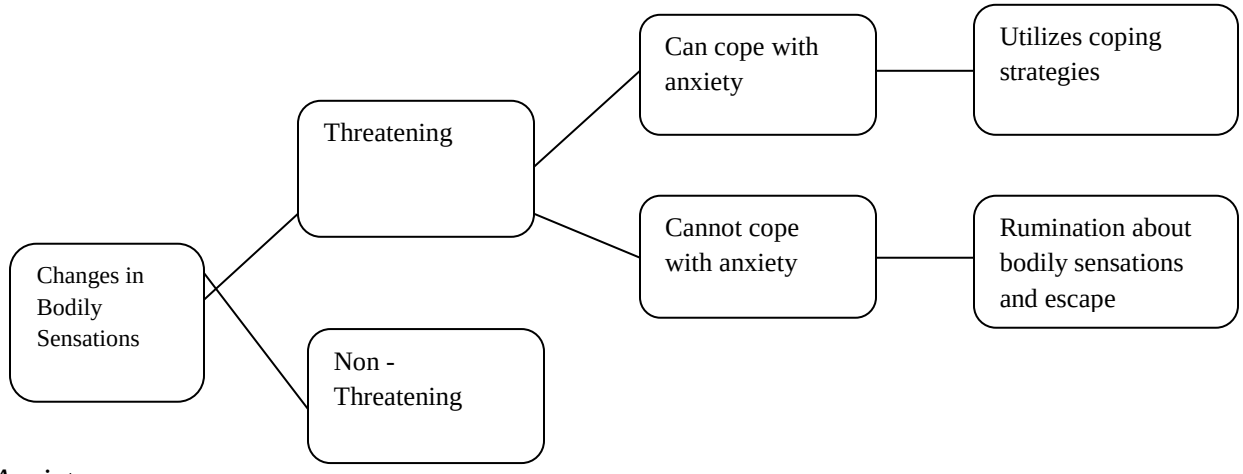
Lazarus' cognitive-motivational-relational model (Hammermeister & Burton, 2004) demonstrates how individuals appraise and cope with stress. This model includes three principle components: primary appraisal, secondary appraisal, and coping resources. Primary appraisal is concerned with an individual's ability to appraise the likely outcome of a situation, be it positive, challenging, threatening, or harmful.

Secondary appraisal is concerned with what the individual is capable of doing in response to the potential outcome of the situation. For example, the individual assesses whether or not he or she is capable of coping with the situation. This is then followed by coping. Coping occurs when individuals are able to assess the situation and utilize strategies to manage distress. They do this by utilizing strategies that either reduce or eliminate the cause of the distress, or they utilize strategies that manage emotional arousal and distress if they cannot remove the source of the distress. Being able to exercise control over the threatening or stressful stimuli is very much a part of all three components (Hammermeister & Burton, 2004). During exercise, individuals who have coping skills are able to appraise what they are feeling and engage in strategies to deal with it (Hammermeister & Burton, 2004). Thus, it is possible that individuals, who are focusing on the normal bodily sensations that occur during exercise and are interpreting them negatively, are getting stuck in the primary appraisal phase and lack the ability to develop coping strategies to deal with what they are feeling.

Concepts from the two models explained above, as they relate to exercise, have led to the creation of a theoretical model, shown as Figure 1. As individuals begin an exercise session, they will experience changes in their bodily sensations. Individuals will interpret the changes with a positive, a neutral, or a negative bias, and they will interpret the changes as threatening or non-threatening. If they interpret the changes as threatening then they will either be capable of coping or incapable of coping with the threatening stimuli. If they are capable of coping, they will do so by engaging in a set of coping strategies. If they are not capable of coping, they will engage in rumination about the

anxiety that they are feeling, and will engage in thoughts of escaping the exercise session. The constructs of anxiety, rumination, and escape thoughts are defined below.

Figure 1. A Theoretical Model of the Constructs Assessed by the NABEM and RUMESC



Anxiety

Anxiety is best considered in two forms, trait and state. Kohn, Kantor, DeCicco, and Beck (2008) defined trait anxiety as "an acquired disposition to perceive a wide range of situations as threatening and to respond to them anxiously" (p. 499). In contrast, they defined state anxiety as "an acute anxious reaction that combines subjective apprehension and arousal of the autonomic nervous system" (p. 499). Anxious individuals tend to focus on threatening stimuli whereas non-anxious individuals do not (Puliafico & Kendall, 2006). During an exercise session, individuals may experience state anxiety regarding the bodily sensations that they feel from exerting themselves, however, most individuals will likely engage in a coping strategy to deal with what they are feeling. In contrast, a person high in trait anxiety could likely perceive the physical sensations as threatening, and fail to engage in coping strategies. This could cause them to ruminate about the physical sensations and engage instead in escape thoughts.

Rumination

Rumination is "a sense that one's feelings are confusing, a sense of being compelled or driven to focus on feelings, an inclination to focus repetitively on the causes and consequences of one's distress, and a perceived inability to repair moods" (McFarland, Buehler, von Rüti, Nguyen, & Alvaro, 2007, p. 729). According to Watkins (2008), the tendency to ruminate about a negative experience can hinder an individual's recovery from the negative experience.

As they relate to exercise, the issues of anxiety and rumination can hinder individuals from maintaining participation in exercise programs. This could occur because as they begin to notice the common bodily sensations, and perceive them negatively, they may become anxious and ruminate, and continuously attend to the bodily sensations and the negative emotions that accompany them.

Escape Thoughts

Some individuals, when presented with threatening stimuli, develop anxiety and try to avoid the threatening stimuli, or have thoughts of escape (Hatzigeorgiadis & Biddle, 2000; Leikas, Lindeman, Roininen, & Lähteenmäki, 2009). Similarly, Edwards, Burt, and Lipp (2010) stated that individuals who succumb to anxiety focus on threatening cues, and that this focus happens automatically and often without the individual's awareness. Consequently, these individuals also tend to engage in selective avoidance of stimuli that they find threatening (Edwards et al., 2010). In accordance with Lazarus' cognitive-motivational-relational model during an exercise session, individuals who attend to their bodily sensations in a negative manner could be developing anxiety about the changes in their bodily sensations and focusing on how much they want to quit

exercising, or wishing that the exercise session was over. In turn, they may end their exercise session earlier and be less likely to re-engage in exercise. Individuals who attend to the changes in their bodily sensations in a positive, neutral, or negative manner, but do not develop anxiety about the changes, will likely be able to cope and continue the exercise.

Pessimism and Neuroticism

Each individual varies with regards to the two personality constructs labeled as pessimistic or neurotic. Costa and McCrae (1992) define neuroticism as "a general tendency to experience negative affects", and they state that individuals higher in neuroticism are "prone to have irrational ideas, be less able to control their impulses, and to cope more poorly than others with stress" (p. 14). Del Valle and Mateos (2008) define pessimists as individuals who "generally expect a negative outcome" (p. 1600). Both pessimism and neuroticism promote self-consciousness, and lead individuals to be highly anxious and lack a sense of control over their lives (del Valle & Mateos, 2008; Tong, 2010). Because individuals who are highly pessimistic and/or neurotic may lack a sense of control, they may struggle with developing coping strategies, and they may be likely to continuously attend to the bodily sensations that they experience during an exercise session, worry and ruminate about them, and perceive them anxiously. This, again, relates to Lazarus' cognitive-motivational-relational model (Hammermeister & Burton, 2004) in that individuals' ability to cope is related to their own assessment of their ability to cope.

