A Preliminary Investigation into the Effects of a Brief Mindfulness Induction on Perceptions of Attention, Aesthetic Response, and Flow during Music Listening

Frank Michael Diaz
A PRELIMINARY INVESTIGATION INTO THE EFFECTS OF A BRIEF
MINDFULNESS INDUCTION ON PERCEPTIONS OF ATTENTION, AESTHETIC
RESPONSE, AND FLOW DURING MUSIC LISTENING

By

FRANK M. DIAZ

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The members of the committee approve the dissertation of Frank M. Diaz defended on April 28, 2010.

__________________________________
Clifford K. Madsen
Professor Co-Directing Dissertation

__________________________________
Alexander E. Jiménez
Professor Co-Directing Dissertation

__________________________________
Eliot Chapo
University Representative

__________________________________
John M. Geringer
Committee Member

__________________________________
Michael Allen
Committee Member

Approved:

Don Gibson, Dean, College of Music

The Graduate School has verified and approved the above-named committee members.
This document is dedicated to the two most wonderful people in the world, my mother, Juana Belkis Reyes, and my wife, Jennifer Kay Diaz, for teaching me and reminding me that among all virtues, kindness is best.
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ABSTRACT

The purpose of this study was to investigate the effects of a brief mindfulness induction technique on subjective reports of attention, aesthetic response, and flow during music listening as measured by Continuous Response Digital Interface (CRDI) and questionnaire. Additionally, differences between aesthetic response and flow were explored in the context of verbal and CRDI responses. Participants were undergraduate and graduate students enrolled in music classes or ensembles at the College of Music at Florida State University (N=132), and were randomly assigned to one of four groups: mindfulness induction paired with aesthetic response (n=34), mindfulness induction paired with flow response (n=35), aesthetic response (n=32), and flow response (n=31). For all groups, a questionnaire was used to gather data on self-reported measures of attention, and all participants were asked to manipulate a CRDI which registered either their aesthetic or flow response to a 10 ½ minute audio excerpt of Giacomo Puccini’s opera, La Bohème. In groups in which a mindfulness induction was used, participants were asked to listen to a previously recorded fifteen minute guided mindfulness audio presentation and report on their experiences. Responses to Likert-type questionnaire items suggest that participants experienced a subjective “heightening” of attention during music listening compared to baseline in all conditions, with no specific modification attributable to the mindfulness task. A majority of respondents in the mindfulness groups, however, reported that the task had modified their listening experience by increasing their ability to focus on the music without distraction. Composite CRDI graphs suggest unique response patterns between groups based on both the presence of a mindfulness task as well as the construct for focus of attention (flow or aesthetic response). In general, composite graphs for flow indicated less decrease in response magnitude between the end of peak responses compared with aesthetic response, and longer and higher magnitude plateau responses. For aesthetic response groups, mindfulness increased the overall magnitude of peak responses, and decreased the depth of valley responses. In flow response groups, mindfulness attenuated both peaks and valleys and increased plateaus. Additionally, verbal accounts imply phenomenological differences between flow and aesthetic responses, with each accounting for a unique type of heightened and positively valenced psychological experience.
CHAPTER 1
INTRODUCTION

The desire for joy and to have meaningful experiences seems axiomatic to the human condition. Mankind has ruminated upon the nature and achievement of happiness from the time of ancient philosophers to the present day. In the *Nicomachean Ethics*, Aristotle spoke of happiness as humanity’s highest aspiration; and all things which were sought – beauty, health, material goods, fame – were but means to the realization of human fulfillment (Aristotle, trans. 1994). Throughout the 20th century, happiness and its related states have become a central tenet of investigation among various psychological disciplines, including humanistic psychology, the psychology of flow, and more recently, positive psychology.

As research into human well-being has continued, an accompanying lexicon has emerged for those experiences which are considered more meaningful and more intense compared to typical everyday feelings of happiness. Consequently, terms such as “peak experience” and “flow” have become well established synonyms for specific types of heightened psychological states. In music research, the study of these experiences occurs within the context of “aesthetic response”, a term used to describe the composite emotional and intellectual responses that individuals feel when listening to music (Madsen & Madsen, 1970; Madsen & Geringer, 2008).

Based on the available literature, it appears that many of the explanatory variables for these experiences share similar characteristics. Generally, each state is described as consisting of both emotional and cognitive elements, and each is said to be associated with perceptions of heightened attention (Maslow, 1968; Kripner, 1972; Csikszentmihalyi, 1990; Madsen & Geringer, 2008). Yet, existing theories do not account for how these factors interact. Specifically, it is unknown whether heightened attention is a necessary antecedent or whether it is an artifact of the experience, and the way in which the term is defined in either capacity is unclear. Furthermore, since the majority of research on subjective constructs such as peak, flow, and aesthetic response are of a qualitative nature, the specific differences and similarities in regards to either temporal or phenomenological characteristics of the experiences are unknown.

The challenges involved in the scientific examination of phenomenological data are numerous. For instance, these perceptions are often multidimensional, and the descriptive terminology which accompanies them may vary greatly between subjects. In essence, subjects might use completely different sets of words to describe very similar or identical experiences, making construct specificity and
validity very difficult to determine (Asmus, 2009). Furthermore, evaluations of phenomenological
experiences often occur after the fact, resulting in responses which are vulnerable to control issues such
as associations and memories that are built up during interviews or throughout experimental tasks
(Fredrickson, 1995).

In music research, these types of control issues have been partially addressed through the use of
the Continuous Response Digital Interface (CRDI), a device designed to register responses in real-time
in relationship to an attendant stimulus (Gregory, 1989). The CRDI is a potentiometer that is structured
in the form of a dial and can be manipulated by participants to indicate a range of “less-more” during a
variety of perceptual tasks. The dial is connected to a computer and its signals are converted into digital
information which can be used for graphic and data analysis.

In recent years, music researchers have been able to produce visual representations of
phenomenological responses as they occur in time. Through the use of CRDI technology, it has become
possible to map the relative peaks, plateaus, and valleys which correspond to an individual or group’s
“aesthetic response”, as defined by each subject (Geringer, Madsen, & Gregory, 2004). Throughout a
number of studies, the CRDI has demonstrated strong levels of reliability as a tool for representing the
temporal topography of phenomenological experiences (Capparella, 1989, Geringer, Madsen, &
Gregory, 2004).

Although it is suggested that both emotional and cognitive responses along with focus of
attention are all essential to the inducement of heightened psychological states, the specific temporal
role and function of attention remains unclear (Novak & Hoffmann, 1997). Among music researchers,
some investigators have theorized the following:

The “peak aesthetic” experience of which some musicians speak may be temporally
very short – 15 seconds or less. In order to experience this peak experience, however, it
is speculated that one must spend several minutes in highly concentrated focus of
attention, especially the 30-45 seconds immediately preceding the peak experience.
(Madsen, Brittin, & Capparella - Sheldon, 1993)

Yet, even as researchers continue to speculate about temporal characteristics, it remains unclear if
heightened attention is a product of either individual volition, the specific properties of the stimulus, or
other unknown variables. To investigate this function, attention would need to be experimentally
manipulated, a notion which has not been explored within the context of either aesthetic or flow response research. In other disciplines, however, research suggests that attention can be modified and that techniques exist which can be used for these purposes. One of these techniques is mindfulness meditation, and a great deal of empirical evidence supports its efficacy in relationship to the modification of attention.

Mindfulness has been described as the process of bringing a specific quality of attention to moment-by-moment experience (Kabat-Zinn, 1990). In the last 20 years, the practice of “mindfulness” has received considerable attention in both the clinical and psychological research communities (Bishop et al., 2003). In contemporary psychology, mindfulness training has been investigated as a clinical intervention for enhancing emotional well being, as a method for modifying aspects of psychological attention, and as a possible treatment for various physiological disorders (Greeson, 2009). In particular, much research has centered on a popular form of meditation training known as Mindfulness Based Stress Reduction or MBSR. MBSR was developed as a method for managing chronic pain for patients at the Massachusetts General Hospital Stress Reduction Clinic in the late 1970’s, but has been used more recently in investigations on modifying attention (Kabat-Zinn, 1982; Kabat-Zinn, Lipworth, Burney, & Sellers; 1987).

Theoretically, mindfulness works by modifying attention for the purposes of reducing cognitive vulnerability to reactive modes of thinking (Bishop et al., 2003). When removed from therapeutic contexts, mindfulness enhances attentional capacity through the inhibition of rumination, improved self-regulation, improved ability to choose and switch between competing tasks, and improved vigilance. All of these skills have been empirically investigated within numerous studies, many of which have been reviewed by Greeson (2009), Walsh and Shapiro (2006), Bishop et al. (2003), and Lutz, Slagter, Dunne, and Davidson (2008). Based on findings from these studies, it appears that attention might be modified through the use of mindfulness-based techniques, and thus may be isolated as an experimental variable for further research.

**Purpose of the Study**

In his book, *Coming to Our Senses*, psychologist Jon-Kabat Zinn suggests that our ability to pay attention may be one of the most important factors in determining our overall quality of life (Kabat-Zinn, 2005, pg. 8). While the exact function of whether attention is an antecedent or an artifact of heightened psychological experience remains unclear, research suggests that some kind of relationship is apparent. Additionally, numerous similarities between accounts of the various types of heightened
psychological states make it difficult to determine exactly what differences may exist among these constructs. As heightened affective experience is an often cited rationale for participation in musical and artistic activities, clarifying the causes and conditions of these experiences seems important to anyone involved in music education and research.

