

CONCENTRATION: CONSTRUCT REFINEMENT AND
SCALE DEVELOPMENT

by

Sabine Anna Krawietz

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The thesis of Sabine Anna Krawietz is approved:

_____ William L. Mikulas, Ph.D., Committee Chair	_____ Date
---	---------------

_____ Stephen J. Vodanovich, Ph.D., Committee Member	_____ Date
---	---------------

Accepted for the Department:

_____ Douglas D. Friedrich, Ph.D., Chair	_____ Date
---	---------------

Accepted for the College:

_____ Jane S. Halonen, Ph.D., Dean	_____ Date
---------------------------------------	---------------

Accepted for the University:

_____ Richard S. Podemski, Ph.D., Dean of Graduate Studies	_____ Date
---	---------------

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TABLE OF CONTENTS

	<i>Page</i>
ACKNOWLEDGMENTS	iii
LIST OF TABLES	vi
ABSTRACT	vii
INTRODUCTION	1
A. The Construct of Concentration	3
1. Mindfulness/Awareness	5
2. Boredom Proneness	7
3. Attention-Deficit Hyperactivity Disorder (ADHD)	9
B. Proposed Definition of Concentration	10
C. Assessment of Concentration	13
ITEM GENERATION AND PILOT TESTING	14
STUDY 1	15
A. Method	15
1. Participants	15
2. Materials and Procedures	15
B. Results	16
STUDY 2	23
A. Method	23
1. Participants	23
2. Materials	23
a. Concentration Scale (CS)	23
b. Mindfulness Questionnaire (MQ)	23
c. Boredom Proneness Scale (BPS)	24
d. Adult Behavior Checklist (ABC)	24
3. Procedure	25
B. Results	25
DISCUSSION	32
A. Conclusions	37

REFERENCES	39
APPENDIXES	47
A. Institutional Review Board Approval	48
B. Concentration Scale Items.....	51
C. Informed Consent Form	56
D. Self-Report Measures.....	58
E. Copyright Permission Letter.....	65

LIST OF TABLES

<i>Table</i>	<i>Page</i>
1. Results of Factor Analysis Using Varimax Rotation	18
2. Means and Standard Deviations of CS, MQ, BPS, and ABC Scales and Subscales.....	26
3. Results of Correlations Between CS, MQ, BPS, and ABC Scores	27
4. Results of Regression Analysis of MQ, BPS, and ABC Subscales Predicting CS Scores	30
5. Results of Regression Analysis of MQ, BPS, and ABC Subscales Predicting CS Subscale Scores	31

ABSTRACT

COONCENTRATION: CONSTRUCT REFINEMENT AND SCALE DEVELOPMENT

Sabine Anna Krawietz

The construct of concentration was refined and a 49-item self-report scale was developed. The development of the Concentration Scale (CS) included factor analysis, reliability, and construct validity testing. In Study 1, 202 college students completed the preliminary CS. An exploratory factor analysis yielded four factors which accounted for 46% of the variance in CS scores. The reliability of CS was found to be .93 (Cronbach's alpha). In Study 2, 130 college students completed the revised CS, the Mindfulness Questionnaire (MQ; Mikulas, 1990), the Boredom Proneness Scale (BPS; Farmer & Sundberg, 1986), and the Adult Behavior Checklist (ABC; Barkley & Murphy, 1998). As expected, significant positive correlations were observed between CS total scores and the measure of mindfulness, while significant negative relationships were found between CS scores and the measures of boredom proneness and attention-deficit hyperactive disorder (ADHD). The subscales scores of MQ, BPS, and ABC together were found to be significant predictors ($R^2 = .54$) of CS scores. The findings are discussed in terms of how CS provides a measure of the construct, and how CS can be used in a variety of applied settings (e.g., counseling, academia, and industry).

INTRODUCTION

Throughout the field of psychology, many researchers have stressed the importance of concentration skills (James, 1890/1950; Mikulas, 2002; Moran, 1996; Schweizer, 2006). For example, James once said, “Concentration is the very root of judgment, character, and will” and an “education which should improve this faculty would be the education par excellence” (p. 424). Sports scientists have identified concentration to be a significant factor for successful performance (Jackson & Csikszentmihalyi, 1999; Moran). For example, Jackson and Csikszentmihalyi associated concentration with absorption and included concentration as one of the nine components of the *flow* experience, which signifies a state of peak (athletic) performance. Moreover, concentration is a prerequisite for common daily behaviors such as reading and listening. Whether an individual reads the newspaper, listens to the radio, or watches the news channel, he or she needs to stay focused in order to understand the information. Most jobs involve reading and listening in one form or another, and concentration deficits can cause severe accidents on the job. Furthermore, sleep disorders such as insomnia have been linked to the lack of attentional control (Kass, Wallace, & Vodanovich, 2003). Even though researchers agree that concentration skills are valuable in human performance, they have not yet established a clear consensus on a common definition (Mikulas; Schweizer, 2006) and have not yet generated an effective general self-report measure of concentration skills (Greher & Mahoney, 2001).

A definition that researchers can agree upon is key to the establishment of a theoretical foundation for a construct, to the building of consistency and clarity among the construct's components, and to the creation of standards for measuring it. Therefore, a self-report measure of concentration has the potential to become important in clinical, organizational, academic, sports, and research-oriented settings. For instance, a concentration scale can diagnose concentration-related deficits, select workers with superior concentration skills, help enhance athletic performance, track cognitive development over time, and measure the effects of an intervention on concentration skills.

The manuscript begins with a review of definitions, theories, and self-report measures of concentration and is followed by the proposed definition of the construct. Next, the development of the concentration scale, which included item generation, pilot testing, and two empirically based studies, is described. The first of these two empirical studies, Study 1, describes the assessment of the scale's internal consistency and the factors that emerged via the factor analysis. Subscales were formed based on these emergent factors. The second empirical study, Study 2, demonstrates the test of the scale's construct validity, in which the revised concentration scale was administered with three construct-related (mindfulness, boredom proneness, and attention-deficit hyperactivity disorder) self-report measures. The results of correlational and regression analyses are illustrated following the description of the methods. Finally, recommendations for future development of the scale and practical applications are discussed.

The Construct of Concentration

When referring to cognitive processes that relate to focusing attention, the Anglo-American literature and the German literature use different terms, attention and concentration, respectively (Schweizer, 2006). Overall, attention has been more widely researched than concentration. Researchers in cognitive science have debated over the relationships between concentration and attention (Mikulas, 2002; Schweizer), and I identified three variations of this relationship (a) concentration as a subprocess of attention (Brickenkamp & Karl, 1986; Enns, 1990; Kinchla, 1992; LaBerge, 1990; Mierke, 1957; Mikulas; Moray, 1969; Rapp, 1982), (b) concentration as a process independent from attention (Schmidt-Atzert, Buettner, & Buehner, 2004; Westhoff & Hagemeister, 2005) and (c) concentration as a combination of two or more types of attention (Moosbrugger, Goldhammer, & Schweizer, 2006; Moran, 1996; Schweizer).

Many researchers call concentration a unique or special type of attention and agree that it is a subprocess of attention (Brickenkamp & Karl, 1986; Mikulas, 2002; Rapp, 1982). Moreover, concentration is seen as a skill that can be learned and unlearned (Mierke, 1957; Mikulas). In the current literature, the terms closest to the construct of concentration are “focused attention,” “sustained attention,” “controlled attention,” and “vigilance” (Mikulas, p. 92). However, Mikulas explains that these terms reflect the “readiness and/or ability to detect critical signals” only and that they are not sufficient in describing the construct in its entirety. Instead, he clarifies that these definitions lack the component of “maintaining a desired focus of attention” (p. 92). Mikulas defined concentration as “the learned control of the focus of one’s attention” and further explains that “it is the behavior of keeping one’s awareness, with varying degrees of one-

pointedness, on a particular set of contents of the mind” (p. 90). Other like-minded researchers describe concentration as the allocation of attentional resources together with the focusing of attention on targeted objects, while withdrawing from unrelated and/or less relevant stimuli (Brickenkamp & Karl; Mierke).

A different group of researchers argues that concentration is a construct independent from attention (Schmidt-Atzert, Buettner, & Buehner, 2004; Westhoff & Hagemester, 2005). They relate attention to conscious awareness and concentration to the process that precedes and facilitates this awareness. Concentration is sometimes described as a “cognitive effort” (Schmidt-Atzert et al.) or “working” (Westhoff & Hagemester) that is said to facilitate the speed and accuracy of a person’s performance on the task.

A third group of researchers does not describe concentration as part of attention; instead, they combine two or more types of attention to define concentration (Moosbrugger et al., 2006; Moran, 1996; Schweizer, 2006). For example, Schweizer describes concentration as the ability to control, divide and switch one’s attention, while Moran divides concentration into selective attention, divided attention, and maintaining alertness. Whether or not these researchers view concentration as a subprocess of attention is not clear.