Stages of Change

A potential moderator variable for this study would be Stages of Change. Stages of Change (i.e., Transtheoretical Model; Prochaska & DiClemente, 1983) refers to one's readiness for sustained participation in a given behavior and is a function of current engagement in that behavior. It takes into account an individual's current exercise status and the individual's intentions for future behavior which is a logical construct to examine in relation to future time perspective. The Stages of Change model is often used to explain the exercise behavior change process with regard to the acquisition and maintenance of exercise behavior. Individuals are classified as being in one of five stages. Persons in the precontemplation stage do not exercise and are not thinking about starting an exercise program in the foreseeable future (in the next six months). Those in the contemplation stage do not currently exercise, but are thinking about starting an exercise program in near future (in the next six months). Persons in the preparation stage plan on exercising and already exercise some, but not regularly. Individuals in the action stage have started to exercise regularly (three exercise sessions per week for at least 30 min per session), but have been doing so for less than 6 months. Those who have been exercising regularly for 6 months or more are classified as being in the maintenance stage. The model is cyclical as opposed to linear; persons can regress back to a previous stage at anytime.

Importance of Study

In summary, the literature demonstrates that individuals may interpret and handle somatic sensations differently due to characteristics such as trait anxiety, neuroticism, and pessimism. The literature also demonstrates that individuals who manifest higher

levels of these traits are more likely to engage in thought processes such as rumination and task avoidance. Higher levels of anxiety about somatic sensation associated with exercise and subsequent maladaptive thought processes could result in lower levels of participation in regular physical activity.

It would be helpful for persons working in the field of health promotion and rehabilitation to be able to identify individuals with a high level of negative attentional bias during exercise so that they could teach them to cope with their negative attentional biases and subsequent anxiety. Consequently, the main purpose of the present study is to develop a measure of negative attentional bias within the context of exercise. An additional benefit of such a measure is the possibility of explaining the ambiguity of results concerning exercise and affect and exercise and cognition. Results regarding the positive effects of exercise on cognition and affect are mixed. Exercise typically has a positive effect on affect, but in some cases there is either no improvement or a worsening of affect after exercise (Yeung, 1996). The results regarding exercise and cognition also show no specific pattern. In some cases cognition is improved, whereas in other cases there is either no improvement or a decrease in cognition (Tomporowski, 2003). It is possible that the lack of, or the negative effects that exercise has on cognition could be attributed to depleted cognitive resources. This depletion would be due to the constant negative attention and wishing the exercise session was over. This same focus could be what is causing the lack of or negative effects on affect. Development of the Negative Attentional Bias during Exercise Measure (NABEM) and the Rumination and Escape Thoughts Measure (RUMESC) will allow researchers to examine negative attention bias as a potential moderator variable.

Hypotheses

H1: Development of the NABEM will yield a 1 factor model.

Factor 1: Negative focus on bodily sensations

H2: The NABEM will demonstrate construct validity via positive correlations with neuroticism, pessimism, and trait anxiety.

H3: Scores on the NABEM will be lower for individuals who are in higher Stages of Change and scores on the NABEM will be higher for individuals who are in lower Stages of Change.

H4: The NABEM, being context specific, will have a higher correlation with Stages of Change than global measures for neuroticism, pessimism, and trait anxiety.

H5: Development of the RUMESC will yield a 2 factor model.

Factor 1: Rumination about bodily sensations

Factor 2: Escape thoughts

H6: The RUMESC will demonstrate construct validity via positive correlations with neuroticism, pessimism, and trait anxiety.

H7: Scores on the RUMESC will be lower for individuals who are in higher Stages of Change and scores on the RUMESC will be higher for individuals who are in lower Stages of Change.

H8: The RUMESC, being context specific, will have a higher correlation with Stages of Change than global measures for neuroticism, pessimism, and trait anxiety.

Method

Participants

Participants in this study consisted of 329 undergraduate students. Participants were recruited through an online study board. Participants either received extra credit or course research credit for completing the survey. There were 90 male participants and 238 female participants. One participant failed to indicate his or her gender. Several participants failed to indicate their ages, but the mean age for those who did indicate it was 19.94 with a standard deviation of 3.67. The Stages of Change (SOC) measure was given to determine the exercise habits of the participants. Five individuals were in the pre-contemplation stage, 51 individuals were in the contemplation stage, 169 individuals were in the preparation stage, 58 individuals were in the action stage, and 46 individuals were in the maintenance stage.

Materials

The Stages of Change (SOC; Marcus, Selby, Niarua, & Rossi, 1992) measure contains five statements; participants indicate the one that best describes them. Stages of Change refer to the individual's level of readiness for participation in an exercise regimen based on their current exercise behavior and intentions to exercise. The five stages are pre-contemplation (I do not currently exercise and do not intend to start exercising in the next six months), contemplation (I do not currently exercise, but I am thinking about starting to exercise in the next six months), preparation (I do currently exercise some, but not regularly where regularly means exercising three or more times per week for at least 30 minutes per session), action (I do currently exercise regularly), and maintenance (I have been exercising regularly for the last six months or longer. Test-retest reliability for

the measure has been found to be .78. (Marcus et al., 1992) Concurrent validity has been demonstrated via differences among the stages for scores on the Seven Day Activity Recall

The neuroticism subscale of the Eysenck Personality Questionnaire Revised Abbreviated version (EPQR-A; Francis, Brown, & Philipchalk, 1992) consists of 6 items that measure neuroticism. Individuals answer each item either yes or no. The EPQR-A has alpha coefficients between .70 and .77 for neuroticism and has demonstrated good concurrent validity with the EPQ-Revised (r = .92 - .94; Francis et al., 1992).

The Life Orientation Test Revised (LOT-R; Scheier, Carver, & Bridges, 1994) is a ten item test that measures optimism; four of the ten items are fillers and are not scored. Individuals rate each item using a Likert-type scale from zero to four where a rating of 0 means *strongly disagree*, a rating of 1 means *disagree*, a rating of 2 means *neutral*, a rating of 3 means *agree*, and a rating of 4 means *strongly agree*. Scores for this measure range from zero to twenty-four; higher scores are associated with higher levels of optimism. The LOT-R has good internal consistency (α = .78; Scheier et al., 1994) and is considered a content-valid test that correlates strongly with the original version of the LOT, r = .95 (Scheier et al., 1994). The LOT-R also has convergent validity with the self-mastery scale, r = .51 for men and r = .46 for women. There is a positive correlation between LOT-R and the Rosenberg's self-esteem scales, r = .50 for men and r = .54 for women (Lyrakos, Damigos, Mavreas, Georgia, & Dimoliatis, 2010; Scheier et al., 1994).