With the development of the Continuous Response Digital Interface, it has become possible to investigate musical responsiveness as it occurs in time, allowing for greater detail in relationship to temporal interactions between participants and stimuli. This type of data is especially useful in determining the relative magnitude of plateaus, peaks, and valleys, which correlate to operant responses under varying conditions. Additionally, the use of the CRDI provides an element of control for the confounding effects of memory in reporting phenomenological experiences and provides a means of responding to stimuli nonverbally.

Along with qualitative responses, these types of data may allow for further insight into the complex interaction between attention, emotion, cognition, and music in respect to heightened phenomenological experiences. These clarifications may be useful to practicing music educators and therapists, and may provide further ideas and applications on how these constructs function in clinical, classroom, and research settings. Thus, the primary purpose of this study is to investigate the effects of a brief mindfulness induction technique on subjective reports of attention, aesthetic response, and flow during music listening as measured by the CRDI and questionnaire. As a secondary thrust, the study will examine what general differences may exist, if any, between aesthetic response and flow based upon verbal and CRDI responses.

Research Questions

1. What are the effects of a 15 minute guided mindfulness task as reflected throughout three response variables:
   (a) summative reports of perceived attentional magnitude
   (b) verbal responses to a question regarding the perceived effect of mindfulness during music listening
   (c) and response patterns within composite CRDI graphs?

2. What are the differences between aesthetic response and flow as reflected throughout verbal responses in relationship to CRDI data?

3. What are the self-reported characteristics of the following variables:
   (a) the overall length of heightened responses
(b) the temporal characteristics of responses in relationship to the stimulus
(c) and the summative magnitude of those responses in relationship to the following conditions;
aesthetic response only, mindfulness paired with aesthetic response, flow only, and flow paired
with aesthetic response?
CHAPTER 2
REVIEW OF LITERATURE

In the subsequent review, theoretical and empirical literature for each of the given constructs will be summarized in the following sequence; attention, mindfulness and meditation, attention in music research, peak experiences, aesthetic and emotional response, and flow.

Attention

Everyone knows what attention is. It is the taking possession by the mind, in clear and vivid form, of one out of what seem several simultaneously possible objects or trains of thought.

-William James, Principles of Psychology

The term “attention” invokes several connotations. In common parlance, the word “attention” is used in reference to the mind’s capacity to focus on one thing to the exclusion of another. The Merriam–Webster Dictionary defines attention as being: a) the act or state of applying the mind to something, b) a condition of readiness for such attention involving especially a selective narrowing or focusing of consciousness and receptivity (Merriam–Webster Online Dictionary, 2010). As a basic aspect of human experience, many assumptions about attention appear to be self-evident. For example, attention is assumed to be primarily volitional, limited in capacity, and multifaceted. It also commonly believed that allocating more attention to an activity will automatically enhance performance, as in “focus on your golf swing”, or “focus on the road when you drive”, but while the process of attention may appear to be automatic, the precise nature and function of attention as a psychological mechanism remains elusive.

In the literature on aesthetic response and flow, heightened attention is a commonly mentioned characteristic of having a peak experience though the exact definition of “heightened attention” within this context remains unclear. As the current study deals specifically with attentional capacity, volition, and subjective quality, these topics will be contextualized within the framework of the historical, theoretical, and empirical literature on psychological attention.

Capacity and filtering theories of attention.

With the publication of The Principles of Psychology (1890), William James became one of the first theorists to write extensively on the subject of psychological attention. In his book, James hypothesized on the nature and function of attentional capacity. For example, James believed that
attentional capacities were limited; therefore, one could only successfully attend to one object, idea, or task at a time. Unfortunately, interest in cognitive psychology declined significantly throughout the first half of the twentieth century, and it would take almost sixty years before attention would re-emerge as a serious area of interest among theoretical and experimental psychologists (Harre, 2002).

During the early 1950’s, a new found interest in attention led numerous theorists to formulate conceptual frameworks for the purposes of modeling how an individual’s attentional capacity interacted with perceptual stimuli. Specifically, theories sought to address how much of the perceptual information available to our senses could be processed, how it is selected for analysis, and what happens to the information which is not selected? One of these early theorists was Donald Broadbent (1957), who speculated that incoming stimuli were held briefly in a sensory register and were (based upon gross physical characteristics) pre-attentively selected and allowed to pass through a capacity channel for analysis. Stimuli that were not selected for processing failed to appear in consciousness and were therefore not subject to analysis of any kind.

Aspects of Broadbent’s model were adopted by Treisman (1969), with differences proposed regarding the function of the pre-attentive process as well as the fate of unattended stimuli. In Treisman’s model, all stimuli that appear in the sensory register are processed according to gross physical characteristics (frequency, intensity, location, etc). Attended stimuli are allowed to pass through a selective filter where a detection device engages in semantic analysis, while the unattended stimuli are attenuated before passing through the filter. If the unattended stimuli meet certain criteria, they can also be semantically analyzed. These models are commonly referred to as early selection theories, differing mostly on the basis of how unattended stimuli may be processed.

In 1963, Deutsch & Deutsch proposed a theory which resembled Treisman’s, but hypothesized a late selection criteria in which all stimuli are processed and analyzed, but only the most personally important stimuli are attended to. In Deutsch and Deutsch’s view, all incoming stimuli interact with the same perceptual and discriminatory mechanisms. Regardless of whether the stimuli are attended to, the mechanisms group and separate the incoming messages. Because of a hypothesized preset hierarchical process, the mechanisms become excited by specific attributes of the incoming message and the highest weighted discriminatory mechanism transfers this information to the classifying mechanisms with which it has been grouped. At this point, a non-specific system is hypothesized to correspond to the level of the highest or most intense discriminatory mechanism. All other levels are compared to this level as a
criterion, and only the highest level stimulates other cognitive processes while inhibiting other lower level stimuli. Thus, only the highest level messages activate higher areas of cognition.

**Volitional theories of attention.**

Along with theorizing about capacity limitations, James also speculated that attention was in essence, a volitional act though in situations where a competing stimulus was more powerful than the attended stimulus, this volition could be limited (James, 1890). Researchers have explored the nature of attentional volition by presenting subjects with tasks involving competing stimuli and then measuring their performance on a variety of response variables. In the research literature, these tasks are often referred to as “dichotic listening tasks”.

Classic dichotic listening tasks were first investigated by Colin Cherry during the early part of the 1950’s. In one of his earliest studies, Cherry (1953) investigated the processes involved in selective auditory attention. He found that subjects who were asked to attend to a message played in one ear, while another simultaneous but unrelated message played in the opposite ear had difficulty remembering anything but the basic physical characteristics of the unattended message. Similar results were found by Moray (1959) in a study in which word-lists served as auditory stimuli, and by Deutsch (1986) in a study using musical melodies.

Other researchers have investigated how varying the degree of similarity in competing stimuli would affect attentional volition. Treisman and Riley (1969) discovered that when the onset of words were digitally synchronized, it was more difficult to attend to one message without interference from the other. However, when both messages were played in both ears at equal intensity, differences in voice pitch (gender) helped increase the overall accuracy of discrimination (Treisman, 1964).

Other research in volitional attention focused on auditory monitoring tasks, in which subjects listen to streams of auditory messages and report if they have heard a requested target. In a study by Pohlmann and Sorkin (1976), three targets had to be detected within broadband noise presented in one ear. In a single channel condition, subjects monitored short intervals of noise for a target frequency. In a multi-channel condition, one, two, or three targets (widely spaced frequencies) could be presented. The multi-channel condition required that subjects monitor for different frequencies simultaneously. In each condition, a target pitch occurred 50% of the time. Subjects could perceive with good accuracy any one of the three targets in the multi-target condition when only one was presented at a time. When more than one was presented, performance worsened. Moray (1975) confirmed these findings using both tones and speech as stimuli.
Attentional function and neuroimaging.

In recent research, contributions from the study of neuroscience have helped to clarify the functional anatomy behind the human attentional system, supplying further evidence about how attention may be processed within the brain. Posner & Peterson (1990) propose that the human attentional system can be divided into three functional subsystems; orienting, conflict monitoring, and alertness. Evidence for these subsystems comes from combining cognitive research with various types of neuroimaging studies. In this model, orienting refers to directing attention to a specific target or set of targets from a variety of inputs, conflict monitoring prioritizes among competing tasks or stimuli, and alerting consists of maintaining a state of vigilance.

In a line of similar research, Corbetta and Schulman (2002) have used neuroimaging studies for the purposes of proposing a two-part model of attention. In this model, the two types of attentional functional are labeled dorsal or “voluntary” attention, and ventral or “alerting” attention. Dorsal attention is characterized by focusing attention on stimuli based upon perceptual and response features, while ventral is activated as an alerting system in response to unexpected sensory stimuli, usually outside the focus of attention, and with low probability of occurrence.

Attention and subjective quality of experience.