Concentration has also been associated with sustained attention. Dember and Warm (1979) define sustained attention as “the ability of observers to maintain their focus of attention and remain alert to stimuli over prolonged periods of time” (p. 148). Individuals who score low on tests of sustained attention tend to have difficulties staying focused in diverse situations such as reading, listening, and analyzing (Brumback, 2000).

Moreover, many researchers found similarities between processes of concentration and processes of sustaining attention (Cahn & Polich, 2006; Dunn, Hartigan, & Mikulas, 1999; Gevins, Smith, McCoy, & Yu, 1997; Kubota et al., 2001; Mizuki, Tanaka, Isozaki, Nishijima, & Inanaga, 1980; Pan, Zhang, & Xia, 1994). For example, meditation practices that utilize concentration (Dunn et al., 1999; Pan et al., 1994) and mental tasks that require sustained attention (Kubota et al., 2001; Mizuki et al., 1980) have been associated with increased frontal midline theta activity.

Besides the relationship between concentration and attention, researchers have found relationships between concentration and other constructs. Some of the more common constructs are mindfulness (Dunn et al., 1999; Mikulas, 1990), boredom (Farmer & Sundberg, 1986), and attention-deficit hyperactivity disorder (Richards, Rosen & Ramirez, 1999).

Mindfulness/Awareness

Mindfulness, or awareness, is defined as the “subjective conscious experience of noticing” (Mikulas, 1990, p. 3) which may lead to an “open receptivity and awareness of all stimulation” (Dunn et al., 1999, p. 148). In other words, being mindful means to be aware of all stimulation including internal (e.g., thoughts, body sensations) and external (e.g., noise, movement in the environment) stimuli without being attached to paying attention to one particular stimulus more than to another. Likewise, while one is aware of all stimulation, one does not evaluate, analyze, or classify the stimuli (Dunn, et al.); instead, one only notices them. Because mindfulness and concentration are highly interrelated, some researchers do not understand their differences (Mikulas, 2002).

Concentration is “the ability to keep one’s attention on a particular object, or domain” (Mikulas, 1990, p. 3). The two constructs are interrelated in that focusing on different stimuli, or different aspects of a stimulus, may increase one’s awareness of the object (Feddon, 1996). In other words, one utilizes concentration to become mindful of an object. Meditation enhances concentration and mindfulness skills (Blackmore, 2004; Goleman, 1988; Mikulas, 2002). Since concentration and awareness are interrelated, awareness is present even during states of intensive concentration. In fact, one cannot concentrate, or focus, on an object without being aware of the object, or certain aspects of the object (e.g., when listening to a talk, one must be aware of what the speaker is saying while simultaneously being aware of how the speaker is saying it.). Even when an individual is completely absorbed, or highly focused, on an object (e.g., being absorbed in a story), he or she is consciously or unconsciously aware of internal and/or external stimuli (e.g., one’s breathing, noise and movement in the environment).

Mindfulness meditation (e.g., zen, vipassana) has been described as “open meditation leading to a perfectly open state known as bare awareness or bare attention” (Blackmore, 2004, p. 389). Such attention leads to increased awareness of both internal and external stimuli (Dunn et al., 1999). Concentration meditation (e.g., the majority of Transcendental and yoga meditations) cultivates the focusing of one’s awareness on a stimulus, or certain aspects of a stimulus (Dunn et al.). Research on different types of meditation (i.e., mindfulness and concentration meditation) provides evidence for the qualitative differences in the constructs of mindfulness and concentration.

Dunn and his colleagues (1999) investigated the relationship between mindfulness and concentration by comparing electroencephalographic (EEG) recordings from 10

volunteers. Wave activity was recorded before and 8 weeks after the volunteers received instructions on mindfulness and concentration meditation. After receiving the instructions, the volunteers practiced concentration and mindfulness meditation on a regular basis. The researchers then measured wave activity during mindfulness and concentration meditation and found significant differences in wave activity between the two types of meditation. Specifically, mindfulness meditation “produced relatively more slow (delta and theta) and relatively more fast (alpha and beta 1) wave activity than concentration meditation” (p. 163). Mindfulness, therefore, was expected to positively correlate with concentration in this study.

Boredom Proneness

Boredom can be described as “a negative, dissatisfying emotional state that is mitigated by individual cognitive capabilities or tendencies” (Kass et al., 2003, p. 83). For example, boredom has been defined as “a state of relatively low arousal and dissatisfaction which is attributed to an inadequately stimulating environment” (Mikulas & Vodanovich, 1993, p. 3) and as “an affective experience associated with cognitive attentional processes” (Leary, Rogers, Canfield, & Coe, 1986).

The relationship between boredom proneness and concentration has not yet been investigated in depth. However, a few studies of sustained attention suggest possible relationships. Boredom has been found to be negatively related to sustained attention (Kass, Vodanovich, Stanny, & Taylor, 2001; Sawin & Scerbo, 1995). Kass and his colleagues showed that boredom-prone individuals performed less well on the Mackworth Clock task than individuals who were not prone to boredom. Similarly,

Sawin and Scerbo found that boredom proneness was negatively related to scores on a flicker detection task that measured sustained attention. Boredom proneness has been associated with other constructs as well.

Boredom has been associated with attention-deficit hyperactivity disorder (ADHD) and sleep disorders (Kass et al., 2003) and cognitive failures (Wallace, Kass, & Stanny, 2002). Kass and his colleagues found that scores on the Boredom Proneness Scale (BPS; Farmer & Sundberg, 1986) and scores on the Athens Insomnia Scale (AIS; Soldatos, Dikeos, & Paparrigopoulos, 2000), a measure of sleep disorders, significantly correlated with a measure of ADHD, the Adult Behavior Checklist (ABC; Barkley & Murphy, 1998). Moreover, these researchers obtained evidence that boredom-prone individuals have “cognitive/attentional shortcomings” and an “inability to be absorbed in their activities” (p. 86). In addition, Wallace and his colleagues found a close relationship between the scores on the BPS and the Cognitive Failures Questionnaire (CFQ; Broadbent, Cooper, Fitzgerald, & Parkes, 1982). Cognitive failures are mistakes (e.g., throwing away a new pen and keeping an old pen) that occur during undemanding tasks (Manly, Robertson, Galloway, & Hawkins, 1999; Martin, 1983).

In addition, boredom has been associated with many other constructs such as diminished performance ability; life dissatisfaction; health problems (O’Hanlon, 1981); high rates of accidents (Branton, 1970); poor academic achievement and psychological development (Watt & Vodanovich, 1999); diminished need for cognition (Seib & Vodanovich, 1998; Watt & Blanchard, 1994); negative emotional states such as depression and anger (Ahmed, 1990; Farmer & Sundberg, 1986; Rupp & Vodanovich, 1997; Vodanovich, Verner, & Gillbride, 1991); addictive behaviors, sensation-

seeking/risk-taking, and impulsivity (Kass & Vodanovich, 1990; Watt & Vodanovich; Zuckermann, 1979); difficulties in interpersonal activities such as higher social dependency and alienation and less sociability (Leong & Schneller, 1993; McGiboney & Carter, 1988; Tolor, 1989); reduced job satisfaction (O'Hanlon); and, more specifically, dissatisfaction with work, pay, promotion, coworkers, and supervisors (Kass, Vodanovich, & Callendar, 2001).

Attention-Deficit Hyperactivity Disorder (ADHD)

Individuals diagnosed with ADHD may not be able to concentrate well. The typical symptoms of this disorder are inattention, the inability to sustain attention, and hyperactivity, a deficit in a person's ability to inhibit behavior (Barkley & Murphy, 1998). *The Diagnostic and Statistical Manual for Mental Disorders IV (DSM-IV)* describes three types of the disorder: predominantly inattentive, predominantly hyperactive-impulsive, and combined (American Psychiatric Association, 1994). The focus of the present study is predominantly on the inattention symptoms; however, hyperactivity aspects of ADHD will also be examined.

Whereas college students who have been diagnosed with ADHD show comparable deficits in inattention and hyperactivity (Richards et al., 1999), adults are more prone to inattention than to hyperactivity deficits (Millstein, Wilens, Biederman, & Spencer, 1997). For instance, Millstein and his colleagues found that 93% of 149 adults diagnosed with ADHD displayed symptoms of inattentiveness, whereas only 3% displayed hyperactive symptoms.