The trait anxiety subscale from the State-Trait Anxiety Inventory (STAI; Spielberger, 1979) was used to measure trait anxiety. The trait anxiety subscale consists of 20 items. The items are rated on a scale of 1-4 where a rating of 1 means *not at all*, a

rating of 2 means *somewhat*, a rating of 3 means *moderately so*, and a rating of 4 means *very much so.* The trait anxiety has a high test-retest reliability ranging from .73 to .86 for college students. The trait anxiety subscale of the STAI has high internal consistency; the coefficient alpha for the trait anxiety scale averages .90. The trait anxiety subscale of the STAI demonstrated relatively high concurrent validity with the Institute of Personality and Ability Testing Anxiety scale, the Taylor Manifest Anxiety Scale, and the Zuckerman Affect Adjective Checklist. The correlations of the trait anxiety subscale for the STAI with the three measures range from .85 to .73 (Spielberger, 1979).

Procedure

Item generation

An item pool for the NABEM and RUMESC was created based on items from the distress subscale from the Attentional Focus Questionnaire (AFQ; Brewer, Van Raalte, & Linder, 1996), the thoughts of escape subscale from the Thought Occurrence Questionnaire for Sports (TOQ-S; Hatzigeorgiadis & Biddle, 2000), and the Rumination-Reflection Scale (RRS; Trapnell and Campbell, 1999). The items generated based on these existing measures were adapted to fit the context of exercise. Descriptions and psychometric properties of these scales are outlined in the paragraphs below.

The distress subscale for the Attentional Focus Questionnaire (Brewer et al., 1996) consists of seven items that are related to an individual's attentional focus on distressful thoughts, such as "getting frustrated with yourself over your performance", during an exercise bout. The items are rated on a seven point scale where responses range from *would not do at all* to *would do a lot.* The following is a sample question from the distress subscale for the AFQ, *Focusing on how much you are suffering.* The distress

subscale has an alpha of .85 when filled out prior to the exercise bout, and an alpha of .88 after the exercise bout (Brewer et al., 1996).

The thoughts of escape subscale of the Thought Occurrence Questionnaire for Sports (Hatzigeorgiadis & Biddle, 2000) consists of five items. The items are rated on a seven-point scale where 1 means *almost* never and 7 means *very often.* The following is a sample item from the TOQ-S: *That I want to quit.* The subscale demonstrates good internal consistency, Cronbach's alpha for this subscale is .90. The TOQ-S also demonstrated strong convergent validity, concurrent validity with the Test of Performance Strategies (TOPS), Sport Anxiety Scale 1 (SAS 1), Sport Anxiety Scale 2 (SAS 2), Sport Anxiety Scale 3 (SAS 3), Intrinsic Motivation Inventory 1 (IMI1), and the Intrinsic Motivation Inventory 2 (IMI 2) measures (Hatzigeorgiadis & Biddle, 2000).

The Rumination-Reflection Questionnaire (Trapnell & Campbell, 1999) consists of 24 items, broken down into 2 subscales, one of which measures the degree to which individuals employ self-ruminative thought the other measures the degree to which individuals employ self-reflective thought. Only the self-ruminative thought subscale was used to generate items. The items are rated on a 7-point scale where 1 means *strongly disagree* and 7 means *strongly agree* (Joireman, Parrott, & Hammersla, 2002). A sample item of the RRQ is *Sometimes it is hard for me to shut off thoughts about myself* (Trapnell & Campbell, 1999). The two subscales were shown to have very high internal reliability (> .90) and good discriminate and convergent validity (Joireman et al., 2002).

The original item pool for the NABEM contained 20 items addressing 5 different bodily sensations (respiration, cardiovascular, muscular, general fatigue, and bodily senses). The original item pool for the RUMESC contained 18 items addressing

rumination tendencies and escape thoughts. The initial measures contained one set of instructions for all items and both measures were administered as one measure. Because one of the bodily sensations for the NABEM section was named bodily senses, and questions for the RUMESC section refer to all bodily sensations it was expected that the participants might be confused and not realize that the RUMESC items refer to all bodily sensations.

During the initial pilot phase the measure was administered to four undergraduate psychology students. The students were asked if they understood that bodily senses on the first part only referred to the examples listed parenthetically after each question in the bodily senses category. They were also asked if, during the RUMESC section, they were aware that bodily sensations referred to all five categories listed in the instructions. Three of the four students had a difficult time understanding that bodily sensations meant all five specified areas. They claimed that the source of their confusion was due to the label bodily senses in the first section. Because of this confusion, “bodily senses” was changed to sensory experiences.

With that change made, the measure was then re-piloted to a group of six psychology graduate students. There was still a concern that there might be confusion when answering the RUMESC items as to what bodily sensations were referring to, so during the second pilot the participants were asked for input about any of the questions as well as if they understood that the questions in the second part were referring to all five of the bodily sensations included in the instructions. Most of the participants were not clear as to what the questions containing the statement bodily sensations were referring. Several participants felt that the symptoms in the sensory experiences section were too

extreme and they would be alarmed if they felt any of those symptoms during exercise. Several comments were also made regarding some of the items on the RUMESC. Specifically, the participants felt that the item "I can't keep the thoughts about the changes in my bodily sensations off of my mind" was too wordy. They also commented that the items "The changes in my bodily sensation will never get any better" and "I can't stop thinking about the changes in my bodily sensations" were confusing and could be worded better. Based on this feedback, the decision was made to eliminate the sensory experiences items and to eliminate the item "I can't keep the thoughts about the changes in my bodily sensations off of my mind". The decision to reword the other items by combining them to form one item, "I can't stop thinking that the changes in my bodily sensations will never get any better" was also made. A final decision resulting from this piloting phase was to split the measure into two separate measures, each containing separate instructions.

With these changes having been made, a final pilot phase was conducted with six other psychology graduate students. The main feedback from these participants was that the measures seemed too long. Considering this feedback, the decision was made to eliminate a few items from the RUMESC that were redundant. The final version of the NABEM contained 16 items and the final version of the RUMESC contained 11 items.

Data Collection

Data for this study were collected via an online survey. The NABEM and the RUMESC, as well as the Eysenck Personality Questionnaire Brief Version (EPQ-BV), the Life Orientation Test Revised (LOT-R), and the State-Trait Anxiety Inventory (STAI)

trait anxiety subscale, were administered to the participants. The participants also answered a series of demographic questions including the SOC measure.

Results

Data Analysis

First, data from the survey platform were uploaded to SPSS. Due to a lack of understanding of the WKU SONA System, 15 participants took the survey two times and three participants took the survey three times. The survey platform recorded the date and time each survey was completed. For the 15 participants who took the survey twice the second set of responses was deleted. For the three participants who took the survey three times the second and third set of responses was deleted. Next, frequencies were run to check for impossible values. No impossible values were found, however, several missing values were revealed. Upon inspection of the missing values it was determined that three individuals left several responses blank. For this reason, those three individuals were removed from the dataset. Upon running frequencies a second time the output revealed 46 missing values randomly placed within the 20,727 responses in the dataset. Because the 46 missing values were spread across all measures rather than just one or two measures the decision was made to locate each missing value and select a value to input into the dataset based on the respondent's answers to similar items. For example, on the NABEM, if a respondent skipped a question that was concerned with respirations then the respondent's answers to the other respiration questions were considered. The numerical value chosen to replace the missing value was the numerical value that occurred most frequently among the other similar items. In cases where the respondent entered a different numerical value for each similar question the first number entered by

the respondent was chosen to replace the missing value. This was the case for only a few of the missing values.