Literature on the function and role of cognitive attention is abundant, yet, as an ordinary part of human experience, the subjective quality of attention in everyday interactions can be of great consequence regardless of scientific implications. For example, if someone is observed to be concentrating intensively on a task, person, or thought process, some may refer to that person as being “on-task.” The implication of being on task is twofold. First, the person is most likely closely engaged in something or someone, and secondly, this type of engagement is apt to result in something of higher quality than if the person were displaying the opposite behavior of being off task. Naturally, attentiveness or being on task are behaviors of supreme importance when the results have a personal significance. We do not want the surgeon who is operating on us to be off task, nor would we like our significant other to be inattentive to us when we are speaking to them.

Philosophers and psychologists have explored the consequences of attentional quality from many perspectives. Langer (1989) investigates how the subjective quality of a person’s attention can have positive or negative consequences in social situations. Using the term “mindfulness”, Langer makes a case for on task attention using dozens of empirical studies. Other theorists have looked at how quality of attention plays a role on subjectively meaningful experiences. In his book, Flow: The Psychology of
Optimal Experience (1990), psychologist Mihaly Csikszentmihalyi reports that heightened attention is a fundamental aspect of the experience of flow. These types of investigations into the psychological effects of heightened attention are also characteristic of studies on meditation (Walsh & Shapiro, 2006).

**Mindfulness and Meditation**

In recent investigations, much has been discovered regarding the neural and anatomical correlates of attention. Additionally, researchers have become interested with the possibility that attentional faculties may be subject to purposeful modification (Lutz et al., 2008). In the subsequent section, the subject of mindfulness and meditation will be explored, specifically in its capacity as a means of heightening attention and improving subjective experience.

The term “meditation” is associated with practices and techniques that originated in non-Western cultures, psychologies, and religions such as Hinduism and Buddhism (Walsh, 1980). It is estimated that there are currently ten million meditation practitioners throughout the United States, along with hundreds of millions world-wide (Deurr, 2004). Meditation is a thoroughly researched psychological discipline, with a body of empirical literature numbering around several hundred studies, most conducted over the past forty years (Walsh & Shapiro, 2006). Additionally, hundreds of books and articles dealing with the philosophical and religious aspects of meditation have been published, and meditation is considered a vital part of many alternative practices such yoga, tai-chi, and chi-gong.

Due to the breadth and depth of the available literature on meditation, it is important to contextualize aspects of the practice that have been subjected to empirical investigations as opposed to those solely based upon philosophical, religious, or theoretical speculation. Although a thorough overview of both approaches would offer a more complete view of meditation in its proper context as both a religious practice as well as psychological technique, the primary purpose of the current investigation regards meditation in its context as an intervention in attentional processes. Thus, what follows deals with meditation as a psychological practice, and includes a history of meditation research, operational and theoretical definitions as well as a summary of research findings.

In empirical research, meditation is often regarded as a self-regulation strategy with a focus on modifying or training attention (Walsh & Shapiro, 2006). From the perspective of the traditions themselves, meditation is associated with various techniques aimed at cultivating or refining the mind (bhavana) for the purpose of developing beneficial mental capacities, including concentration and positive emotions (Goleman, 1988). Based on a comprehensive review of the literature, Walsh & Shapiro (2006) offer the following operational definition of meditation,
The term meditation refers to a family of self-regulation practices that focus on training attention and awareness in order to bring mental processes under greater voluntary control and thereby foster general mental well-being and development and/or specific capacities such as calm, clarity, and concentration. Defining meditation in this way is important for differentiating it from similar practices, and for building an appropriate taxonomy to deal with the large body of research currently available.

Although many meditation techniques include similar features, further delineation is necessary in order to isolate the specific function and goal of differing types of approaches. For example, although modifying attention is a fundamental aspect of almost all practices, there are two types of attentional functions generally recognized within the meditation literature. The first type is referred to as *concentrative* or *focused* attention, and deals primarily with the process of attending continuously to one object. In the second type, researchers refer to a process of heightened awareness which is described as *open monitoring* or *open meditation*. The aim of the second type of process is that it allows for flexibility of attention between objects, with the aim of maintaining a non-reactive state to an individual’s experiential content (Walsh & Shapiro, 2006; Lutz et al., 2008; Shapiro, 1980).

It is interesting to note the similarities between the two major types of attention described in the literature on meditation, and related findings on dorsal and ventral attentional systems in the neuroimaging studies of Corbetta and Shulman (2002). Posner and Peterson’s (1990) tri-part model of attention also describes attentional function as being characterized by various functions, including orienting, conflict monitoring, and alerting attention.

Although dozens of meditation techniques exist, the types most often documented in experimental studies are Transcendental Meditation (TM) and Mindfulness Meditation. TM is described as a concentrative type of meditation in which practitioners focus on a “mantra” or inner sound as the primary object of attention. Mindfulness meditation, which has been the subject of much of the experimental research within the last decade, is a type of open monitoring meditation whose origins can be traced to the Buddhist meditation practice known as *Vipassana*.

For the purposes of this study, the review of literature will deal primarily with these two types of meditation as they represent the most documented constructs in the literature and are generally used in research which adheres to stricter standards of experimental control and design. In most studies
regarding Mindfulness Meditation, the term Mindfulness Based Stress Reduction or MBSR is used. MBSR refers to a popular program which was designed by Jon-Kabat Zinn and piloted at the Massachusetts Stress Reduction Clinic in the early 1970’s. Since then, MBSR has become one of the most widely used and documented meditation techniques in the field.

**Empirical findings on meditation and mindfulness.**

Considerable scientific research on the psychological and physiological effects of meditation has been conducted from the early 1970’s into the present day (Shapiro, Schwartz, & Santerre, 2002). Recent literature reviews demonstrate that meditation practice is an effective intervention for improving emotional well-being (Greeson, 2009), as well as managing and reducing chronic pain (Kabat-Zinn et al., 1987). Other studies suggest that meditation may result in positive physiological benefits for persons dealing with coronary disease (Zamarra, Schneider, Besseghini, Robinson, & Salerno, 1996), substance abuse (Gelderloos, Walton, Orme-Johnson, & Alexander, 1991), skin disorders (Kabat-Zinn et al., 1998), and hormone regulation (Jevning, Wilson, & Davidson, 1978). Further benefits of meditation include improved cognition (Dillbeck, Assimakis, Raimondi, & Orme-Johnson, 1986) and enhanced along with prolonged attention (Lutz et al., 2008; Tang et al., 2007; Amishi, Krompinger, & Baime, 2007; Valentine & Sweet, 1999).

In investigations of the effects of meditation on emotions, Arche & Craske (2006) found that subjects who participated in a 15 minute focused breathing induction (adapted from MBSR techniques) reported lower negative affect and emotional volatility to aversive visual images than subjects who were asked to purposefully worry or think of whatever came to mind. MBSR meditation was also associated with reducing ruminative thinking in subjects dealing with clinical depression (Ramel, Goldin, Carmona, & McQuaid, 2004), ruminative thinking being a process commonly associated with maintaining depressive states as well as sad emotional affect. Additionally, female cancer patients with sleep related distress reported improved sleep quality after engaging in short periods of consistent MBSR practice (Shapiro, Bootzin, Figueredo, Lopez, & Schwartz, 2003).

Further studies dealing with meditation and emotional regulation have been conducted in relationship to anxiety disorders and stress (Miller, Fletcher, & Kabat-Zinn, 1995; Shapiro, Schwartz, & Bonner, 1998). Miller et al. (1995) found that patients dealing with anxiety disorders reported clinically and statistically significant improvements on both subjective and objective measures of anxiety and panic disorder symptoms after an 8-week outpatient prescribed MBSR intervention. Investigators also found that 18 of the original 22 patients in the study maintained clinically measured gains after a three
year period. For medical students, engaging in the 8-week MBSR meditation program decreased levels of self-reported state and trait anxiety as well as overall psychological distress including depression (Shapiro, Schwartz, & Bonner, 1998).

Chronic pain management is another area where meditation seems to be an effective method of intervention. Kabat-Zinn (1982) designed a 10-week stress reduction and relaxation program for use by patients who had not improved with traditional medical care. Although the study lacked a control group, at the end of the 10 week period results indicated a decrease of ≥ 33% in the mean total of the Pain Rating Index (Melzack) for 65% percent of the patients, and a decrease of ≥ 50% for the remaining subjects (N=51). The researcher theorized that mindfulness meditation appears to cause an “uncoupling” of the sensory dimension of pain experiences from the affective or cognitive interpretation of such experiences as causing suffering or distress. A follow up study was conducted using the same 10-week intervention on 225 patients (Kabat-Zinn et al., 1987). Significant improvements in both physiological and psychological effects were recorded, and most subjects reported maintaining gains from 2.5-48 months after the intervention. Overall, MBSR seems to be an effective strategy in reducing suffering due to chronic pain.

Along with improvements in chronic pain reduction, meditation has also been associated with decreasing negative physiological symptoms resulting from various disorders. Patients with coronary artery disease showed improvements in exercise-induced myocardial ischemia after participating in a TM-meditation program for 6 to 8 months (Zamarra et al., 1996). In a review of 24 studies on the effects of TM-meditation on substance abuse, results indicated that the intervention was effective in decreasing abuse among various populations (Gelderloos et al., 1991). Skin disorders, in particular psoriasis, were shown to be reduced in patients participating in a short MBSR intervention while simultaneously receiving phototherapy (UVB) and photochemotherapy (PUVA) in comparison with those receiving UVB or PUVA alone (Kabat-Zinn et al., 1998). For a group of long term (3 to 5 years) TM meditators, cortisol levels were significantly reduced in comparison to a short term meditation group (3-4) months (Jevning et al., 1978). High Cortisol levels are associated with stress and panic symptoms in patients, suggesting that long term TM meditation practice may reduce these psychological symptoms through alterations in physiological function.