In addition, ADHD has been associated with boredom proneness and sleep disorders (Kass et al., 2003). Kass and his colleagues found that scores on the BPS subscale of Internal Stimulation (indicative of boredom from the inability to create appealing activities) significantly correlated with the ABC subscale of Inattention, while BPS External Stimulation (representing boredom resulting from the lack of sufficient environmental stimuli) significantly correlated with the ABC Hyperactivity scale. Moreover, the researchers concluded that daytime sleepiness and insomnia highly correlated with the Inattention subscale of the ABC, whereas only daytime sleepiness significantly correlated with Hyperactivity scores of the ABC. Furthermore, Shaw and Giambra (1993) found that ADHD negatively affected performance on a sustained attention task and that ADHD individuals experienced higher rates of task-unrelated thoughts. ADHD has been related to lower academic achievement, poor social skills, anxiety and depression, conduct and delinquency problems, substance abuse, and driving accidents (Barkley, 1997; Nadeau, 1995), lower job performance (Murphy & Barkley, 1996), and impulsivity (Richards et al., 1999). Although, the relationship between concentration and ADHD has not yet been investigated, studies of sustained attention suggest a highly negative relationship between the two constructs. ADHD is expected to correlate highly and negatively with concentration.

Proposed Definition of Concentration

Concentration is the ability to intentionally sustain and shift one's attention while minimizing involuntary shifts of attention. In particular, sustaining attention is the ability to maintain one's attention on an object despite internal and external stimuli distractions

(e.g., continuing to read while people are talking). Moreover, shifting attention is the ability to disengage, move, and engage one's attention from one object to another without unintentionally losing and/or misplacing one's attention (e.g., skillfully directing one's attention from one speaker to another in a group conversation). Furthermore, concentration corresponds more to a behavior, or skill, than to a state.

Concentration is a behavior superordinate to focusing and corresponds to the maintenance of the desired focus (Mikulas, 2002). Mikulas describes concentration as a "behavior of the mind" that selects and constructs what are called "contents of the mind" (p. 88). In other words, concentration is the mechanism that manipulates the focus in a desired way and can be seen as a metacognition. Moreover, concentration involves not only focusing on an object but also disregarding those stimuli that are not part of the focus. Furthermore, there is a sense of intentionality associated with this manipulation of focus. In general, the better one's concentration skills, the better one is at using one's focus intentionally. For example, individuals with superior concentration skills can better shift their focus from one speaker to another than individuals with inferior concentration skills.

Nideffer (1976) said that the focus of one's attention can be narrow or broad and internal or external, depending on the object of one's focus. For example, paying attention to the sensation of one's breath requires a narrow and internal focus whereas watching a football game normally requires a broad and external focus. Concentration is required in order to continue to observe one's breath (or the game).

The object of focus can also change. During group conversations, for example, as speakers change, so does the object of focus (i.e., the person talking). Therefore, staying

focused in a group conversation requires the ability to shift one's attention according to who speaks. In cognitive science, the spotlight metaphor is often used to compare and illustrate such shifts in attention. Furthermore, individuals shift attention in more complex ways and usually without conscious awareness (e.g., when they change from talking to thinking or when they narrow their focus from many stimuli to few). For example, individuals may narrow their focus before going to bed. At first, they may focus on, or be aware of, a large number of stimuli, internal and external. Then, they may slowly decide to withdraw from external stimuli, narrow our focus to internal stimuli, and finally withdraw from most stimuli to fall asleep. Even though individuals generally sustain and shift their attention unconsciously, concentration can use the ability to the focus in an intentional way.

When a novel and/or salient stimulus (e.g., loud noise) emerges, it becomes very difficult, if not impossible, to stay focused on one's activity. However, one can learn to keep one's focus on a desired object for most of the time and minimize involuntary shifts of attention. For example, one can learn to refocus when one's attention drifts away; one can learn to sustain one's focus in the presence of less salient stimuli; and one can learn to skillfully shift one's attention from one object to another without getting stuck or caught up in irrelevant objects. Consequently, concentration skills may dramatically affect one's life.

Poor concentration skills may lead to difficulties when studying, difficulties falling asleep, losing control over disturbing and/or intruding thoughts, and poor listening skills (Mikulas, 2002). In addition, poor concentration skills may lead to higher occurrences of absent-minded events such as misplacing one's car keys. Concentration

has been associated with relaxation, as effects of meditation indicate (Mikulas), and may result in superior mental performance and emotional control. For example, some people may have difficulties controlling their focus before going to sleep and may stay up late because they are unable to withdraw from thoughts and/or noise. However, one can learn to disengage one's attention from intruding thoughts or distractions.

Assessment of Concentration

Nideffer's (1976) *Test of Attentional and Interpersonal Style* (TAIS) has commonly been used as a measure of concentration (Bergandi, Shryock, & Titus, 1990; Greher & Mahoney, 2001); however, many researchers found that the TAIS did not accurately measure all facets of concentration (Greher & Mahoney; Mikulas, 2002, Moran, 1996) and others have criticized the test's internal consistency and validity (Van Schoyck & Grasha, 1981). A number of sport-specific concentration self-report measures have appeared in the literature the *Basketball Concentration Survey* (Bergandi et al.), the *Golf Performance Survey* (Thomas & Over, 1994), and the *Tennis Test of Attentional and Interpersonal Styles* (Van Schoyck & Grasha). However, these measures are limited in their applicability to other domains. The present study has generated a new self-report measure for general concentration skills. Its purpose is to measure all facets of concentration and to reach high internal consistency and validity.

ITEM GENERATION AND PILOT TESTING

The literature on the construct of concentration was used to develop an initial pool of 83 concentration items that reflected the factors of sustaining attention, shifting attention, volition, immersion/absorption, and absent-mindedness (Cahn & Polich, 2006; Jackson & Csikszentmihalyi, 1999; Mikulas, 1990; Moran, 1996; Schweizer, 2006; Tellegen & Atkinson, 1974). Both positive and negative concentration items were constructed for each factor. The items reflected a person's engagement in commonplace behaviors (e.g., reading and listening). The initial concentration scale utilized a 5-point Likert-type response format ranging from "never" to "always."

A total of 20 master's students and 5 psychology professors from The University of West Florida volunteered to review the initial scale items. These reviewers were asked to comment on, delete and/or add items to the questionnaire. After the reviews were completed, all reviewers were interviewed regarding face validity of the scale. After taking these recommendations into consideration, the initial item pool was reduced to 56 items (see Appendix B for Concentration Scale Items). In addition, the scale was expanded to a 7-point Likert format.

STUDY 1

Method

Participants

Two hundred and two introductory psychology students (mean age = 20.2 years, $SD = 3.8$) from The University of West Florida completed the 56-item preliminary concentration scale (74 males; 128 females). Seventy-three percent of the participants were Caucasian, 9% were Hispanics, 7% were African American, and 11% were categorized as “other.” Participation was anonymous and voluntary. Upon participation, students received class credit and their names were entered in a lottery that gave them the chance to win a prize (a \$20.00 gift certificate).

Materials and Procedure

The Concentration Scale (CS) and demographic sheet were made available to participants via an online site (www.SurveyMonkey.com). The survey included a welcome page, the informed consent form, a demographic questionnaire, a description of the concentration scale, an instructions page for the concentration scale, the items of the concentration scale, and a debriefing page. All pages were linked together sequentially and could be navigated by clicking “Next” on the bottom of each page. The welcome note included a preview of the survey’s components and a description of the incentives.

The informed consent page described the purpose of the study and assured the anonymity and confidentiality of participant responses. Participants indicated their informed consent by clicking “Next” on the informed consent page (see Appendix C for Informed Consent Form). The last page of the survey was a debriefing page where participants were thanked for their contribution.

The researchers recruited participants by briefly explaining the study during class sessions and requesting e-mail addresses of those willing to participate. E-mail addresses were entered into the (www.SurveyMonkey.com) online database. An e-mail, including a brief description of the study and a link to the online survey, was sent to all potential participants. The link connected participants directly to the welcome page of the survey.

Finally, lists of participants were sent to instructors so that participants could receive extra course credit for their participation. Five participants were randomly selected through a lottery drawing and awarded a \$20.00 gift certificate.

Results

A reliability analysis was performed on the 56-item Concentration Scale. A total of seven items were shown to have low item-total score correlations and/or resulted in an increase in the alpha if the item was removed; therefore, seven items were removed from the scale. The reliability of the revised 49-item scale was found to be .93.

A principal components factor analysis with a varimax rotation was computed on the responses to items on the CS. Items were considered to belong to a factor if they had loadings of .40 or greater. All but one item (Item 5) met this criterion, and this item was excluded from further analyses. If an item loaded significantly on more than one factor,

the larger of the two factor loadings was used to categorize the item. An initial factor analysis indicated the existence of eleven factors that accounted for 66% of the variance on CS scores. Based on the concentration literature, and the conceptual basis for item development, a factor analysis requesting five factors was performed. This solution accounted for altogether 49.4% of the variance. The fifth factor contained only two items and their content conceptually overlapped with another factor (Factor 2). Consequently, a four-factor solution was performed and found to be most appropriate for the current study. The four factors that emerged accounted for 46% of the variance in CS scores (see Table 1).