The next step in the data analysis process was to recode all reversed scored items in the NABEM, RUMESC, and the preexisting measures that were administered. Once the appropriate values were recoded, reliability estimates with item-analyses were done on the three existing measures that were administered. Results of the reliability estimate and item analysis for the neuroticism subscale from the EPQR-A yielded a Cronbach's alpha of .77 which was consistent with the alpha obtained by previous studies. The item analysis did not show a significant increase of the Cronbach's alpha if item deleted for any of the items. Results of the reliability estimate for the LOT yielded a Cronbach's alpha of .80 which is consistent with the alpha obtain by previous studies. Cronbach's alpha if item deleted would not have been significantly increased if any of the items were deleted. Results of the reliability analysis for the trait anxiety subscale for the STAI yielded a Cronbach's alpha of .92 which is consistent with the alpha obtain by previous studies. Here again, the overall coefficient alpha would not have been significantly increased had any items been deleted.

Next, descriptive statistics, including frequencies, mean, median, standard deviation, skewness, and kurtosis, were calculated for the preexisting measures (see Table 1). There were no problems with skewness or kurtosis for any of the existing measures.

Table 1

Descriptive Statistics for the Composite Scores for Existing Measures

	Mean	Median	SD	Skewness	Kurtosis	Reliability
Neuroticism (EPQR-A)	3.13	3.00	1.99	-.11	-1.20	.77
LOT-R	14.11	14.00	4.18	-.41	.13	.80
STAI-T	42.15	41.00	10.77	.49	-.02	.92

Note. Composite score range on the neuroticism subscale for the EPQR-A is 0-6, composite score range on LOT-R is 0-24, and composite score range on STAI-T is 20-80.

Numerous data sources were evaluated in order to determine which items to retain for the NABEM and the RUMESC measures. Descriptive statistics, including frequencies, mean, median, standard deviation, skewness, and kurtosis, were considered. The descriptive statistics were used to identify any extreme means or scores, to identify the amount of variability, and to identify any issues with skewness or kurtosis. Two statistics from item analyses were evaluated, item-total correlations and Cronbach's alpha if item deleted. Relative strength of item total correlations were considered as well as occurrence of any negative item total correlation, as a negative item total correlation would be an indicator of a problematic item. Any meaningful increase in alpha, if a particular item were deleted, would also be an indicator of a problematic item.

Several factor models were considered in determining which would be most appropriate for each measure. Criteria for determining factor models to examine included eigen-values, Lautenschlager's (1989) parallel analysis criteria, and scree plots. In considering factor structure, eigen-values greater than 1 indicate the existence of a factor. Similarly, the scree plot is a visual diagram that shows a distinct break between numbers that indicates the number of possible factors in the measure. Lautenschlager's (1989)

parallel analysis criteria is based on a Monte Carlo study where the appropriate eigen-values are determined, based on the Monte Carlo data for specific numbers of items with specific numbers of participants. In the current study Lautenschlager's (1989) tables were considered based on having an N of 329 for both measures and a total of 16 items for the NABEM and 11 items for the RUMESC. This allows for a more specific evaluation of eigen-values.

NABEM

Descriptive statistics, including frequencies, mean, median, standard deviation, skewness, and kurtosis, were calculated for the NABEM items (see Table 2). The reliability for the NABEM was strong with an overall coefficient alpha of .87. Removing items did not significantly decrease the overall coefficient alpha. The corrected item total correlations were all strong and positive with the exception of the positively worded items. The positively worded items were all weak and two were negative. There were no problems with skewness or kurtosis for any of the items on the NABEM.

H1: Development of the NABEM will yield a 1 factor model

A principal components analysis was run on the NABEM to help determine the number of factors to keep. There were four components with eigen-values greater than 1.0. Examination of the scree plot did not reveal a clean break past two to three components. Lautenschlager's (1989) parallel analysis criteria were also consulted. This data set consisted of 16 items with an N of 329; therefore Table 3 from his paper was referenced. Acceptable eigen-values were found for four factors, with the fourth factor barely missing the cutoff (actual value = 1.047, required value was 1. 172).

Table 2

Descriptive Statistics for Each Item for the NABEM

Item	Mean	Median	SD	Skewness	Kurtosis	Alpha if item deleted	Corrected item total correlation
NABEM_1	2.55	2.00	1.12	.48	-.30	.86	.58
NABEM _2	2.99	3.00	1.16	-.04	-.76	.85	.70
NABEM _3	**2.94**	**3.00**	**1.10**	**.20**	**-.73**	**.88**	**-.01**
NABEM _4	2.69	3.00	1.13	.31	-.68	.85	.68
NABEM _5	**2.64**	**2.00**	**1.10**	**.51**	**-.44**	**.88**	**-.04**
NABEM _6	2.95	3.00	1.16	.13	-.81	.85	.71
NABEM _7	2.47	2.00	.99	.46	-.12	.86	.61
NABEM _8	2.44	2.00	1.03	.55	.00	.85	.70
NABEM _9	**2.65**	**3.00**	**1.03**	**.40**	**-.30**	**.88**	**.02**
NABEM _10	2.52	2.00	.99	.43	-.31	.85	.62
NABEM _11	2.87	3.00	1.08	.10	-.59	.85	.80
NABEM _12	2.65	3.00	1.08	.33	-.57	.85	.76
NABEM _13	2.50	2.00	.98	.48	-.16	.85	.66
NABEM _14	**2.77**	**3.00**	**1.06**	**.29**	**-.51**	**.88**	**.00**
NABEM _15	2.72	3.00	1.06	.32	-.53	.85	.74
NABEM _16	2.43	2.00	1.00	.61	-.03	.85	.69

Note. Responses were based on a 1-5 scale
The overall coefficient alpha estimate = .87
Bold items are the positively worded items

An Exploratory Factor Analysis (EFA) with a maximum likelihood extraction and an oblimin rotation which is a form of an oblique rotation used when factors are correlated (Stevens, 1996) was conducted for one, two, three, and four factor models. The cardiac and respiration items consistently hung together as a single factor in the two, three, and four factor models. In the four factor model there was a factor for the cardiorespiratory items, a factor for the leg symptom items, a factor for the energy level items, and a factor for the positively worded items. Factor loadings for the pattern matrix ranged from .726 to .879 for the cardiorespiratory items, from -.765 to -.811 for the leg

symptom items, from.749 to .878 for the energy level items, and from .383 to .884 for the positively worded items.