Research into the effects of meditation on cognitive processes has yielded data suggesting the efficacy of the technique in relationship to modifying attention and intelligence. Tang et al. (2007) found that subjects receiving five consecutive days of 20 minute meditation training sessions showed
significantly better attention and control of stress than a control group. In this particular study, the control group received a popular form of relaxation training. The meditation group showed improved scores in “conflict” attention, a subsystem of attention that is measured by the Attention Network Test (ANT). Additionally, the experimental group reported lower levels of anxiety, depression, anger, and fatigue, with increased measures of vigor on the Profile of Mood States. Decreases in stress-related Cortisol and increase in immunoreactivity were also reported.

Further research using cognitive measures as a dependent variable have demonstrated that other subsystems of attention, including “alerting” and “orienting” attention improved significantly in groups participating in short and long term MBSR retreats (Amishi et al., 2007). Valentine and Sweet (1999) found that sustained attention also improved compared to control groups. Additionally, data analysis also indicated that the amount of experience a person had meditating correlated with increased measures of sustained attention. In a review of literature on the effect of meditation on two types of attention, “focused” and “open” monitoring, results suggest that meditation practice has a potential regulatory function on cognitive and affective mental processes (Lutz et al., 2008). Meditation may also have some possible effects on cognitive ability. When subjects were administered the Culture Fair Intelligence Test and Group Embedded Figures Test, students who had engaged in TM meditation made significant gains over a 3-5 year period on both measures (Dillbeck et al., 1986).

**Attention in Music Research**

The role of attention in musical tasks is a primary concern among educators, researchers, and performers. In instructional settings, focused attention is considered a necessary antecedent to keeping students socially and academically on-task, and is believed to result in heightened discrimination, learning, and responsiveness to aesthetic elements (Madsen, 1997; Madsen & Geringer 2000/2001). Studies on student attentiveness under various conditions have been conducted using both teacher imposed behavioral contingencies (Madsen, 1982), and instructional behaviors as variables (Brendall, 1996; Witt, 1986; Dunn, 1997). Researchers have also investigated attention in relationship to listening patterns in musically trained and untrained populations (Madsen & Geringer, 1990; Eastlund, 1992; Geringer & Madsen, 1995/1996; Madsen, Geringer, & Fredrickson, 1997; Geringer & Madsen, 1998), as well as the effects of background music as competition for focus of attention (Madsen, 1987; Madsen, Diaz, & Geringer, 2009). Additionally, the role of attention to musical elements as well as descriptions of these elements has been explored using different techniques, including vocabulary instruction, focus of attention to changes in musical stimuli, and verbal descriptions (Flowers, 1983, 1984). Other areas of
research include the effect of focus of attention on perceptions of teacher effectiveness (Madsen & Cassidy, 2005; Duke & Prickett, 1987), focus of attention and aesthetic response (Adams, 1994; Coggiola, 1996; Madsen, 1997), and the role of “mindful” musical performance on performer satisfaction and listener preference (Langer, Russell, & Eisenkraft, 2009).

Discipline in classroom settings is vital to minimizing distractions and maintaining attention during instruction and student performance. The effect of approval and withholding music performance was investigated in relationship to student attentiveness as measured by on-task behavior (Madsen, 1982). Results suggest that withholding of music performance was a more effective contingency than teacher approval in improving on-task behavior in a junior high school instrumental music class. Brendell (1996) investigated the effect of various instructional behaviors during the warm-up portion of a choral rehearsal on student attentiveness. The highest level of off-task behavior was recorded during activities that required less singing or active participation, including getting ready, physical warm-up, literature instruction, and other. In a related study, use of class time was explored in high school instrumental music ensembles. Student attentiveness was highest during performance versus teaching or getting ready (Witt, 1986). Similar results were reported by Dunn (1997), using choral groups as subjects.

Comparisons of listening patterns between musicians and non-musicians are also of interest to music teachers and researchers. It is assumed that musical training develops advanced levels of discrimination among musicians, thus an observable difference should be apparent between those with musical training compared to those without. Using ten excerpts as stimuli, Geringer & Madsen (1995/1996) explored the listening patterns of music major and non-majors between four basic musical elements – rhythm, dynamics, timbre, melody, or everything. For music majors, the element of timbre was more salient than for non-majors. Non-majors also reported more quantity of attention for dynamics and melody than did music majors. In a similar study, Madsen and Geringer (1990) found that musicians spend most of their time attending to melody, then rhythm, dynamics, and lastly timbre. Non-musicians attend mostly to dynamics, melody, timbre, and then everything, with a very low percentage of time spent focused on rhythm.

In a study by Madsen, Geringer, & Fredrickson (1997), focus of attention to musical elements was compared to previous investigations on aesthetic response and tension. Using two-groups, musicians were asked to register their attention to basic musical elements while listening to Haydn’s Symphony no. 104 (group 1), with a second group asked to register their attention to just one specific
element. Measures of attention between participants did not reveal significant differences between the two groups. Tension was not related to any of the musical elements, but aesthetic experience was related to rhythm for this excerpt. Eastlund (1992) found that for both novice and expert listeners, classification of musical style among fifteen-second excerpts were related primarily to perceptions of historical period, complexity, and tempo. In a study on musicians’ ratings of “good” versus “bad” vocal and string performances, deficiencies in intonation was the most salient element in discriminating between quality of the performances (Geringer & Madsen, 1998).

Attention to musical tasks is susceptible to interference from competing stimuli. In a study on the effects of attempting two tasks simultaneously, one musical and the other academic, attention to music as the primary task reduced accuracy in the other task. Conversely, subjects were able to phase music out of awareness if the goal of the competing task was primarily academic (Madsen 1987; Madsen et al., 2009). The study lends support to the improbability of multitasking high level cognitive tasks.

The effect of instruction on focus of attention to musical elements has been investigated in undergraduate populations as well as children. Flowers (1983) used four techniques; vocabulary training, listening only, vocabulary plus listening, and a control group to study the effect of listening on three variables: number of changes counted in a music excerpt, verbal descriptions of these changes, and use of music vocabulary. After four weeks of treatment conditions, there were significantly fewer changes among the listening only and vocabulary plus listening groups on the posttest compared to pretest. The vocabulary plus listening group made significant gains in the number of descriptions of musical elements, and vocabulary only and vocabulary plus listening gained significantly in the use of technical musical vocabulary. In a related study, children and undergraduates were compared regarding their focus of attention to musical elements based upon verbal descriptions. Children were more likely to refer to extra-musical elements, timbre, and tempo, while undergraduates referred mostly to extra-musical elements, tempo, and pitch/melody (Flowers, 1984). When children were given vocabulary instruction, a significant increase in attention to specified elements occurred, specifically for dynamics, articulation, and tempo, with a decrease in overall responses also reported.

Music education researchers have also been interested in the effects of focus of attention and its relationship to perceptions of teacher effectiveness. Duke & Prickett (1987) found that varying visual conditions (teacher only, student and teacher, and student only) affected positive and negative perceptions of applied teaching episodes by non-music education majors. While subjects were more apt
to give negative ratings to the individual or group on whom their attention was directed, disapproval responses were most frequent in visual conditions where the teacher was the primary focus of attention. A similar study found that when both pre-service and experienced music teachers were asked to observe and comment on videos of music classroom teaching, both groups made significantly more comments about the teacher, even when visual conditions were focused mostly on students. Experienced teachers tended to criticize and make judgment statements more frequently than pre-service teachers.

Questions on the nature and function of aesthetic response have historically been a primary concern in the field of music. Empirical investigations of the relationship between focus of attention and aesthetic experiences have been conducted in regards to presentation type (audio/visual), attention to musical elements, and the use of a continuous response dial as a way of maintaining vigilance throughout a listening task. Many of these investigations have resulted in divergent but related lines of research on aesthetic response, and these are dealt with in a separate area of this document. What follows is a review of those studies directly dealing with focus of attention as a defined variable within the study.

Adams (1994) researched the effects of focus of attention to visual/aural conditions and their effect on emotional response. Comparing musicians and non-musicians, results suggest that musicians responded more intensely to a video tape of a recorded excerpt of Mahler’s Symphony no. 2 compared to nonmusicians, but there were no significant differences between the groups on the audio only presentation. When comparing attention to musical elements in an audio excerpt of ACT I of Puccin’s La Boheme, the highest degree of attentiveness was registered for melody, followed by dynamics, everything, rhythm, and timbre. Aesthetic response was most closely associated to melody for this excerpt (Madsen, 1997).