The first factor consisted of 17 positively phrased items. It included all initial volition and absorption items and the sustaining and shifting attention items that related to listening (i.e., to a talk or friend), group conversations/meetings, and writing letters. This factor was labeled Control of Focus and assessed the ability to stay focused among distracters or to refocus one's attention. The factor accounted for 14.9% of the variance in CS scores and showed high internal consistency with a coefficient alpha of .91.

The second factor consisted of 15 negatively phrased items and included all initial absent-mindedness items and the sustaining and shifting attention items that related to watching TV, writing e-mails/letters, talking on the phone, and group conversations. It was named Uncontrolled Focus and assessed the lack of control over one's attention in the above mentioned daily situations. All items in this factor were reverse scored. The Uncontrolled Focus factor accounted for 13.4% of the variance in CS scores and the internal consistency was .87.

Table 1

Results of Factor Analysis Using Varimax Rotation

Item	Varimax rotation factors			
	1	2	3	4
2. I can easily focus on a talk and immerse myself into what the speaker says.	.52	.17	.29	.06
6. When talking to someone, I disregard thoughts in my mind so that I can listen to what the other person is saying.	.46	-.15	.08	.25
9. When listening to a friend, I am able to ignore everything else that goes on around us to focus on the conversation.	.61	.05	.17	.10
10. If I run into someone I know I have no trouble breaking out of my train of thought and focusing on the conversation.	.48	-.01	.02	.07
21. When I notice that my attention drifts away during a talk, I bring it back to the speaker right after I realize that I got sidetracked.	.61	-.06	.15	-.12
22. Whenever I get distracted while reading, I make an effort to redirect my focus back to the book.	.73	.11	-.04	-.05
25. When involved in a group conversation, I tend to focus on one speaker at a time and direct my attention accordingly.	.52	.04	-.08	.25
26. When sitting in a meeting, I can easily shift my attention from one speaker to another.	.62	.36	-.02	.07
30. While sitting in a talk, I tune out unrelated thoughts that come up in my mind.	.50	.12	.27	.27
36. When talking to someone at a social gathering, I can listen to him or her while disregarding the conversations around us.	.65	.27	.11	.12

(Table continues)

(Table 1 continued)

Item	Varimax rotation factors			
	1	2	3	4
37. When writing a letter or email, I can simply filter out all distractions and focus on what I want to write.	.57	.35	.04	.05
39. Whenever I read a book, I get easily immersed into the story.	.47	-.01	.43	-.07
41. As soon as I notice that I lost focus during a conversation, I redirect my attention back to the speaker.	.79	.17	-.08	-.08
47. When I get distracted while talking on the phone, I bring myself back to the conversation as soon as I notice that I lost focus.	.75	.09	-.10	-.08
48. In group discussions, I remain focused on what's being said even if the conversation goes back and forth between several people.	.72	.19	.16	-.00
49. Whenever I lose attention while I'm talking to someone, I actively redirect my focus back to the conversation.	.73	.10	-.04	-.14
52. In meetings, I can focus on the conversation while not paying attention to the surrounding noise.	.51	.27	.44	.09
1. When I watch TV, I cannot stay focused on what I'm watching because I get distracted by things going on around me.	.16	.57	-.03	.01
3. I get so sidetracked that I get lost in familiar environments.	.13	.56	.07	.13
4. After returning from the store, I realize I forgot to buy the important items that I wanted to get.	.05	.51	.03	.11
8. When watching movies, I miss out on scenes because I get distracted by things going on around me.	.20	.58	.25	.18

(Table 1 continues)

Table 1 continued)

Item	Varimax rotation factors			
	1	2	3	4
13. I have problems shifting my attention from one thing to another.	.17	.50	.13	.10
15. When walking into a room for something, I lose track of what I was going into the room for.	-.08	.55	.10	.17
16. While writing emails/letters, I get lost in thoughts and I do not easily get back to finishing the message.	.17	.63	-.01	.16
23. When answering a question, I forget the question and I do not know if my answer is at all related to the question.	.10	.65	.08	-.02
29. When watching a movie, I get so caught up in thought that I can't seem to follow the story of the movie.	.33	.58	.04	.03
32. When talking on the phone, my mind wanders to things outside the conversation.	.05	.45	.23	.02
35. When I watch a movie, I miss out on parts of the story because my attention tends to drift away.	.20	.60	.31	.10
38. I become preoccupied with certain thoughts and find it difficult to direct my attention away.	.11	.55	.34	.23
40. I have to search for my keys because I can't remember where I put them.	.04	.50	.16	-.21
43. In group conversations, I find it difficult to shift my attention from one speaker to the next because my mind is occupied with thinking about what I want to say next.	.14	.52	.25	.14
46. In group situations, I find it difficult to listen to others because I think about what I want to say next.	-.02	.44	.30	.02

(Table 1 continues)

(Table 1 continued)

Item	Varimax rotation factors			
	1	2	3	4
14. While reading, I can disregard unrelated thoughts with the intention of focusing on my reading.	.40	-.00	0.60	.01
17. In a noisy environment, I can focus on reading while paying no attention to the noise around me.	.26	.01	.69	.11
24. It is difficult for me to listen to a lecture without getting distracted by unwanted thoughts.	.01	.41	.52	.16
27. When listening to a talk, I seem to be caught up in something else in the room although I want to be listening to the speaker.	.15	.48	.48	.17
31. Whenever I read, I get distracted by things going on around me.	-.02	.29	.72	.16
34. Whenever I read, I have to reread passages because I forget what I just read.	-.10	.38	.63	.19
42. I don't get easily distracted when I read or study.	.20	.22	.45	.15
50. While listening to a speech, I lose focus and my mind drifts away.	.06	.43	.56	.24
54. I have to have silence in order to read effectively; otherwise, I get distracted and lose focus.	-.14	.11	.66	.06
55. When listening to a speech, I start looking around the room and lose track of the talk.	.08	.46	.56	.13
7. When trying to sleep, my mind gets lost in what I need to do the next day or what I did earlier that day.	-.14	.30	.09	.69

(Table 1 continues)

(Table 1 continued)

Item	Varimax rotation factors			
	1	2	3	4
11. When I go to sleep, I become so sensitive to sounds in the environment that I have difficulties falling asleep.	.00	.18	.18	.69
19. When trying to sleep, I can't stop my mind from racing.	-.03	.33	.06	.80
28. When I want to sleep, I can ignore noise from my environment and immediately fall asleep.	.27	-.00	.20	.70
33. I find my mind racing uncontrollably.	-.08	.43	.27	.51
44. In bed, I am able to disregard the thoughts in my mind so that I can more easily fall asleep.	.30	.02	.25	.66
Eigenvalue	7.3	6.6	5.1	3.6
% of Variance	14.9	13.4	10.4	7.3
Cumulative %	14.9	28.3	38.7	46.0

Note: Items are sorted by factor; Item 5 excluded due to inadequate factor loadings.

The third factor (10 items) was composed of the initial sustaining attention items that involved reading and listening to a talk or speech. This factor assessed the tendency to lose focus or get distracted while reading or listening to a talk. This factor was named Reading and Listening Focus. It accounted for 10.4% of the variance and demonstrated adequate reliability with an internal consistency estimate of .87.

The fourth factor included 6 shifting attention items that concerned an individual's ability to willingly withdraw from internal and external stimuli in order to go to sleep. It was called Control of Focus before Sleeping, accounted for 7.3% of the variance, and had a coefficient alpha of .84.

STUDY 2

Method

Participants

One hundred and thirty undergraduate student volunteers (mean age = 24.44 years; $SD = 6.2$ years) from The University of West Florida participated in Study 2 (80 females; 50 males). Seventy-eight percent of the participants were Caucasian, 9% African American, 4% Hispanics, and 9% were classified as “other.” As in Study 1, participation was anonymous and voluntary and volunteers received class credit and were entered into a lottery to win a prize (a \$20.00 gift certificate).

Materials

Concentration Scale (CS). CS was developed in Study 1 and was revised to a 49-item scale that assesses the ability to concentrate across common, daily behaviors (e.g., “I can easily focus on a talk and immerse myself into what the speaker says” and “I get so sidetracked that I get lost in familiar environments”). Items are arranged on a 7-point Likert scale ranging from 1 (“never”) to 7 (“always”). High scores on the scale reflect high-level concentration abilities.

Mindfulness Questionnaire (MQ). The Mindfulness Questionnaire (Mikulas, 1990) includes 45 items arranged on a 5-point Likert scale from 1 (“never or almost

never true of me”) to 5 (“always or very often true of me”). Two other choices are included. One response reflects the answer “does not apply to me” and the other indicates “the meaning of the statement is unclear.” Only the answer choices from the Likert scale (i.e., 1 through 5) were used in the current study. Negative items were reverse scored and the answer choices were added together. MQ consists of four subscales named Mind, Feelings, Body, and General (see Appendix D for Self-Report Measures).