In the three factor model, the factors for leg symptoms and energy level merged together into one factor. There was also a factor for the cardiorespiratory items and a factor for the positively worded items. The factor loadings ranged from-.447 to -.941 for the leg symptom/energy level items, from .716 to .889 for the cardiorespiratory items, and from .389 to .890 for the positively worded items

In the two factor model the factor for heart rate and respiration was clearly defined, with factor loading ranging from.630 to .771, while the second factor contained the remainder of the items which did not seem meaningful.

When the items were evaluated in a one factor model, all items with the exception of the positively worded items, loaded strongly on the single factor. Factor loadings from the component matrix ranged from .573 to .874. Because all items except for the four positively worded items loaded strongly on a single factor the decision was made to remove the four positively worded items and reevaluate the remaining 12 items. Additionally, the item total correlations for the four positively worded items were weak and/or negative and the overall alpha would be increased with the deletion of the four positively worded items.

A principal components analysis was run on the remaining 12 items to help determine the number of factors to keep. There were three components with eigen-values greater than 1.0. Examination of the scree plot did not reveal a clean break past three to four components. Lautenschlager's (1989) parallel analysis criteria were also consulted. This data consisted of 12 items with an N of 329; therefore Table 2 from his paper was

referenced. Acceptable eigen-values were found for two factors (actual value = 1.315, required value was 1.205).

An EFA with a maximum likelihood extraction and an oblimin rotation (because factors were expected to be related) was conducted for one, two, and three factor models. The cardiorespiratory factor was perfectly identified in the two and three factor models. Factor loadings from the pattern matrix ranged from .760 to .930 for the three factor model and from .760 to .935 for the two factor model. In the three factor model a factor for energy level and a factor for leg symptoms were identified. Factor loadings from the pattern matrix for these factors ranged from .814 to .926 and .813 to .966 respectively. In the two factor model, the factors for energy level and leg symptoms merged together with factor loadings from the pattern matrix ranging from .730 to .863. When the items were evaluated in a one factor model all items loaded strongly on the single factor with factor loadings from the component matrix ranging from .721 to .852. This single factor for the items making up the NABEM portion of the questionnaire supports the hypothesis that the questionnaire would have a single factor for a negative focus on bodily sensations (α = .94). Using the single factor also yields the most parsimonious model which would be more apt to be adapted and used by health professionals.

Table 3

Final Component Matrix for One Factor Model for NABEM: Factor Loadings

Item	Factor 1
NABEM_11	.85
NABEM _12	.85
NABEM _15	.84
NABEM _6	.81
NABEM _2	.81
NABEM _4	.79
NABEM _13	.69
NABEM _8	.77
NABEM _16	.77
NABEM _10	.72
NABEM _7	.72
NABEM _1	.65

H2: The NABEM will demonstrate construct validity via positive correlations with neuroticism, pessimism, and trait anxiety

Individual item correlations were run between each item on the NABEM and the STAI trait anxiety subscale, the LOT, and the EPQR-A. In addition to not loading on the single factor in the factor analysis, the four positively worded items (items 3, 5, 9, and 14) were not significantly correlated with the STAI, LOT, or EPQR-A. This further supported the decision to delete the four positively worded items. The correlations between the remaining 12 items and the 3 measures were significant (see Table 4) which supported the hypothesis that the NABEM would demonstrate construct validity via positive correlations with neuroticism (r = -.22 to -.15), pessimism (r = -.22 to -.12), and trait anxiety (r = .15 to .23).

Table 4

Correlations for the NABEM and Global Measures

NABEM	EPQ-RA neuroticism subscale	LOT	STAI trait anxiety subscale
NABEM _1	-.15**	-.21**	.20**
NABEM _2	-.22**	-.12*	.16**
NABEM _3	**-.03**	**.03**	**-.02**
NABEM _4	-.20**	-.16**	.18**
NABEM _5	**-.00**	**-.06**	**.08**
NABEM _6	-.22**	-.17**	.17**
NABEM _7	-.16**	-.16**	.15**
NABEM _8	-.18**	-.17**	.19**
NABEM _9	**.03**	**-.06**	**.03**
NABEM _10	-.19**	-.20**	.19**
NABEM _11	-.22**	-.17**	.21**
NABEM _12	-.19**	-.14*	.16**
NABEM _13	-.22**	-.22**	.23**
NABEM _14	**.02**	**-.10**	**.09**
NABEM _15	-.20**	-.17**	.22**
NABEM _16	-.19**	-.20**	.22**

* $p < .05$. ** $p < .01$
Note: Deleted items are bolded.

H3: Scores on the NABEM will be lower for individuals who are in higher Stages of Change and scores on the NABEM will be higher for individuals who are in lower Stages of Change

Composite scores were computed for the NABEM and then correlations were run between the composite scores for the NABEM and scores on the SOC measure. The correlations between the SOC measure and the NABEM composite scores was negative and significant, $r = -.24$ and $p < .01$, which supported the hypothesis that scores on the NABEM would be lower for individuals who are in higher Stages of Change and higher for individuals who are in lower Stages of Change.

H4: The NABEM, being context specific, will have a higher correlation with Stages of Change than the global measures (for neuroticism, pessimism, and trait anxiety).

While the correlations between the global measures and the SOC measure were significant, the magnitude of the correlation between the NABEM and SOC (r = -.24) was higher than that of the global measures of neuroticism (r = .14), pessimism (r = .15), and trait anxiety (r = -.17; t-tests comparing these correlations revealed that while close, the differences between the correlations were not significant). This supports the hypothesis that the NABEM, being context specific, would have a higher correlation with Stages of Change than global measures.

RUMESC

Descriptive statistics, including frequencies, mean, median, standard deviation, skewness, and kurtosis, were run on the RUMESC (see Table 5 and Table 6). The reliability for the rumination factor of the RUMESC was strong with an overall coefficient alpha of .86; likewise, the reliability for the escape thoughts factor of the RUMESC was strong with an overall coefficient alpha of .92. Removing items did not significantly decrease the overall coefficient alpha, and the corrected item total correlations were all strong and positive with the exception of the two positively worded items which were weak. There were no problems with skewness or kurtosis for any of the items on the RUMESC.

Table 5

Descriptive Statistics for Each Item for the Rumination Factor of the RUMESC

Item	Mean	Median	SD	Skewness	Kurtosis	Alpha if item deleted	Corrected item total correlation
RUMESC_1	2.06	2.00	.98	.74	-.08	.86	.66
RUMESC _2	2.06	2.00	1.06	.77	-.26	.74	.78
RUMESC _5	2.23	2.00	1.07	.46	-.75	.78	.75

Note. Responses were based on a 1-5 scale
The overall alpha estimate = .86

Table 6

Descriptive Statistics for Each Item for the Escape Thoughts Factor of the RUMESC

Item	Mean	Median	SD	Skewness	Kurtosis	Alpha if item deleted	Corrected item total correlation
RUMESC _3	2.13	2.00	1.0	.68	-.25	.89	.82
RUMESC _6	2.12	2.00	1.05	.66	-.28	.88	.86
RUMESC _8	2.11	2.00	1.04	.68	-.22	.92	.73
RUMESC _11	2.21	2.00	1.06	.46	-.65	.89	.84

Note. Responses were based on a 1-5 scale
The overall alpha estimate = .92

H5: Development of the RUMESC will yield a 2 factor model

A principal components analysis was also run on the RUMESC to help determine the number of factors to keep. There were three components with eigen-values greater than 1.0. Examination of the scree plot did not reveal a clean break past two to three components. Lautenschlager's (1989) parallel analysis criteria were also consulted. This data consisted of 11 items with an N of 329; therefore Table 2 from his paper was referenced. Acceptable eigen-values were found for two factors with the second factor barely missing the cutoff (actual value = 1.197, required value was 1. 205).