Peak Experiences

As defined by Maslow (1968), peak experiences constitute moments of “highest happiness and fulfillment.” This broad definition, which may seemingly represent a variety of psychological experiences, is indicative of the difficulty that researchers and theorists encounter in defining psychological constructs, whether they refer to cognitive functions such as attention, or subjective states such as peak experiences, happiness, or fulfillment. Until the advent of modern psychology, the study of constructs such as happiness and well-being remained within the province of philosophical and religious speculation. Throughout its nascent years, modern experimental and theoretical psychology dealt primarily with questions of human perception, cognition, intelligence, behavior, and pathology. Around
the late 1950’s, a new subfield of psychology emerged whose prime concern was the investigation of subjective states such as human happiness. Specifically, what was it about “happy” people that made them vital and fulfilled. This field came to be known as humanistic psychology, and among its earliest proponents was Abraham Maslow (Schneider, Bugental, & Pierson, eds., 2001).

By their very nature, peak experiences are difficult to describe or measure due to the intensely subjective nature of such phenomena. Yet, within the literature on the various types of peak experiences, there are common themes that emerge among phenomenological accounts of these extraordinary states. Starting with Maslow, researchers have used verbal accounts of these experiences as data for investigating, both formally and informally, the emergence of specific patterns or themes. For example, in his initial investigations, Maslow (1968) described the following common phenomenological characteristics of peak experiences: (1) objects tend to be seen as a whole, as a complete unit, detached from relations, from possible usefulness, from expediency, and from purposes, (2) the percept is exclusively attended to with full attention or absorption, (3) external objects are seen as important in themselves, without concern for their usefulness to human beings, (4) perceptions are richer, (5) loss of subject/object duality in which perceptions feel like an integrated whole, (6) the experience is felt as carrying its own intrinsic value, (7) perceptions of time and space are altered, (8) the experience is always felt as good, never evil or undesirable (pp. 73-83).

Similar types of accounts have emerged within the research on flow. In *The Psychology of Optimal Experience*, Csikszentmihalyi (1990) describes the characteristics of flow as follows: (1) the experience occurs when tasks have a chance of being completed, (2) we must be able to focus our attention on the task at hand, (3) the task has clear goals and provides immediate feedback, (4) one acts with a deep but effortless involvement that removes from awareness the worries and frustrations of every-day life (5) there is a sense of control over our actions (6) concerns for self disappear (7) the sense of time is altered; hours pass in minutes and minutes can stretch for hours.

In the present study, meditation is being examined in its function as an attention modification technique; however an extensive amount of research has been conducted on the phenomenological aspects of meditative peak experiences. Walsh (1980) states that these experiences, often referred to as “transcendental”, are characterized as follows: (1) ineffability: the experience is of such power and so different from ordinary experience as to give the sense of defying description, (2) noesis: a heightened sense of clarity and understanding, (3) altered perception of space and time, (4) appreciation of the holistic, unitive, integrated nature of the universe and one’s unity with it, and (5) intense positive affect,
including a sense of the perfection of the universe. Additionally, Shapiro and Giber (1978) explain that altered states or “peak” experiences occur in a continuum. Therefore, although the characteristics of certain peak experiences may seem similar, the magnitude of such experiences varies between individuals.

In the field of aesthetics, the phenomenological characteristics of peak experiences have also been investigated (Panzarella, 1980, Beardsley 1982). Beardsley (1982) describes some of these characteristics as follows: (1) object focus: the person willingly invests attention on the stimulus, (2) felt freedom: he or she feels a sense of harmony that preempts everyday concerns and is experienced as freedom, (3) detached affect, the experience is not taken literally, (4) active discovery: the person becomes cognitively involved in the challenges presented by the stimulus and derives a sense of exhilaration from the involvement, (5) wholeness: a sense of integration follows from the experience. Panzarella (1980) found that subjects who had aesthetic peak experiences reported altered physical sensations and a loss of contact with the environment due to a narrowing of focus on the aesthetic stimulus.

It is striking that within various contexts, peak experiences share many common phenomenological characteristics. Altered sense of time and self are commonly reported, and complete absorption or focus of attention as both an antecedent and consequent are also common. As with many intense subjective experiences, language is an insufficient medium for the purposes of accurately portraying the variety of phenomena inherent in such states, even if descriptions share some similarities.

In the present study, one of the aims is to compare the characteristics of two types of peak experiences: (a) flow and (b) aesthetic. Using a behavioral measure (CRDI) along with qualitative responses, it may be possible to further clarify similarities as well as differences between the two experiences using a mixed-methods approach. Aspects of this issue were explored by Lychner (1998), who investigated if aesthetic responses to music would differ among subjects receiving instructions that were semantically different in their description of “aesthetic response”. Strikingly, the results of the experiment showed similar topographical data on a device measuring continuous response regardless of the use of terms such as “aesthetic-response”, “felt-emotional-response”, or a “free-response” condition. Although research in this area is limited, the results of Lychner’s study suggests that regardless of the terminology used in describing aesthetic response, the topographical footprints of such experiences may be more similar than one would expect.
Aesthetic and Emotional Response in Music

A great deal of philosophical, and more recently, empirical literature, indicates that aesthetic responsiveness to music has been a topic of discussion throughout much of the history of Western civilization. Yet, like many of the constructs in the present study, a precise definition of what aesthetic response is and how it functions is still a matter of considerable debate. Various researchers and philosophers have attempted to define aesthetic response, offering a wide spectrum of explanations and theoretical models for exploration.

The Merriam-Webster dictionary traces the etymology of the word “aesthetic” from the German ästhetisch, in New Latin aestheticus, and from the Greeks aisthetikos meaning, “sense perception” or aisthanestha, meaning, “to perceive”. The dictionary offers the following definition, “appreciative of, responsive to, or zealous about the beautiful; also: responsive to or appreciative of what is pleasurable to the senses” (Merriam – Webster Online Dictionary, 2010). Historically, the use of the term “aesthetics” as a field of inquiry is attributed to Baumgarten (1735/1954), who used the term in respect to the broad philosophical study of arts and emotions. More recently, aesthetics has been treated as an object of philosophical investigation by Langer (1976), and by Reimer (1989) in relationship to music education. Additionally, prominent theoretical models have been proposed by Meyer (1956), and Madsen and Madsen (1970).

Meyer (1956) proposes that aesthetic response to music is a product of a listener’s expectations in relationship to the characteristics of a given stimulus. If the musical stimulus is too novel compared with the listener’s training, exposure, or expectation, then the individual does not respond aesthetically. The reverse is also posited, if the information is too predictable, this tends to inhibit aesthetic responsiveness. When these elements are in balance, then aesthetic arousal occurs through the inhibition of tendencies (tension) which are eventually resolved. In writings by Reimer (1989), aesthetic response occurs as a combination of cognitive functions such as discrimination and matching combined with personal preference and taste. Madsen and Madsen (1970) propose that the aesthetic experience constitutes the “composite emotional and intellectual responsiveness to music which is modified and reinforced through time and always defined as good” (pg. 44).

In the present study, aesthetic response is viewed as a psychological construct capable of being studied through the use of experimental and empirical methods. The emphasis on these types of investigations can be traced to figures such as G. T. Fechner, who proposed that through the use of descriptive methods, aesthetic response could be the subject of experimental investigation (1876). In a
similar manner, Birkoff (1933) proposed that aesthetic response could be investigated through the use of content analysis techniques. More recently, Berlyne (1974) proposed that by using both verbal and non-verbal response measures, the psychological characteristics of aesthetic responsiveness could be established.

Other methods of investigation on the psychological characteristics of aesthetic response have included dependent measures such as adjective check lists (Heinlein, 1928; Rigg, 1937, Hevner, 1936), semantic differentials (Osgood, Suci, and Tannenbaum, 1957), and Likert – Scales (Likert, 1932). Although much progress has been made toward the empirical study of aesthetic response using the previously mentioned techniques, many researchers believe that since subject evaluations of musical experiences often occur after the fact, these responses may be subject to various control issues stemming from associations and memories that may be built up during listening tasks. For this reason, various instruments have been developed in an attempt to study aesthetic response using non-verbal means and as it occurs in “real-time”. A more thorough treatment on the use of these devices and techniques is provided in a subsequent area of this document.

**Empirical findings on aesthetic and emotional response.**

Emotional response to music has been the subject of numerous studies. Giomo (1993) used a non-verbal measuring instrument to study children’s perceptions of mood differences after listening to music. Participants were compared by age (five years and nine years old), as well as gender, handedness, home musical environment, and socio-economic status. There were no significant differences for age and handedness, but significant differences were found for gender, socio-economic status, and presence of home musical environment. For gender, girls performed significantly better than boys at both age levels. Socio-economic status revealed differences at the nine year old age level, with children of lower status scoring lower than both other nine year olds as well as five year olds on similar measures. Additionally, the presence of a home musical environment seemed to have an inverse effect on accuracy, with those with some musical background scoring lower than their counterparts.

In another study using children, Kratus (1993) investigated if the developmental, gender, or emotion-based characteristics of children affected their ability to interpret emotion in music. The study also sought to determine which musical elements contribute to children’s interpretations of emotion. Analysis of the data revealed no differences in interpretation related to age or gender, but subjects were significantly more consistent in distinguishing between happy and sad music in contrast to being able to differentiate between excited or calm music. Analysis also suggested that happy-sad distinctions were
based mostly on the rhythmic activity and articulation style in the music. Excited-calm distinctions were based on rhythmic activity and meter.

An analysis of subjects’ verbal descriptions of 18 one minute musical excerpts of different styles was conducted on three groups of participants of varying musical experience; none; some; and experienced (Hargreaves, & Colman, 1981). Four principal components were extracted from the content analysis, each representing a type of response. These were labeled as categorical, objective-analytical, objective-global, and affective.