Boredom Proneness Scale (BPS). The Boredom Proneness Scale (Farmer & Sundberg, 1986) consists of 28 items using a 7-point Likert scale ranging from 1 (“strongly agree”) to 7 (“strongly disagree”). The internal consistency of the BPS has ranged from .79 to .84 across numerous studies (Kass & Vodanovich, 1990; Seib & Vodanovich, 1998; Vodanovich & Kass, 1990; Vodanovich et al., 1991; Watt & Vodanovich, 1992). A recent factor analysis of the BPS (Vodanovich, Wallace, & Kass, 2005) proposed two BPS factors, Internal Stimulation, or the “perceived ability to generate sufficient stimulation,” and External Stimulation, or “the need for a variety and change” (p. 300). Scores on these two factors were used in this study (see Appendix D for Self-Report Measures).

Adult Behavior Checklist (ABC). The Adult Behavior Checklist (Barkley & Murphy, 1998) is an 18-item scale that assesses symptoms of ADHD as identified by the *DSM-IV* (American Psychiatric Association, 1994). The items are arranged on a 4-point scale, ranging from 0 (“never or rarely”) to 3 (“very often”). The ABC consists of two subscales with 9 items each. Odd-numbered items assess inattention and even-numbered items assess hyperactivity. Possible scores range from 0 to 27 for each subscale (see Appendix D for Self-Report Measures; see Appendix E for Copyright Permission Letter).

Past research (Smith & Johnson, 1998) has reported the reliability of the subscales to be adequate, ranging from .74 to .78.

Procedure

The procedure of Study 2 resembled the procedure of Study 1. Participants were recruited from undergraduate classes at The University of West Florida and participated voluntarily through an online site (www.SurveyMonkey.com).

Study 2 started with a welcome page, an informed consent form, and a demographic questionnaire. Pages were linked together sequentially and could be navigated by clicking “Next” on the bottom of each page. A survey description page and an instructions page were created for each of the four surveys utilized in this study. The survey description and instructions pages preceded the respective survey. In the debriefing page, the study was explained in detail and participants were thanked for their contribution.

Results

Means and standard deviations for each of the scales and subscales are included in Table 2. Pearson correlation coefficients were computed between measures of concentration, mindfulness, boredom proneness, and attention-deficit hyperactivity disorder. As expected, significant positive correlations were observed between CS total scores and a measure of mindfulness, while significant negative relationships were found between CS scores and measures of boredom proneness and ADHD.

Table 2

Means and Standard Deviations of CS, MQ, BPS, and ABC Scales and Subscales

Scale	Statistics			
	Minimum	Maximum	<i>M</i>	<i>SD</i>
CS total	132	321	224	34.1
CS controlled focus	51	107	82	12.1
CS uncontrolled focus	49	103	72	10.2
CS reading and listening focus	13	69	41	11.1
CS control of focus before sleeping	10	42	25	7.2
MQ total	60	194	146	20.6
MQ body	5	33	22	4.6
MQ mind	11	69	47	9.7
MQ feeling	5	20	12	3.2
MQ general	15	44	31	6.8
BPS total	53	170	97	17.9
BPS internal	9	36	19	4.2
BPS external	6	39	22	6.1
ABC total	18	49	31	7.2
ABC inattention	9	26	14	3.8
ABC hyperactivity	9	28	17	4.4

Note: $N = 130$; CS = Concentration Scale, MQ = Mindfulness Questionnaire, BPS =

Boredom Proneness Scale, ABC = Adult Behavior Checklist.

* $p < .05$, ** $p < .01$;

Table 3

Results of Correlations Between CS, MQ, BPS, and ABC Scores

Scale	Scale															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. CS	1.00															
2. CS1	.85**	1.00														
3. CS2	.87**	.65**	1.00													
4. CS3	.85**	.60**	.66**	1.00												
5. CS4	.70**	.45**	.56**	.49**	1.00											
6. MQ	.41**	.38**	.33**	.37**	.21*	1.00										
7. MQ1	.36**	.28**	.32**	.31**	.27**	.74**	1.00									
8. MQ2	.22*	.22**	.12	.26**	.08	.86**	.51**	1.00								
9. MQ3	.43**	.32**	.41**	.27**	.44**	.52**	.42**	.28**	1.00							
10. MQ4	.56**	.44**	.60**	.42**	.38**	.43**	.36**	.05	.43**	1.00						

(Table 3 continues)

(Table 3 continued)

Scale	Scale															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
11. BPS	-.56**	-.50**	-.44**	-.42**	-.48**	-.37**	-.33**	-.23*	-.46**	-.44**	1.00					
12. BPS1	-.48**	-.45**	-.42**	-.37**	-.28**	-.37**	-.25**	-.31**	-.31**	-.35**	.60**	1.00				
13. BPS2	-.42**	-.35**	-.29**	-.37**	-.37**	-.18*	-.21*	-.03	-.31**	-.33**	.71**	.14	1.00			
14. ABC	-.60**	-.41**	-.58**	-.48**	-.54**	-.30**	-.30**	-.10	-.46**	-.53**	.46**	.37**	.34**	1.00		
15. ABC1	-.58**	-.40**	-.62**	-.47**	-.41**	-.28**	-.23*	-.08	-.36**	-.58**	.45**	.44**	.27**	.86**	1.00	
16. ABC2	-.48**	-.32**	-.41**	-.38**	-.53**	-.25**	-.30**	-.09	-.44**	-.37**	.36**	.22**	.32**	.89**	.54**	1.00

Note: $N = 130$; CS = Concentration Scale, CS1 = Controlled Focus, CS2 = Uncontrolled Focus, CS3 = Reading and Listening Focus, CS4 = Control of Focus before Sleeping, MQ = Mindfulness Questionnaire, MQ1 = Body, MQ2 = Mind, MQ3 = Feeling, MQ4 = General, BPS = Boredom Proneness Scale, BPS1 = Internal Stimulation, BPS2 = External Stimulation, ABC = Adult Behavior Checklist, ABC1 = Inattention, ABC2 = Hyperactivity.

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

Specifically, all of the CS subscales were significantly related to all Mindfulness subscales, with the exception of the Mindfulness Mind subscale. Furthermore, all four CS subscales were significantly related to all of the BPS and ABC subscales (see Table 3).

A regression analysis was performed to assess the extent to which the measures of mindfulness, boredom proneness, and ADHD were predictive of CS total scores. The scores on the subscales MQ, BPS, and ABC were found to be significant predictors of scores on CS ($R^2 = .54$), $F(8, 121) = 17.7$, $p < .001$. Specifically, the findings indicated that the ABC subscale of Inattention, as well as scores on both of the BPS subscales (Internal and External) and the MQ subscale General were significant predictors of CS total scores. Results of this regression analysis are presented in Table 4.

In addition, regression analyses were performed to assess the extent to which subscales of MQ, BPS, and ABC were predictive of each CS subscale. These results are presented in Table 5. All CS subscales were significantly predicted by two or three of the predictor subscales. The variance accounted for in CS subscales ranged from 36% to 51%. Specifically, BPS External scores significantly predicted all but one CS subscale (the Uncontrolled Focus subscale).

MQ General scores significantly predicted scores on two CS subscales, namely, Control of Focus and Uncontrolled Focus, while scores on ABC Inattention significantly predicted scores on Uncontrolled Focus and Reading and Listening Focus. Finally, BPS Internal and MQ Mind significantly predicted the CS subscales of Control of Focus and Reading and Listening Focus, respectively.

Table 4

Results of Regression Analysis of MQ, BPS, and ABC Subscales Predicting CS Scores

Subscale	Statistics		
	<i>B</i>	<i>Beta</i>	<i>t</i>
ABC inattention	-1.82	-.21*	-2.33
ABC hyperactive	-1.08	-1.4	-1.76
BPS internal	-1.64	-.20**	-2.76
BPS external	-1.12	-.20**	-2.94
MQ body	.38	.05	.63
MQ mind	.27	.08	1.00
MQ feelings	.33	.03	.41
MQ general	1.12	.22**	2.66

Note: $N = 130$; ABC = Adult Behavior Checklist; BPS = Boredom Proneness Scale;

MQ = Mindfulness Questionnaire.