An EFA with a maximum likelihood extraction and an oblimin rotation (because factors were expected to be related) was conducted for one and two factor models. In the two factor model, a factor for the two positively worded items was identified with factor loadings from the pattern matrix ranging from .605 to .863. A factor containing the items intended to measure rumination and the items intended to measure escape thoughts merged together also was identified with factor loadings from the pattern matrix ranging from .711 to .873. When the items were evaluated in a one factor model, all items with the exception of the positively worded items, loaded strongly on the single factor with factor loadings from the component matrix ranging from .714 to .885. Because all items except for the two positively worded items loaded strongly on a single factor the decision was made to remove the two positively worded items and reevaluate the remaining 9 items. Additionally, the item total correlations for the two positively worded items were weak and the overall alpha would be increased with the deletion of the two positively worded items.

A principal components analysis was run on the remaining 9 items to help determine the number of factors to keep. There was one component with an eigen-value greater than 1.0. Examination of the scree plot did not reveal a clean break past two to three components. Lautenschlager's (1989) parallel analysis criteria were also consulted. This data consisted of 9 items with an N of 329; therefore Table 2 from his paper was referenced. Acceptable eigen-values were found for two factors with the second factor barely missing the cutoff (actual value = .923, required value was 1. 205).

An EFA with a maximum likelihood extraction and an oblimin rotation (because factors were expected to be related) was conducted for one and two factor models. In the

two factor model a factor for the items intended to identify escape thoughts fell out with factor loadings from the pattern matrix ranging from .748 to .945. A factor for the items intending to identify rumination also fell out with factor loading from the pattern matrix ranging from .811 to .931. This supported the hypothesis that the RUMESC would yield a two factor model. Item 10 loaded on both factors and item 4, a rumination item, loaded on the escape thoughts factor. Because item 4 loaded on the wrong factor the decision was made to eliminate the question on a revised version of the RUMESC. Because item 10 double loaded, this item was also eliminated a revised version of the RUMESC.

Table 7

Final Pattern Matrix for Two Factor Model for RUMESC: Factor Loadings

Item	Factor 1	Factor 2
RUMESC _8	.95	
RUMESC _11	.94	
RUMESC _6	.84	
RUMESC _3	.75	
RUMESC _2		.93
RUMESC _1		.84
RUMESC _5		.81

H6: The RUMESC will demonstrate construct validity via positive correlations with neuroticism, pessimism, and trait anxiety

Individual item correlations were run between each item on the RUMESC and the STAI trait anxiety subscale, the LOT, and the EPQ. The correlations between all items on the RUMESC and the 3 existing measures were significant (see Table 8) which supported the hypothesis that the RUMESC would demonstrate construct validity via positive correlations with neuroticism, pessimism, and trait anxiety. Item7 and item 9 were significant but had relatively lower magnitudes which supported the decision to delete

those items. The range of correlations with neuroticism for the seven items that were retained was -.28 to -.21 as opposed to -.13 for item 7 and -.19 for item 9. The range of correlations with pessimism for the seven items that were retained was -.33 to -.22 as opposed to -.13 for item 7 and -.16 for item 9. The range of correlations with trait anxiety for the seven items that were retained was .31 to .43 as opposed to .15 for item 7 and .19 for item 9. Item 10, while significant, had a lower magnitude with neuroticism and optimism (r = -.20 and r = -.23).

Table 8

Correlations for the RUMESC and Global Measures

RUMESC	EPQ-RA neuroticism subscale	LOT	STAI trait anxiety subscale
RUMESC _1	-.24**	-.33**	.38**
RUMESC _2	-.28**	-.28**	.43**
RUMESC _3	-.23**	-.31**	.38**
RUMESC _4	-.30**	-.31**	.39**
RUMESC _5	-.21**	-.22**	.31**
RUMESC _6	-.23**	-.32**	.41**
RUMESC _7	**-.13***	**-.13***	**.15****
RUMESC _8	-.21**	-.31**	.35**
RUMESC _9	**-.19****	**-.16****	**.19****
RUMESC _10	-.20**	-.23**	.33**
RUMESC _11	-.23**	-.29**	.39**

* $p < .05$. ** $p < .01$

Note: Bold items are the positively worded items

H7: Scores on the RUMESC will be lower for individuals who are in higher Stages of Change and scores on the RUMESC will be higher for individuals who are in lower Stages of Change

Composite scores were computed for the rumination and escape thoughts components of the RUMESC and then correlations were run between the composite

scores for the two components of the RUMESC and scores on the SOC measure. The correlations between the SOC measure and the two composite scores of the RUMESC were negative and significant, $r = -.22$ and $p < .01$ for the rumination component and $r = -.24$ and $p < .01$ for the escape thoughts component. This supports the hypothesis that scores on the RUMESC would be lower for individuals who are in higher Stages of Change and higher for individuals who are in lower Stages of Change.

H8: The RUMESC, being context specific, will have a higher correlation with Stages of Change than global measures for neuroticism, pessimism, and trait anxiety

While the correlations between the global measures and the SOC measure were significant, the magnitude of the correlation between the rumination component on the RUMESC ($r = -.22$) and the escape thoughts component on the RUMESC ($r = -.24$) were higher than that of the global measures of neuroticism ($r = .14$), pessimism ($r = .15$), and trait anxiety ($r = -.17$; t-tests comparing these correlations revealed that while close, the differences between the correlations were not significant). This supports the hypothesis that the RUMESC, being context specific, would have a higher correlation with Stages of Change than global measures.

Discussion

The intent of the study was to develop a measure to identify individuals with a negative attentional bias toward changes in bodily sensations during exercise as well as to develop a measure to identify individuals with a tendency toward rumination about the changes in their bodily sensations and subsequent tendency to escape the exercise. An exploratory factor analysis identified a single factor of negative attentional bias for the items in the NABEM and two factors, rumination and escape thoughts, in the RUMESC.

The items in both the NABEM and the RUMESC had good reliability and internal consistency.

The two measures also correlated well with existing measures for neuroticism, pessimism, and trait anxiety. All measures in this study correlated well with the SOC measure, however, the contextual measure had a higher magnitude compared to the global measures of similar constructs. Higher scores on the NABEM and RUMESC indicated a higher level of negative attentional focus on changes in bodily sensations during exercise and higher scores on the RUMESC indicated a higher tendency for rumination and escape thoughts. Scores on the NABEM and RUMESC were higher for individuals who were lower in Stages of Change. Individuals lower in Stages of Change exercise less frequently than individuals higher in Stages of Change.