Gfeller, Asmus, and Eckert (1991) compared the effects of musical and textual setting on affective responses and mood among non-musicians (N=150). Participants were randomly assigned into one of five groups; text-alone, commercial-type background music, commercial-type background music with text, atonal music, and atonal music with text. Affective response was measured by semantic differential scales and the 9-Affective Dimensions (Asmus, 1985). Mood was evaluated as a pre-test and posttest condition using an adapted version of Wesmman and Rick’s (1966) Elation vs. Depression Scale. Data analyses revealed significant differences across the five experimental conditions for affective response and significant differences in mood between pre and posttest. Results suggest that ratings for complexity of stimuli are inversely proportional to preference for music among non-musicians. Mood indicators were also significantly lower in posttest conditions compared to pretest, and were also related to stimulus complexity. There was an exception for participants in the commercial-type background music group, whose mood was not significantly affected.

**Aesthetic response and CRDI.**

Measuring emotional or aesthetic response has been the ongoing subject of various studies. One of the difficulties in studying these responses is that subject evaluations of musical experiences occur after the fact. This type of evaluation depends on the subject’s recall of an event, and is subject to various control issues stemming from associations and memories that may be built up during listening tasks.

Attempts at measuring subject responses in real time have been developed since the 1980’s, resulting in the design of various devices (Fredrickson, 1994). Using a potentiometer (spring-loaded tongs) attached to a computer, Nielsen (1983) measured musical tension as perceived by subjects listening to the first movement of Haydn’s *Symphony no. 104*. Musical tension was not defined for the subjects, but none had any problem accepting tension as an element of aesthetic response. Additionally, the use of a potentiometer in the study allowed for observations of aesthetic response in “time”, similar
to how it would be perceived in an actual music listening settings. Discussions on the ways in which aesthetic response is described by various theorists and researchers were the subject of another treatise by Nielsen (1987). The premise of the document is that both arousal and valence are defining characteristics of descriptions of aesthetic experience.

Other attempts at quantifying aesthetic response in music have been conducted using a Continuous Response Digital Interface (CRDI). The CRDI is another type of potentiometer that samples musical responses in time. The device was designed to be used as a continuous operant method for evaluating performance (Gregory, 1989). To collect data, an interface converts analog signals to digital signals using an integrated circuit. Software then converts the signal into summary data which can be displayed as tables and graphs. In the early part of its inception, the device was used for music evaluation (Robinson, 1988), attention studies (Rentz, 1992), and musical hierarchy studies (Madsen & Geringer, 1989).

Several studies have been conducted examining the reliability and validity of the CRDI. Caparella (1989) used eleven musical excerpts selected as corresponding to major musical elements such as rhythm, dynamic, timbre, melodic, and all. Participants were asked to manipulate a CRDI in response to what element they were attending to while the music was being played. A pre-post test designed was used to measure reliability, with subjects listening to all excerpts two times. Correlation coefficients between the first and second listening trials were high and positive, suggesting that the CRDI is a reliable and valid tool for measuring music perception. More recent analysis of the literature compared the CRDI to other continuous measurement instruments on measures of input stability, test-retest measures, and inter-observer reliability (Gregory, 1995). Comparisons with other instruments suggest that the CRDI is a reliable measurement tool for diverse applications. The author also suggests that applicability is affected to some degree depending upon the timing of measurement, amount of detail requested and compresses, perceptual requirements and duration of the task, and musical experience of the respondents. Other studies have found similar results for validity and reliability measures on the CRDI (Geringer et al., 2004)

**CRDI and tension.**

Various facets of emotional response have been empirically investigated using the CRDI. These facets include tension, emotion, aesthetic response, preference, evaluation, and listening patterns. One of the first studies attempting to replicate Nielsen’s investigation on tension used the CRDI to measure subjects’ perceptions of ongoing “musical tension” while listening to the first movement of Haydn’s
Symphony no. 104 (Madsen & Fredrickson, 1993). Different procedures and instrumentation were used in this study to determine the universality, if any, of experiences of “tension” during music listening. Analysis of graphic data revealed strong similarities between Nielsen’s study and the present one.

A related study used the CRDI to determine perceived tension in the first movement of Haydn’s Symphony no. 104 was used with children as participants (Fredrickson, 1997). Subjects included school age students from grades 2, 5, 8, and 11/12. As in previous studies, no definition of the term “tension” was given allowing subjects to determine their own definition. Although magnitude of response varied widely, there were frequent similarities in the timing of major group responses. Pearson correlations between groups of fifth and eighth graders as well as second graders and a population of professional musicians from a previous study ranged from .71 to .98. Older and more musically experienced subjects were more conservative than younger subjects in regards to moving the CRDI (range). Results were consistent with previous studies of the same type.

In a related study, musicians’ responses on the CRDI were compared while listening to Haydn’s Symphony no. 104, but using a two-dimensional CRDI that registered perceived tension as well as valence (Madsen, 1998). Participants were presented with dimensions of relaxing-exciting (vertical axis) and ugly-beautiful (horizontal axis) and asked to move a cursor on a computer screen while listening to the excerpt. Results indicated an inverse relationship, \( r = -.58 \), between the two dimensions. Graphic analysis revealed mirrorlike images relating to both dimensions. Findings suggest that these two dimensions represent different aspects of perceived listening, with arousal (exciting-relaxing) often representing the opposite direction than affective response.

Fredrickson and Coggiola (2003) investigated participants’ perceptions of tension in two selected jazz excerpts using the CRDI. Participants were categorized into one of two groups, music major (n=40) or non-major (n=40). The selection used as a stimulus for the study was St. Louis Blues by W. C. Handy. One version was a popularized version sung by Nat King Cole and the second was performed by Ella Fitzgerald. The version performed by Ella Fitzgerald included an extended improvisatory section. Results of the study resembled previous findings on perceptions of intensity and aesthetic response and whether they differed among music majors and non-major. Namely, there are few differences in the overall contour of CRDI graphs between the groups. Results also suggested an order effect in presentation of stimuli.
CRDI emotion and tension.

The terms emotional response and tension seem to be related in descriptions of aesthetic experiences. Lychner (1998), explored the effects of terminology used for aesthetic experience using the CRDI. The terms “aesthetic response”, “felt emotional response”, and “perceived tension” were used in instructions to music majors and non-majors to contextualize the movement of a CRDI while listening to musical excerpts. Four musical selections were used as stimuli; “Nessun dorma” from Turandot by Giacomo Puccini, “Fugue” from Toccata and Fugue in D minor by J. S. Bach, “Scherzo” from Symphony no. 3 by Ludwig Van Beethoven, and Stars and Stripes Forever by John Philip Sousa. The excerpts were presented in four different orders to control for possible order effects. No significant differences were found among the terms. Graphic analysis of CRDI data revealed a strong similarity between aesthetic-response and felt-emotional-response conditions. The free-response condition demonstrated a remarkable similarity to the aesthetic response condition and the felt-emotional response condition. Marked differences were noted in the perceived-tension condition.

Ongoing perceptions of aesthetic response in the first movement of Haydn’s Symphony no. 104 were investigated to determine if musical tension might be related to aesthetic experience (Fredrickson, 1995). A CRDI was used to measure participants’ responses while listening to the music. Analysis compared responses from this study to a previous study using the same music but asking for perceptions of tension instead. Graphic analysis of mean group responses in comparison to the previous study revealed some co-variation. Overall, tension responses were found to be more variable than aesthetic response. In addition, aesthetic response was consistently more positive and somewhat higher. Non-musician responses were consistently more positive than musicians, conforming to previous CRDI studies.

CRDI aesthetic response.

In a study Madsen et al., (1993) faculty members and advanced graduate students at a large university school of music were asked to indicate their perceived level of “aesthetic response” through manipulating a continuous response digital interface (CRDI) while listening to a 20 minute excerpt from Act I of Puccini’s La Bohème. CRDI responses were charted graphically to indicate levels of aesthetic experience across time. Additionally, a questionnaire solicited information regarding frequency, duration, location, and magnitude of perceived aesthetic experience, along with whether the dial responses corresponded to these experiences. Results indicated differing responses throughout the excerpt for each subject. All participants recorded having at least one peak experience, with each
experience lasting approximately 15 seconds in duration. Aesthetic experiences were usually preceded by a period of concentrated focus of attention. “Afterglow” experiences ranged from 15 seconds to several minutes. Participant responses on the questionnaire indicate that movement of the CRDI roughly corresponded to aesthetic experience. Aesthetic responses for subjects clustered around similar places in the music, with a collective peak experience represented by the highest CRDI movements.

Napoles and Madsen (2008) investigated emotional response using a paper-and-pencil drawing in order to compare this method to the more sophisticated CRDI device. High school students attending a summer music camp were asked to draw a continuous line on a grid consisting of 11 boxes divided by a y axis (low-high) and x axis (minutes) corresponding to their emotional response. The stimuli for the experiment were excerpts from Act I of Puccini’s, La Bohème. An exit questionnaire was used to ask participants if they had had an aesthetic experience while listening to the music, how long it lasted, and the highest magnitude of the experience on a scale from 1-10. Response graphs were almost identical to previous research on the same excerpts using CRDI. Fifty six percent of participants indicated that they had had an aesthetic experience, 36% had several aesthetic experiences, and 7% indicated that they had not had an aesthetic experience. The mean for highest magnitude of felt-response was 7 on a 10-point Likert-type scale.