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

Table 5

Results of Regression Analysis of MQ, BPS, and ABC Subscales Predicting CS Subscale Scores

Predictor	CS Subscales											
	<u>Control of focus</u>			<u>Uncontrolled focus</u>			<u>Reading and listening focus</u>			<u>Control of focus before sleeping</u>		
	<i>B</i>	<i>Beta</i>	<i>t</i>	<i>B</i>	<i>Beta</i>	<i>t</i>	<i>B</i>	<i>Beta</i>	<i>t</i>	<i>B</i>	<i>Beta</i>	<i>t</i>
MQ body	.03	.01	.10	.14	.06	.77	.11	.05	.48	.08	.05	.53
MQ mind	.12	.10	1.06	-.02	-.02	-.23	.21	.18	2.04*	-.05	-.07	-.77
MQ feeling	.01	.00	.04	.26	.08	1.04	-.34	-.10	-1.11	.39	.18	1.97
MQ general	.39	.22	2.19*	.42	.28	3.26**	.24	.15	1.49	.07	.06	.63
BPS internal	-.80	-.28	-3.20**	-.30	-.13	-1.67	-.35	-.13	-1.53	-.16	-.09	-1.11
BPS external	-.38	-.19	-2.40*	-.07	-.13	-.56	-.41	-.23	-2.86**	-.19	-.16	-2.09*
ABC inattention	-.15	-.05	-.45	-.89	-.34	-3.70**	-.62	-.22	-2.10*	-.09	-.05	-.47
ABC hyperactivity	-.23	-.08	-.88	-.08	-.04	-.44	-.30	-.12	-1.30	-.52	-.32	-3.50**

Note: $N = 130$; CS = Concentration Scale, MQ = Mindfulness Questionnaire, BPS = Boredom Proneness Scale, ABC = Adult Behavior

Checklist; *B* = standardized regression weights; *Beta* = Unstandardized regression weights.

* $p < .05$, ** $p < .01$;

DISCUSSION

The results of this study indicate that concentration may be best considered a multidimensional construct and that a four-factor model may be present. A factor analysis found three factors (Control of Focus, Uncontrolled Focus, and Reading and Listening Focus) that represent key factors of concentration. Indeed, several authors have discussed the importance of the role of concentration in common daily situations, such as listening, reading, and watching TV (Brumback, 2000; Mikulas, 2002). In contrast, the last factor found in the factor analysis (Control of Focus before Sleeping) reflects a specific situation that requires one to concentrate in order to withdraw from stimuli and fall asleep. The role of concentration has not yet been experimentally addressed in this instance of attentional withdrawal. However, the presence of this factor in this study's analysis suggests that concentration may play an important role in filtering and/or ignoring unwanted information. Additionally, the patterns of correlations and regression analyses suggest that each of the four Concentration Scale (CS) factors tap into somewhat different aspects of concentration.

The positive correlations between CS and the Mindfulness Questionnaire (MQ), along with negative correlations between the Adult Behavior Checklist (ABC) and the Boredom Proneness Scale (BPS), offer support for the construct validity of CS. Specifically, high concentration scores were associated with greater mindfulness scores, while BPS and ABC scores were negatively related to scores on the CS scale. It is

reasonable, therefore, to find that individuals who are good at concentrating are also able to be mindful. According to Mikulas (2002), concentration and mindfulness are interconnected, and concentration may be seen as a prerequisite to mindfulness. For example, when learning meditation, Mikulas recommends that one learns to control one's focus before practicing mindfulness meditation.

Moreover, boredom prone individuals are generally less likely to have high concentration skills (Kass et al., 2001). Interestingly, the correlations of the Internal and External subscales of BPS with CS are about equally high; that is, individuals with low CS scores are unable to generate sufficient stimulation but they also express a need for variety and change. Jackson and Csikszentmihalyi (1999) explained that boredom is the result of high skill level and low task difficulty. For example, if a tennis player is much better than his opponent, he may get bored during the competition. This boredom may then interfere with the better player's performance, potentially causing him to lose the match. Research supports, then, the idea that learning to stay focused can prevent such performance lapses.

Significant correlations were also found between CS and ABC scores. The current study collected only self-report data on ABC inattention and hyperactivity scores in order to place individuals on a continuum for ADHD symptomology. A full diagnosis of ADHD, which was not the purpose of the current study, typically includes additional information such as age of onset and behavioral indicators. The negative relationship found in this study was especially strong between ABC's Inattention subscale and the CS. Contrary to the findings in other studies (Kass et al., 2003), hyperactivity was more highly correlated with insomnia type symptoms than with the inattention subscale of

ABC. That is, the Control of Focus before Sleeping subscale was more highly correlated with ABC Hyperactivity than with ABC Inattention. Overall, the patterns of correlations among the CS factors and other scale factors varied, suggesting that each CS factor taps into somewhat different aspects of concentration and other mechanisms associated with uncontrolled focus.

Additional information was provided by the multiple regression analysis. The subscales of the mindfulness, boredom proneness, and attention-deficit hyperactive disorder measures were significant predictors of scores on CS. Four of these subscales (i.e., ABC Hyperactivity, MQ Mind, MQ Feelings, and MQ Body) did not significantly predict CS scores independently.

Even though mindfulness requires concentration, mindfulness of cognitive processes, mindfulness of bodily sensations, and mindfulness of feelings did not serve as significant predictors for concentration in this study. This outcome is not surprising considering that the Mind, Body, and Feelings subscales measure awareness of thoughts, bodily sensations and feelings, while CS assesses concentration skills in daily activities such as reading, listening, and watching TV. However, the MQ subscale titled General subscale assesses daily activities and serves as a significant predictor of CS scores. Similarly, MQ General significantly predicted scores on the Control of Focus and the Uncontrolled Focus subscales. These results make sense as MQ General highly relates to the volition items in the Control of Focus subscale and to the absent-mindedness items in the Uncontrolled Focus subscale.

Both BP subscales (Internal and External Stimulation) were significant predictors of CS scores. Generating stimulation for oneself requires concentration. For example,

designing and planning a project requires an individual to be focused while completing the task. Consequently, it makes sense that the Internal BP subscale predicts CS scores. Concentration, which is a skill that requires practice, is not cultivated during quickly changing and relatively short-term activities. Consequently, it is understandable that BPS External subscale scores are negatively correlated with CS scores.

ABC's subscale Inattention is a higher predictor of CS scores than the Hyperactivity subscale, probably because inattention is conceptually more closely related to concentration than hyperactivity. Barkley and Murphy (1998) write that hyperactive individuals engage in excessive motor and vocal activity (e.g., restlessness; fidget behavior; and gross, purposeless body movement), whereas inattentive individuals lack the ability to sustain their attention and are said to have great difficulties with repetitive or dull tasks such as homework. Concentration, as measured by CS, is the control of one's focus or attention and is not so much the control of motor or vocal movements; therefore, inattention should be more strongly related to concentration than hyperactivity. Moreover, this study found that the CS subscale of Control of Focus before Sleeping is more closely related to hyperactivity than to inattention. This result provides supporting evidence that such control may reflect processes of concentration different from those of other factors.

The newly developed scale can be applied as a measure of concentration skills to a wide range of situations such as health and safety, job performance, academia, clinical settings, sports performance, and relationships. Concentration abilities can be an important part of insuring safety at the workplace. Several jobs require workers to sustain attention in the performance of job tasks. Numerous jobs involve maintaining focus in

boring tasks (e.g., lifeguards) and others require filtering out information in complex situations (e.g., air traffic controllers). Recently, there have been several airplane accidents due to air-traffic controller mistakes. These and similar accidents may possibly be prevented by the assessment and monitoring of concentration skills. While some jobs require a high level of concentration abilities, all jobs require some level of concentration. In 2005, more than 5,000 US employees died, and approximately 4.2 million were injured due to work-related accidents (Bureau of Labor Statistics, 2005). Steps taken to improve the concentration of employees in the workplace can have significant positive effects on the safety of those employees. Screening for concentration abilities and/or selecting employees based on such cognitive abilities is one way to make these improvements. In addition to safety, concentration can also affect job performance. Employees with superior concentration skills may work more efficiently; that is, they may work faster and make fewer mistakes than employees with inferior concentration skills. Overall, many jobs require the ability to extract information, and it is difficult to find a job where reading and listening are not important.

Similarly, concentration skills are important components in academia. Students need to acquire shifting and sustaining attention skills to be successful in college. For instance, when reading textbooks and listening to lectures, students need to be able to focus their attention in order to extract information. Moreover, they need to be able to disregard distractions when studying in a noisy environment or going to bed in a noisy dormitory. Research has found that children with attention and/or executive function deficits have lower grade point averages and lower retention rates than healthy individuals (Biederman et al., 2004).

Concentration has been shown to be an important factor in athletic performance for a variety of sports (Jackson & Csikszentmihalyi, 1999; Moran, 1996; Sanchez & Torregrosa, 2005). For example, athletes need to be able to concentrate on game strategy and technique while disregarding disturbing spectators and/or intruding thoughts. These and other kinds of distractions can harm concentration and hinder successful performance. In some cases, (e.g., mountain climbing) losing concentration can lead to severe accidents. In all high-risk sports, one should screen for and monitor an individual's concentration skills in order to prevent injuries.

Finally, the ability to focus one's attention during a conversation can be particularly meaningful in clinical work and relationships. Clinicians and counselors require superior concentration skills in order to listen, diagnose, and treat a person. Similarly, relationships are perceived as more satisfactory when partners can effectively listen to the each other.