The fact that individuals who were in lower Stages of Change tended to have higher scores on the NABEM and RUMESC shows support for the theoretical model presented in this paper. The theoretical model suggests that some individuals may develop a negative attentional bias and anxiety while attending to the changes in their bodily sensations while exercising, this focus and anxiety could lead to rumination about the changes in bodily sensations and ultimately lead to thoughts of escaping the exercise.

While results of this study support this theoretical model, there are limitations to this study. One limitation of this study was that the sample consisted only of college students. This may pose a problem when attempting to integrate these newly developed measures to a more general population. Another limitation of this study was a low number of participants (n = 5) in the pre-contemplation stage on the SOC measure. This could have attenuated the correlations. Persons in lower stages do not exercise. One

reason for not exercising may be higher levels of anxiety experienced during exercise. Future research should explore means of testing more participants in lower stages. Finally, there may have been a social desirability bias which was not evaluated in this study but should be addressed in future research. This social desirability bias may influence how an individual responds to the items on the measures. Participants may have been less likely to admit anxiety about exercise or ruminative or escape thoughts.

The positively worded items in both the NABEM and the RUMESC proved to be problematic. The positively worded items had very low total item correlations and tended to be considered a separate factor even though the positively worded items were unrelated to one another. For example, in the NABEM there was one positively worded item for each bodily sensation (cardiorespiratory, leg muscles, and energy levels). Theoretically, each positively worded item should have loaded with the other items that were addressing each bodily sensation. Instead, they all loaded as a separate factor. The same was true for the two positively worded items in the RUMESC. One possible reason for this is that this study considered exercise to be a continuum where individuals who were anxious about and fear exercise would be at one end of the continuum and individuals who are excited and elated at the notion of exercising would be at the other end. The reality may be that perhaps exercise-related emotion is not a continuum but mulitdimensional; perhaps some individuals do not fear exercise but also do not love doing it and do not exercise for fun, but rather, because they have to for their livelihood. Another possible reason that the positively worded items were problematic was because the measures were designed to capture a negative focus on exercise, rumination about that negative focus, and ultimately thoughts of escaping the exercise bout. Because of the

negative focus of the measures, writing context specific positively worded items was difficult.

This study centered on the creation of two context specific measures that were developed to test a novel theoretical model based on a combination of two existing theoretical models. One direction for future research would be to further test the validity of the newly created measures. Determining the validity of the measures will also help test or support the novel theoretical model presented in this paper. It may also be useful to re-administer the newly created measures, sans the items that were removed, to a new set of participants for the purpose of running a confirmatory factor analysis to confirm the factors that were identified in an exploratory factor analysis in the current study.

Other directions for future research would be to examine whether negative attentional bias moderates the affective benefits of exercise, or whether it predicts self-selected intensity. It could be possible that the positive effects on affect are decreased as individuals dwell on the negative thoughts and feelings about the exercise bout. It is also likely that individuals who experience anxiety and interpret the changes in bodily sensations negatively will self select an exercise intensity that is lower than individuals who are not anxious about the changes in bodily sensations. Additionally, future research could examine how the model relates to other measures, such as the Preference for and Tolerance of the Intensity of Exercise Questionnaire (PRETIE-Q), or how it is separate from other variables such as social desirability bias.

The research presented in the current study could be furthered by incorporating the ideas generated by Wadlinger and Isaacowitz (2011) on attentional focus. They propose that if a person's attention can be trained and directed, then it could possibly be

used as a tool to help with the emotion regulation processes, which would then ultimately improve a person's overall well-being. If a person who has a tendency to have a negative attentional bias during exercise could be trained to reshape the negative bias, then he or she could improve his or her emotional regulation process while exercising.

An additional suggestion for future research would be to incorporate Vujanovic, Zvolensky, Bernstein, Feldner, and McLeish's (2007) work with the Mindful Attention Awareness Scale (MAAS). They define mindfulness as "open observation of internal and external processes" (Vujanovic et al., 2007, p. 1394), and propose that mindfulness could be a useful tool for individuals to disengage from automatic thoughts or tendencies and negative behavior patterns. It would be interesting to evaluate the possible relationship between the MAAS, the NABEM, and the RUMESC.

A final suggestion for future research would be to test the ability of the NABEM to predict the situation specific measures of the RUMESC. This would allow the novel theoretical model presented in Figure 1 to be tested.

In conclusion, the results of the analyses done on the NABEM indicate that it is a reliable single factor measure. The overall coefficient alpha for the NABEM when we deleted the positively worded items was .94. The NABEM demonstrated construct validity via positive correlations with global measures of neuroticism, pessimism, and trait anxiety. The NABEM also correlated significantly with the SOC and the magnitude of the correlation was higher than the correlations between global measures, supporting the notion that a context specific measure would have better application in an exercise setting.

The results of the analyses done on the RUMESC indicate that it is a reliable two factor measure containing one factor that measures rumination and another factor that measures escape thoughts. The overall coefficient alpha for the rumination factor was .86 and the overall coefficient alpha for the escape thoughts factor was .92. Both factors of the RUMESC demonstrated good construct validity via positive correlations with global measures of neuroticism, pessimism, and trait anxiety. The RUMESC, like the NABEM, correlated significantly with the SOC and the magnitude of the correlations were higher than the correlations between global measures, once again supporting the notion that a context specific measure would have better application in an exercise setting.

While there were limitations to this study, the results indicate that, with further research and validation, the NABEM and RUMESC have the potential to be very useful in the field of health promotion and rehabilitation.

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Appendix A

Negative Attentional Bias during Exercise Measure (NABEM)

The following questions pertain only to **aerobic exercise**, for example, running, walking, elliptical, cycling, stair climbing, **or** rowing. Changes in bodily sensations during aerobic exercise include changes to the following four areas: cardiovascular, respiration, leg muscles, and energy levels.

Please use the scale below to indicate, **during your typical exercise session**, how often the following statements apply to you

1. Almost Never 2. Seldom 3. Sometimes 4. Often 5. Almost Always

---

1. I become concerned when I notice changes in my leg muscles (**examples may include:** heavy legs, rubbery legs, or wobbly legs)
2. I feel worried when I notice changes in my breathing (**examples may include**: increased breathing rate, difficulty in catching your breath, **or** heavier breathing).
3. I know I'm having a good workout when my energy level decreases (**examples may include**: feeling tired, drained, **or** fatigued).
4. I feel uneasy when I notice changes in my heart rate (**examples may include**: an increased heart rate **or** a rapid or racing heart).
5. I know I'm having a good workout when I notice changes in my leg muscles (**examples may include**: heavy legs, rubbery legs, **or** wobbly legs).
6. I become concerned when I notice changes in my breathing (**examples may include**: increased breathing rate, difficulty in catching your breath, **or** heavier breathing).
7. I feel worried when my energy level decreases (**examples may include**: feeling tired, drained, **or** fatigued).
8. I feel uneasy when I notice changes in my leg muscles (**examples may include**: heavy legs, rubbery legs, **or** wobbly legs).
9. I know I'm having a good workout when I notice changes in my heart rate (**examples include**: an increased heart rate **or** a rapid or racing heart).