A related study investigated the role of focus of attention on participatory as well as meaningful listening (Madsen & Geringer, 2008). Using a paper-and-pencil method, aesthetic responses were recorded across time to determine if this method could be used as an alternative to more expensive or sophisticated equipment. University music majors reflected and wrote comments on their listening experiences. Results indicated that the paper-and-pencil task yielded almost as much information as previous studies using more sophisticated measuring devices such as the CRDI.

Although many studies on aesthetic response show little difference between music major and non-major populations, other investigations do suggest differences among the populations when the musical stimuli is considered to be less tonal. Misenhelter and Price (2001) investigated affective response between music majors and non-majors while listening to excerpts from Stravinsky’s Le Sacre du printemps. A CRDI was used to measure responses. Statistical analysis revealed a significant difference between majors and non-majors on responses. Graphic representation and analysis revealed that patterns of response were related to changes in texture, with a moderate inverse relationship for non-music majors and a weaker moderate positive relationship for music majors. Discussion of the results suggests that musical background may have an effect on affective response, in contradiction to
It may also be that music majors have an a priori need to respond positively to complex 20th century music since they are trained in this way in music school.

Audio and video presentations of stimuli have also been compared on studies on aesthetic response. Music major and non-majors at a comprehensive university listened to an audio recording and music video of the song Drive (For Daddy Gene), by country music singer Alan Jackson (Lychner, 2008). Results indicated that non-musicians had a stronger response to the stimuli than musicians, particularly when the music was coupled with the video. However, aesthetic response was not enhanced when video was added to the audio stimulus. Differences also occurred between musicians and non-musicians overall in response to the stimulus.

**CRDI and preference.**

An ongoing area of research involving the CRDI is musical preference. Gregory (1994) investigated undergraduate college music majors and high school musicians enrolled in performance groups, as well as 6th grade students across the United States to study relationships between familiarity with musical excerpts and preference. The stimuli included brief excerpts of music from early contemporary composers, popular classics, selections in the Silver Burdett/Ginn elementary music education series, and current jazz crossover recordings. Among high school and college musicians, instrumental biases were found for relatively unfamiliar classical music. College music majors were less apt to have a strong bias for music featuring the instrument they played compared to high school musicians. In addition, results suggest that a high level of musical training is related to a broader receptivity across musical genres. No predictable connection between the degree of familiarity with an excerpt and preference for that excerpt, however, could be found.

In a related study, Brittin (1996) investigated listeners’ preferences for music of other cultures using a 10-point Likert-type scale and a CRDI. Participants included music majors, non-music majors, and junior high school musicians. One third of the subjects in each group rated the musical selections using a Likert-type scale, representing a summative response. One third rated used a CRDI to rate the excerpts, representing a continuous response. The remaining third used two CRDI’s simultaneously to indicate complexity and preference. Stimuli included excerpts from Carribean, African, Indian, and Oceanic music. Results indicate that participants using the CRDI rated selections significantly higher than those using paper-and-pencil. No differences were found in preference between participants who rated preference only and those who rated preference and complexity.
The effect of overt listener categorization was also studied in relationship preference for “crossover” excerpts (Brittin, 1991). No significant differences were found in non-music majors’ ratings subsequent to one of the following treatments: (a) stipulated categorization, (b) no overt categorization, or (c) free-operant categorization (any). Musically experienced participants gave significantly more positive ratings than those who were musically inexperienced and females’ ratings were more positive than males. For the second part of the study, a CRDI and Likert-type scale was used. Results showed that CRDI responses were significantly more positive compared to static responses. Additionally, gender and musical experience significantly affected preferences for pop and jazz, but not rock.

Preferences have also been investigated using young children and handicapped populations (Byrnes, 1997). Students in Grades 2, 5, 8, 11/12, and trainable mentally handicapped students (TMH), listened to excerpts from Puccini’s *La Bohème*, Haydn’s Symphony no. 104, Mozart’s *Vesperae Solennes*, and Holst’s *Suite in E–flat*, while simultaneously manipulating a CRDI. Overlays were used in conjunction with the CRDI that included pictographic information appropriate for the populations in the study. Results indicated that second grade participants rated all excerpts higher than did the other groups, and that instrumental music examples were rated higher than vocal examples. Results of the study are consistent with previous studies in music preference. The use of CRDI for TMH participants seemed appropriate within certain limitations.

**CRDI – Other.**

The manner in which CRDI data is interpreted is a major concern among researchers. One such issue is how to interpret a “mean” or average derived from a sample of continuous data compared to a summative response given at the end of a musical excerpt. Brittin and Duke (1997) asked university students to evaluate the level of musical intensity expressed in various musical excerpts. The two different measurement methods evidenced high levels of internal consistency; however, the summative responses were higher than continuous response means. Results suggest that arithmetic means are not equivalent to participants’ “psychological averages”, especially in stimuli with changing intensity levels.

Other issues concerning the CRDI involve the use of a two-dimensional instrument rather than the standard one dimensional CRDI in measuring musical responses. In a study designed to test the reliability and validity of a two-dimensional continuous response interface, two orthogonal dimensions were explored, happy-unhappy and excited-not excited (Tyler, 1996). The two dimensions corresponded to established models that include positive-negative continuums as well as arousal. Paper
and pencil tests validated the polar adjective pairs, happy/unhappy and excited/not excited. Another set of paper and pencil tests validated simultaneous orthogonal use of the constructs. In a second study, 2 CRDI’s were used to test for reliability of the constructs in the first study using a digital interface. Results suggest reliability of the 2D CRDI model when comparing test/retest data and when comparing responses to repeated musical sections.

The CRDI has also been used in investigations of aural perception. Rentz (1992) gathered information on listening patterns in relation to selective listening using a CRDI. Participants were undergraduate college students and included musicians and non-musicians. Each participant was asked to listen to an excerpt of Aaron Copland’s Billy the Kid and manipulate a CRDI in conjunction with their focus of attention to one of the following instrument families: (a) brass, (b) percussion), (c) woodwinds, (d) strings, and (e) all. The all category included focus on three or more families. Analysis of cumulative seconds across all intervals indicated that non-musicians focused on the brass and percussion families longer than musicians. Musicians spent longer and more frequent periods of time attending to strings. Musicians also focused on three or more families more than non-musicians.

One of the earliest studies involving the CRDI concerned the use of the device as a measuring tool for evaluation. Audiotaped choral performances were evaluated using both prescribed categories (adjudication form) and a free operant condition (CRDI) (Robinson, 1988). The population included undergraduate musicians, undergraduate non-musicians, and music educators. Analyses examined differences among assigned performance ratings, operant performance ratings, categorical choices of “best” and “worst” performance aspects, and use of music versus non-music vocabulary. Significant difference between non-musicians and other groups were found in relationship to assigned ratings. For operant condition ratings, non-musicians’ evaluations were generally more positive when compared with undergraduate musicians and music educators. In addition, operant ratings of second pieces were more positive than those of first and third pieces of a three-piece program. Subjects who used the free operant evaluation before the prescribed evaluation also generated slightly more positive ratings. For “best” and “worst” aspects of performances, no significant differences were found between evaluative conditions or between different performance stimuli (choirs). Significant differences were found among groups with non-musician responses clustering around tone as “best” and diction as “worst” aspects. Undergraduate musicians and music educators showed even distribution for “best” aspects between “tone” and “interpretation”. Undergraduate musicians more frequently chose “intonation” for worse aspect and
music educators evenly divided the categories of “tone”, “balance”, and “intonation”. Less total words were used among non-musicians as well as less musical terms in free operant written responses.

Flow

Csikszentmihalyi (1990) describes flow as a “state in which people are so involved in an activity that nothing else seems to matter, the experience itself is so enjoyable that people will do it even at great cost for the sheer sake of doing it.” Inspired by Abraham Maslow’s work on “self-actualization”, Csikszentmihalyi examined interviews with artists, rock climbers, chess players, composers, and other like-minded individuals to determine the causes behind their continued engagement in activities offering little to no external rewards. Throughout hundreds of accounts, many reported experiencing an intense state of concentration and enjoyment which they referred to as “flow”.

Throughout the last several decades, research on flow has been both extensive and multidisciplinary. However, due its wide applicability, no established operational definition has been agreed upon among researchers (Ghani & Deshpande, 1994; Novak & Hoffmann, 1997). Thus, for the purposes of contextualizing flow within the present study, a review of the related theoretical and empirical literature will be provided.

Flow: Frameworks, models, and theories.

In investigating flow experiences, Csikszentmihalyi (1975) used phenomenological accounts to describe conditions which he hypothesized as being necessary to their inducement. These conditions included:

1) Perceptions of challenge – individuals must perceive that the task in which they are engaging in is neither too difficult or too easy in relationship to their skills
2) The activity has clear goals and provides immediate feedback regarding progress

When individuals perceived that they were in flow, the activity elicited feelings of seamless absorption. Individuals reported the following subjective characteristics during experiences of flow:

1) Focused and high magnitude concentration on the present moment
2) Action and awareness are merged
3) Loss of self-awareness
4) A sense of control over their actions in relationship to the activity
5) Altered temporal experiences (time goes by faster, the room seems to disappear, the person feels completely merged with the object of their awareness)
6) The task is rewarding for its own sake
When in flow, individuals experience dynamic equilibrium and optimum functioning, both largely dependent on maintaining the proper balance between skills and challenges. If the challenges become too difficult in relationship to skills, the individual may become vigilant, then anxious. If the opposite conditions occur, where there are high skills and low challenges, then the person may experience boredom, and eventually, apathy (Nakamura and Csikszentmihalyi, 2002, pg. 90).