Conclusions

In short, this study provides preliminary evidence that the Concentration Scale is a valid and reliable scale to determine concentration skills. However, these results need to be treated tentatively until more research further identifies the underlying dimensions of the construct of concentration. For example, one area of concern is that the four factors only account for 46% of the variance in CS scores.

Future research should investigate whether the CS factors reflect true dimensions of concentration and should ask certain questions: (a) Why did reading and listening items, as well as sleeping items, load on independent factors?; (b) Do reading and

listening require a different type of concentration than watching TV or writing a letter?;

(c) Does resting your mind and disengaging your attention from stimuli (e.g., before going to sleep) require a different type of concentration than other situations? In other words, are loadings based on the contents of items or the activity assessed, or do they involve true differences in processes?

Furthermore, future research should investigate whether the absent-mindedness items in the second factor and the items in the last factor (Control of Focus before Sleeping) truly relate to concentration. It is possible that absent-mindedness may be highly related to concentration but is still a separate construct that relates to mindfulness more than to concentration. Similarly, the items in this last factor highly relate to hyperactivity; therefore, there is a possibility that these do not correspond to a dimension of concentration. A validity study involving a more direct measure of concentration, such as a behavioral concentration performance test, should be conducted to answer these questions.

Another recommendation for future development of CS is the generation of additional items; specifically, future studies should include negatively phrased volition and absorption items, positively phrased absent-mindedness items, and positively phrased items involving watching TV. Moreover, additional items should be generated that involve other activities such as walking, driving, and staying focused while eating a meal. Finally, the scale should be tested with additional samples to assess its generalizability to groups other than college students.

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APPENDIXES

Appendix A

Institutional Review Board Approval



Research and Sponsored Programs
 Building 11, Room 109
 11000 University Parkway
 Pensacola, FL 32514-5750

April, 6 2006

Ms. Sabine Krawietz
 523 Chadwick St.
 Pensacola, FL 32503

Dear Ms. Krawietz:

The Institutional Review Board (IRB) for Human Research Participant Protection has completed its review of your proposal titled "Development of the Concentration Self-Report Scale" as it relates to the protection of human participants used in research, and has granted approval for you to proceed with your study. As a research investigator, please be aware of the following:

- You acknowledge and accept your responsibility for protecting the rights and welfare of human research participants and for complying with all parts of 45 CFR Part 46, the UWF IRB Policy and Procedures, and the decisions of the IRB. You may view these documents on the Office of Research web page at <http://www.research.uwf.edu>. You acknowledge completion of the IRB ethical training requirements for researchers as attested in the IRB application.
- You will ensure that legally effective informed consent is obtained and documented. If written consent is required, the consent form must be signed by the participant or the participant's legally authorized representative. A copy is to be given to the person signing the form and a copy kept for your file.
- You will promptly report any proposed changes in previously approved human participant research activities to the Office of Research and Graduate Studies. The proposed changes will not be initiated without IRB review and approval, except where necessary to eliminate apparent immediate hazards to the participants.
- **You are responsible for reporting progress of approved research to the Office of Research and Graduate Studies at the end of the project period. Approval for this project is valid for one year. If the data phase of your project continues beyond one year, you must request a renewal by the IRB before approval of the first year lapses. Project Directors of research requiring full committee review should notify the IRB when data collection is completed.**
- You will immediately report to the IRB any injuries or other unanticipated problems involving risks to human participants.

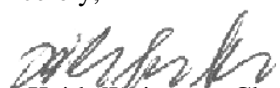
Good luck in your research endeavors. If you have any questions or need assistance, please contact the Office of Research and Graduate Studies at 857-6378.

Phone 850.474.2824 Fax 850.474.2082

Web research.uwf.edu

An Equal Opportunity/Equal Access Institution

Sincerely,



Dr. Keith Whinnery, Chair
IRB for Human Research
Participant Protection



Ms. Sandra VanderHeyden, Director
Research and Sponsored Programs

Cc: Dr. William L. Mikulas

Appendix B

Concentration Scale Items

1. When I watch TV, I cannot stay focused on what I'm watching because I get distracted by things going on around me.
2. I can easily focus on a talk and immerse myself into what the speaker says.
3. I get so sidetracked that I get lost in familiar environments.
4. After returning from the store, I realize I forgot to buy the important items that I wanted to get.
5. When writing a letter or an email, it seems as though the right words just flow right out of my fingers.
6. When talking to someone, I disregard thoughts in my mind so that I can listen to what the other person is saying.
7. When trying to sleep, my mind gets lost in what I need to do the next day or what I did earlier that day.
8. When watching movies, I miss out on scenes because I get distracted by things going on around me.
9. When listening to a friend, I am able to ignore everything else that goes on around us to focus on the conversation.
10. If I run into someone I know I have no trouble breaking out of my train of thought and focusing on the conversation.
11. When I go to sleep, I become so sensitive to sounds in the environment that I have difficulties falling asleep.
12. When writing an email or a letter, I catch myself being so focused on what I write that I forget about everything else happening around me.
13. I have problems shifting my attention from one thing to another.
14. While reading, I can disregard unrelated thoughts with the intention of focusing on my reading.
15. When walking into a room for something, I lose track of what I was going into the room for.
16. While writing emails/letters, I get lost in thoughts and I do not easily get back to finishing the message.

17. In a noisy environment, I can focus on reading while paying no attention to the noise around me.
18. While driving, I don't remember the last few miles I traveled.
19. When trying to sleep, I can't stop my mind from racing.
20. I can get so involved into group conversations that I feel as though I lose myself in the group.
21. When I notice that my attention drifts away during a talk, I bring it back to the speaker right after I realize that I got sidetracked.
22. Whenever I get distracted while reading, I make an effort to redirect my focus back to the book.
23. When answering a question, I forget the question and I do not know if my answer is at all related to the question.
24. It is difficult for me to listen to a lecture without getting distracted by unwanted thoughts.
25. When involved in a group conversation, I tend to focus on one speaker at a time and direct my attention accordingly.
26. When sitting in a meeting, I can easily shift my attention from one speaker to another.
27. When listening to a talk, I seem to be caught up in something else in the room although I want to be listening to the speaker.
28. When I want to sleep, I can ignore noise from my environment and immediately fall asleep.
29. When watching a movie, I get so caught up in thought that I can't seem to follow the story of the movie.
30. While sitting in a talk, I tune out unrelated thoughts that come up in my mind.
31. Whenever I read, I get distracted by things going on around me.
32. When talking on the phone, my mind wanders to things outside the conversation.
33. I find my mind racing uncontrollably.
34. Whenever I read, I have to reread passages because I forget what I just read.

35. When I watch a movie, I miss out on parts of the story because my attention tends to drift away.
36. When talking to someone at a social gathering, I can listen to him or her while disregarding the conversations around us.
37. When writing a letter or email, I can simply filter out all distractions and focus on what I want to write.
38. I become preoccupied with certain thoughts and find it difficult to direct my attention away.
39. Whenever I read a book, I get easily immersed into the story.
40. I have to search for my keys because I can't remember where I put them.
41. As soon as I notice that I lost focus during a conversation, I redirect my attention back to the speaker.
42. I don't get easily distracted when I read or study.
43. In group conversations, I find it difficult to shift my attention from one speaker to the next because my mind is occupied with thinking about what I want to say next.
44. In bed, I am able to disregard the thoughts in my mind so that I can more easily fall asleep.
45. When I watch a movie, I get so involved that I forget about everything else going on around me.
46. In group situations, I find it difficult to listen to others because I think about what I want to say next.
47. When I get distracted while talking on the phone, I bring myself back to the conversation as soon as I notice that I lost focus.
48. In group discussions, I remain focused on what's being said even if the conversation goes back and forth between several people.
49. Whenever I lose attention while I'm talking to someone, I actively redirect my focus back to the conversation.
50. While listening to a speech, I lose focus and my mind drifts away.
51. When I listen to music, I pay attention to the music for the entire length of the song.

- 52. I meetings, I can focus on the conversation while not paying attention to the surrounding noise.
- 53. When listening to a song, I never really hear the whole of the song because my mind starts thinking about other things.
- 54. In have to have silence in order to read effectively; otherwise, I get distracted and lose focus.
- 55. When listening to a speech, I start looking around the room and lose track of the talk.
- 56. When filling out an online survey, I answer my emails and/or surf on the Internet.

Appendix C

Informed Consent Form

Dear Participant:

This stage of the research project involves the development of a survey on mental processing. You will be given series of statements and need to indicate how often the behavior in the statement occurs. There are no potential risks associated with completing this study and there will be no harm if you do not participate or discontinue your participation. Information obtained from this study may provide a better understanding of the cognitive processes in everyday behaviors.

Please note:

Any information that you provide to us will be kept strictly confidential. If you have any questions or concerns regarding this project, please contact Sabine Krawietz at The University of West Florida at (850) 474-2108 or by email at sk7@students.uwf.edu.