10. I become concerned when my energy level decreases (**examples may include**: feeling tired, drained, **or** fatigued).
11. I feel uneasy when I notice changes in my breathing (**examples may include**: increased breathing rate, difficulty in catching your breath, **or** heavier breathing).
12. I feel worried when I notice changes in my heart rate (**examples include**: an increased heart rate **or** a rapid or racing heart).
13. I feel uneasy when my energy level decreases (**examples may include**: feeling tired, drained, **or** fatigued).
14. I know I'm having a good workout when I notice changes in my breathing (**examples may include**: increased breathing rate, difficulty in catching your breath, **or** heavier breathing).
15. I become concerned when I notice changes in my heart rate (**examples include**: an increased heart rate **or** a rapid or racing heart).
16. I feel worried when I notice changes in my leg muscles: (**examples may include**: heavy legs, rubbery legs, **or** wobbly legs).

Rumination and Escape Thoughts Measure (RUMESC)

The following questions pertain only to **aerobic exercise**, for example, running, walking, elliptical, cycling, stair climbing, **or** rowing. Changes in bodily sensations during aerobic exercise include changes to the following four areas:

Four Areas of Change in Bodily Sensations

Cardiovascular- examples may include: an increased heart rate **or** a rapid or racing heart.

Respirations- examples may include: increased breathing rate, difficulty in catching your breath, **or** heavier breathing.

Leg Muscles- examples may include: heavy legs, rubbery legs, **or** wobbly legs.

Energy Level- examples may include: feeling tired, drained, **or** fatigued.

Please use the scale below to indicate, **during your typical exercise session**, how often you have the following thoughts:

1. Almost Never 2. Seldom 3. Sometimes 4. Often 5. Almost Always

---

1. I keep thinking that the changes in my bodily sensations will never get any better.
2. I can't stop thinking about the changes in my bodily sensations.
3. The changes in my bodily sensations make me want to quit.
4. All I can think about is how much I'm suffering.
5. I keep thinking about the changes in my bodily sensations.
6. The changes in my bodily sensations make me want to stop exercising.
7. I am really enjoying the changes in my bodily sensations.
8. The changes in my bodily sensations make me feel like I can't go on.
9. I don't dwell on the changes in my bodily sensations very long.
10. I wish I could stop thinking about the changes in my bodily sensations.
11. The changes in my bodily sensations make me feel like I don't want to complete this exercise session.

Eysenck Personality Questionnaire Abbreviated: Neuroticism Subscale (EPQ-R)

Please answer each question by putting a circle around the 'YES' or the 'NO'. Work quickly and do not think too long about the exact meaning of the questions.

1. Does your mood often go up and down? YES NO
2. Do you often feel "fed up"? YES NO
3. Would you call yourself a nervous person? YES NO
4. Are you a worrier? YES NO
5. Do you suffer from "nerves"? YES NO
6. Do you often feel lonely? YES NO

Revised Life Orientation Test (LOT-R)

Please answer each question using the following scale: 0 = Strongly Disagree, 1 = Disagree, 2 = Neutral, 3 = Agree, and 4 = Strongly Agree.

1. In uncertain times, I usually expect the best.
2. It's easy for me to relax.
3. If something can go wrong for me, it will.
4. I'm always optimistic about my future.
5. I enjoy my friends a lot.
6. It's important for me to keep busy.
7. I hardly ever expect things to go my way.
8. I don't get upset too easily.
9. I rarely count on good things happening to me.
10. Overall, I expect more good things to happen to me than bad.

State-Trait Anxiety Inventory for Adults Trait Subscale (STAI)

Read each statement below and then circle the appropriate value to indicate how you feel ***now***, that is, ***at this moment***.

Please respond to each item using the following response set:

1. Not at All 2. Somewhat 3. Moderately so 4. Very much so

1. I feel pleasant.
2. I feel nervous and restless.
3. I feel satisfied with myself.
4. I wish I could be as happy as others seem to be.
5. I feel like a failure.
6. I feel rested.
7. I am "calm, cool, and collected".
8. I feel that difficulties are piling up so that I cannot overcome them.
9. I worry too much over something that really doesn't matter.
10. I am happy.
11. I have disturbing thoughts.
12. I lack self-confidence.
13. I feel secure.

14. I make decisions easily.
15. I feel inadequate.
16. I am content.
17. Some unimportant thought runs through my mind and bothers me.
18. I take disappointments so keenly that I can't put them out of my mind.
19. I am a steady person.
20. I get in a state of tension or turmoil as I think over my recent concerns and interests.

Stages of Change (SOC)

Which of the following statements best describes you? Please read all 5 statements and then mark your response.

1. I currently do not exercise and do not intend to start exercising in the next six months.
2. I currently do not exercise, but I am thinking about starting to exercise in the next six months.
3. I currently exercise some, but not regularly (regularly is defined as exercising three or more times per week for at least 30 minutes per session).
4. I currently exercise regularly.
5. I have been exercising regularly for the past six months or longer.

Appendix B

WESTERN KENTUCKY UNIVERSITY
Institutional Review Board
Office of Research
301 Potter Hall
270-745-4652; Fax 270-745-4211
E-mail: Paul.Mooney@wku.edu

In future correspondence, please refer to HS11-095, November 12, 2010

Katie Brown
c/o Dr. Wininger
Psychology
WKU

Katie Brown:

Your research project, *Development of a Negative Attentional Bias during Exercise Measure*, was reviewed by the HSRB and it has been determined that risks to subjects are: (1) minimized and reasonable; and that (2) research procedures are consistent with a sound research design and do not expose the subjects to unnecessary risk. Reviewers determined that: (1) benefits to subjects are considered along with the importance of the topic and that outcomes are reasonable; (2) selection of subjects is equitable; and (3) the purposes of the research and the research setting is amenable to subjects' welfare and producing desired outcomes; that indications of coercion or prejudice are absent, and that participation is clearly voluntary.

1. In addition, the IRB found that you need to orient participants as follows: (1) signed informed consent is not required; (2) Provision is made for collecting, using and storing data in a manner that protects the safety and privacy of the subjects and the confidentiality of the data. (3) Appropriate safeguards are included to protect the rights and welfare of the subjects.

This project is therefore approved at the Exempt from Full Board Review Level.

2. Please note that the institution is not responsible for any actions regarding this protocol before approval. If you expand the project at a later date to use other instruments please re-apply. Copies of your request for human subjects review, your application, and this approval, are maintained in the Office of Sponsored Programs at the above address. Please report any changes to this approved protocol to this office. A Continuing Review protocol will be sent to you in the future to determine the status of the project. Also, please use the stamped approval forms to assure participants of compliance with The Office of Human Research Protections regulations.

Sincerely,

Paul J. Mooney, M.S.T.M.
Compliance Coordinator
Office of Research
Western Kentucky University

cc: HS file number Brown HS11-095