If you wish to participate in this study, click on “Next” below. The submittal of the completed survey will indicate your consent to participate.

Next*

*By starting this survey I signify that I agree to participate in the present study

Appendix D

Self-Report Measures

Mindfulness Questionnaire

NAME: _____

Instructions: On the line before each statement put a number from 1 to 5, using the code below, to indicate how often the statement is true for you. Put an NA (not apply) on the line if the statement doesn't apply to you. Put an X if the statement is unclear.

5 = always or very often true of me

4 = often true of me

3 = occasionally true of me

2 = seldom true of me

1 = never or almost never true of me

NA = does not apply to me

X = the meaning of the statement is unclear

- ___ I get anxious or angry before I realize why.
- ___ When listening to people, I miss part of what they say because I am thinking about what they said, what I will say, or other things.
- ___ After leaving home I wonder about something I may have forgotten to do, such as turning off the coffee pot, closing the windows, or locking the doors.
- ___ When I am in a particular mood, my mind contains related music or images.
- ___ If I put my attention on a physical pain, the pain will increase or decrease.
- ___ When I am sitting down, I am aware of the sensations of sitting.
- ___ When I am influenced by desire or anger, I observe how it affects my mind.
- ___ I notice a difference between sounds and the hearing of the sounds.
- ___ I lose track of time.
- ___ I unconsciously move my body when it is uncomfortable without noticing the discomfort.
- ___ Before becoming anxious I notice thoughts and feelings that lead to the anxiety.
- ___ I eat much of a meal without really noticing the tastes.
- ___ I experience muscle tension I do not see coming on.
- ___ I get depressed without knowing why.
- ___ I notice how my beliefs often influence what I see and how I feel.

- 5 = always or very often true of me
 4 = often true of me
 3 = occasionally true of me
 2 = seldom true of me
 1 = never or almost never true of me
 NA = does not apply to me
 X = the meaning of the statement is unclear

- ___ When I am thinking, I am aware of the thoughts and the fact that I am thinking.
- ___ I don't pay attention to my breathing, such as whether it is shallow or deep.
- ___ I forget where I have left things, such as my glasses or where I parked the car.
- ___ I notice sensations of pleasure or pain before I label them.
- ___ I notice how thoughts and feelings gradually arise in my consciousness.
- ___ I know the difference between eating when I am hungry and eating for other reasons.
- ___ I am aware of when I am seeking sensual pleasure.
- ___ I catch myself viewing other people in terms of stereotypes or preconceptions.
- ___ I will say or do something without actually intending to do it.
- ___ I know when I am in a situation that will lead to my being angry.
- ___ I am aware of my body positions when talking with others.
- ___ I notice how much I am involved in what is currently happening or how much I am lost in thought and fantasy.
- ___ By the end of the day I don't remember some of the snacks I have eaten.
- ___ I am basically aware of how distracted or focused my mind is.
- ___ I get severe headaches before noticing them coming on.
- ___ I am aware of the effects on my mind when I feel worry, uncertainty, or ill-will.
- ___ I suddenly find myself eating or drinking something or lighting up a cigarette without having given any thought to doing it.
- ___ I feel there is a part of me that just watches my life.

- 5 = always or very often true of me
 4 = often true of me
 3 = occasionally true of me
 2 = seldom true of me
 1 = never or almost never true of me
 NA = does not apply to me
 X = the meaning of the statement is unclear

- ___ When listening to music I enjoy, my mind runs off in directions other than music.
- ___ I get particularly happy and cheerful without knowing just why.
- ___ I loose track of money I spend.
- ___ I don't respond so much to what I perceive, but more to how I label or categorize what I perceive.
- ___ I notice how feelings, sensations, and thoughts gradually weaken and leave my consciousness.
- ___ I know when it is inevitable that I will become angry or anxious before I actually feel the emotion.
- ___ Part of my mind is filled with thoughts, visual images, and/or music.
- ___ I miss appointments because I have gotten lost in other activities.
- ___ I notice the effects on my body and mind of what I have eaten or drunk.
- ___ When I am looking at something, I am aware of what I see and the process of seeing itself.
- ___ I am aware of an intent to do something before I actually do it.
- ___ I feel that I am an observer watching my mind.

Boredom Proneness Scale

The statements can be answered using a true-false response (the original format used) or with a 7-point format from "1" (highly disagree) to "7" (highly agree) used in recent research.

- _____ 1. It is easy for me to concentrate on my activities.
- _____ 2. Frequently when I am working I find myself worrying about other things.
- _____ 3. Time always seems to be passing slowly.
- _____ 4. I often find myself at "loose ends", not knowing what to do.
- _____ 5. I am often trapped in situations where I have to do meaningless things.
- _____ 6. Having to look at someone's home movies or travel slides bores me tremendously.
- _____ 7. I have projects in mind all the time, things to do.
- _____ 8. I find it easy to entertain myself.
- _____ 9. Many things I have to do are repetitive and monotonous.
- _____ 10. It takes more stimulation to get me going than most people.
- _____ 11. I get a kick out of most things I do.
- _____ 12. I am seldom excited about my work.
- _____ 13. In any situation I can usually find something to do or see to keep me interested.
- _____ 14. Much of the time I just sit around doing nothing.
- _____ 15. I am good at waiting patiently.
- _____ 16. I often find myself with nothing to do, time on my hands.
- _____ 17. In situations where I have to wait, such as a line, I get very restless.
- _____ 18. I often wake up with a new idea.
- _____ 19. It would be very hard for me to find a job that is exciting enough.
- _____ 20. I would like more challenging things to do in life.
- _____ 21. I feel that I am working below my abilities most of the time.
- _____ 22. Many people would say that I am a creative or imaginative person.
- _____ 23. I have so many interests, I don't have time to do everything.
- _____ 24. Among my friends, I am the one who keeps doing something the longest.

- _____ 25. Unless I am doing something exciting, even dangerous, I feel half-dead and dull.
- _____ 26. It takes a lot of change and variety to keep me really happy.
- _____ 27. It seems that the same things are on television or the movies all the time; it's getting old.
- _____ 28. When I was young, I was often in monotonous and tiresome situations.

Adult Behavior Checklist - Self Report Form

Instructions: Please circle the number next to each item that best describes your behavior during the past 6 months.

Items:	Never or rarely	Sometimes	Often	Very often
1. Fail to give close attention to details or make careless mistakes in my work	0	1	2	3
2. Fidget with hands or feet or squirm in chair	0	1	2	3
3. Have difficulty sustaining my attention in tasks or fun activities	0	1	2	3
4. Leave my seat in situations in which seating is expected	0	1	2	3
5. Don't listen when directly spoken to	0	1	2	3
6. Feel Restless	0	1	2	3
7. Don't follow through on instructions and fail to finish work	0	1	2	3
8. Have difficulty engaging in leisure activities or doing fun things quietly	0	1	2	3
9. Have difficulty organizing tasks and activities	0	1	2	3
10. Feel "on the go" or "driven by a motor"	0	1	2	3
11. Avoid, dislike, or am reluctant to engage in work that requires sustained mental effort	0	1	2	3
12. Talk excessively	0	1	2	3
13. Lose things necessary for tasks or activities	0	1	2	3
14. Blur out answers before questions have been completed	0	1	2	3
15. Am easily distracted	0	1	2	3
16. Have difficulty awaiting turn	0	1	2	3
17. Am forgetful in daily activities	0	1	2	3
18. Interrupt or intrude on others	0	1	2	3

Appendix E

Copyright Permission Letter

Email Response from Dr. Russell Barkley about the Permission to Use the ADHD Symptom Checklist for this Study

Sabine,

You have my permission to use the scale. As long as you are not selling it or distributing it to other professionals and are only using it with your participants in your research you are free to use it.

Best wishes

Russ Barkley

>

>-----Original Message-----

>From: Sabine Krawietz [<mailto:sk7@students.uwf.edu>]

>Sent: Tuesday, April 04, 2006 12:51 PM

>To: info@guilford.com

>Cc: guilford2@formatease.com; DrBarkley@russellbarkley.org

>Subject: Inquiry from Guilford website

>

>To whom it may concern:

>

>I'm Sabine Krawietz, a graduate student from the University of West Florida,

>and would like to use the Adult Behavior Checklist (ABC)

>for a research project. I'm developing a self-report scale

>measuring the construct of concentration and would like to use the ABC

>1.1 to test my newly developed scale's construct validity. Do you have a

>program that allows using this instrument for research purposes without the

>need for purchasing the whole package under licensure? I would be very glad

>to send you the test results of my research if they can be of use for you.

>

>Sincerely,

>

>Sabine Krawietz.

>sk7@students.uwf.edu

>Psychology Department

>University of West Florida

>

>

>

>Cc: DrBarkley@russellbarkley.org <<mailto:DrBarkley@russellbarkley.org>>

>