To account for the conditions and experiences of flow, conceptual models have been developed in order to further clarify relationships between the role of skills and challenges. One early model is the three channel model (see Figure 1), which describes flow in relationship to a balance between these factors (Csikszentmihalyi, 1975).

![Figure 1. Three Channel Flow Model](image)

A later model accounts for apathy in addition to anxiety, flow, and boredom (Massimi & Carli, 1988) (see Figure 2).
A more recent model includes an eight channel configuration, in which additional channels are included for arousal, control, relaxation, and worry. Although the eight channel model is extensive, collinearity between channels makes this model no more effective in predicting flow than the four channel version (Novak & Hoffmann, 1997). In computer-mediated environments, theorists have developed modifications of these frameworks while accounting for additional context-specific variables (Trevino and Webster, 1992; Ghani and Deshpande, 1994).

Operational definitions of flow for purposes or research continue to be elusive. In a study by Novak and Hoffmann (1997), a list of operational definitions from the existing literature is examined. The researchers concluded that definitions of flow can be characterized as conditions that are conducive to flow, the experience(s) of flow itself, and consequents of the experience. This has led to difficulties in conducting systematic research on flow, yet several methods have been developed towards this aim. These approaches include interview techniques, questionnaires, and the experience sampling method (ESM).

Interviews were the original method for researching flow and its conditions (Csikszentmihalyi, 1975; Nakamura & Csikszentmihalyi, 2002). The strength of this method is that it allowed respondents to provide loosely structured answers to broad questions, thus providing the researcher with data that
could be used to build models, notice trends, delineate dynamics, and build conceptual categories. Questionnaires were among the first step in developing some type of measurable and empirical approach to studying flow. Csikszentmihalyi and Csikszentmihalyi (1988) developed questionnaires that helped to ascertain whether or not subjects had experienced flow, how often, and in what contexts. Other researchers have also developed measuring scales, further clarifying the context, magnitude, and conditions for flow (Mayers, 1978; Delle Fave & Massimi, 1988, Jackson & Marsh, 1996; Parks, 1996).

The usefulness of interviews and questionnaires for creating models and delineating the phenomenological characteristics of a construct are an important step in theory building. However, by the late 1970’s Csikszentmihalyi and Csikszentmihalyi (1988) and other researchers reported feeling frustrated at the limitations of this method,

Being retrospective, the interview cannot easily separate the actual event from the cultural forms and the personal wishes that may influence its retelling. More than anything else, interviews are limited by the vagaries of memory and by the difficulty that persons unused to reflection have in reporting events, especially internal events that take place in consciousness. (p. 252)

These sentiments have led researchers to develop a method in which flow could be measured in everyday life; the experience sampling method or ESM (Csikszentmihalyi M., & Csikszentmihalyi, I., 1988, pg. 252). This method relies on using a pager or some other form of transmitter to alert subjects at random times of the day when it is time to fill out items on a questionnaire. This was in conjunction with a self-report booklet, and the combination of these strategies led to a more detailed and accurate account of both the conditions and experiences of flow.

Flow – research findings.

One of the initial questions for flow researchers was the role of leisure and work contexts in producing flow. In a study by Sato (1988), the experience of flow was studied among Japanese motor cycle gangs. Sato found that gang members engaged in a “bosozoku” run described several of the key elements necessary for the experience of flow, including clear rules, unambiguous feedback, a sense of play, a narrow range of stimuli for concentration, and a balance of personal skills and challenges. Macbeth (1988) found similar results within the context of ocean cruising. In work settings, flow seems to occur more often among higher ranking individuals, thus professional women, engineers, and

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managers experience flow more frequently than blue-collar women and assembly line workers (Allison & Duncan, 1988; Lefevre 1988). Larson (1988) found that in order for flow to occur during writing activities, the writer’s skills must be in balance with the demands of the writing task. In the study, students whose writing goals exceeded their ability level reported anxiety and frustration throughout the entirety of the task. McQuillan and Conde (1996) found that reading flow is enhanced when participants both self-select their materials and when reading occurs outside of academic settings.

Researchers have also tried to determine the role culture plays in flow experiences. In a study on older Korean immigrants, Han (1988) found that leisurely home activities provided more opportunities to attain flow than work activities among this population. The inverse was true for their American counterparts who found work activities to be more conducive to flow than leisure activities. Han notes that this inverse relationship may be more a product of the work status of the participants rather than any cultural differences, since most of the immigrant participants were in retirement. Cultural differences were also the subject of a study by Massimi and Carli (1988), which compared how much time American and Italian students spent in each of the flow channels proposed in the eight channel model (arousal, flow, control, boredom, relaxation, apathy, worry, and anxiety). No significant differences occurred between channels, but qualitative reports did indicate that although flow was a positive experience for both groups, American adolescents preferred to be more in control (high skills, low challenge), while Italian adolescents preferred the opposite (higher challenge, lower skills).

Since the inception of flow research in the 1970’s, technological advances and availability have resulted in significant changes in the way in which human beings live. This is especially true of computers and the World Wide Web. The amount of time in which humans interact with computers has prompted several researchers to study flow within this context. One of the initial goals for these researchers was to establish if there were any new constructs related to flow that would appear in computer-mediated contexts. Hoffmann and Novak (1996) identified a set of constructs which were unique to this line of research, they included interactivity, involvement, focused attention, skill, control, challenge, arousal, telepresence, time distortion, and exploratory behavior. Consequently, factor analysis techniques were used to confirm these constructs for research purposed (Novak, Hoffmann, & Yung, 2000). Research in this area has looked at how software may be designed to be more conducive to flow (King, 1999), and to differentiate the role of exploratory versus task-oriented activities (Novak, Hoffmann, & Duhachek, 2003; Ghani and Deshpande, 1994).
Due to its broad applicability as well as similarity to other constructs, flow has been a widely researched topic in sports psychology. Specifically, researchers in this field are interested in how flow may be used to enhance performance. Research in flow has led many in the field to conclude that not only is flow an elusive state among athletes (Jackson, 1999), but that trying to monitor flow may lead to compromised performance (Mahoney, 1989). Additionally, the possibility of inducing flow at will is considered to be unlikely (Jackson, 1999).

Maddux (1997) has stated that the capacity to experience flow is based on the ability of the subject to be absorbed in whatever the task or object of attention is in the present moment. Clarke & Haworth (1994) studied flow experiences among British college students and found that high levels of cognitive involvement through concentration were conducive to the experience. This has led researchers to explore more closely what the effects of modifying attention may be on experiences on flow. To this end, Clark (2002) investigated how the modification of attention through mindfulness practices would affect graduate students in education. In this pilot study using ESM, Clark found the three out of the six participants reported an increase in flow based on their practice.

In the field of education, flow has been explored as a means to predict student interest, teacher effectiveness, and other variables related to creating optimal conditions for learning. Using the framework of challenge and skills, Moneta and Csikszentmihalyi (1996) found that the relationship between these two variables were the best predictors of student involvement and concentration among talented high school students. In a related study, (Nakamura, 1988) found that low achieving students had higher levels of anxiety and lower levels of flow compared to high achieving students. Additionally, students that came from a supportive and challenging home environment experienced more flow in school (Rathunde, 1996). From an instructional perspective, teachers who were identified as effective spent more time in flow than those in a control group (Gunderson, 2003), and students who had teachers who structured classes around student involvement experienced more flow than they did with other instructional approaches (Coleman, 1994).

**Flow and Music.**

Csikszentmihalyi (1990) identifies music as a universal flow-inducing stimulus. In the field of music research, several qualitative dissertations have addressed flow and music in varying contexts. Gangi (1998), observed the musical and aesthetic experiences of adolescent choral music students over three years using flow theory as a “lens” for analysis. Each musician’s experience was unique, and changed throughout the length of the study. Aspects investigated included play function; imitation as
opposed to re-creation; temporal displacement; perception as creation; therapeutic; emotional; intellectual; communicative; attentional; and discovery qualities; loss or transcendence of ego; the experience in relation to the conductor; to the group; and to the audience.

In a study by Matthews (2003), flow was investigated during private lessons that included improvisation as an integrated element. The theoretical framework of skills and challenges as a necessary condition for flow was explored among three adult singers. “Challenge” was investigated using indicators previously established by Custodero (1997), and included the constructs of anticipation, expansion, extension, self-assignment, self-correction and deliberate gestures. “Skill” was measured by indicators created by the researcher and included: breath support, intonation/tone, vocal freedom, phrasing and expressivity. Results suggested that improvisational activities were more flow inducing than non-improvisational across all cases.

In a study on music learning processes in a classroom environment, young children were observed using flow as an interpretive lens (Custodero, 1997). Specifically, the construct of high skills/high challenges as an antecedent to flow was explored. Participants were a class of 11 four and five year old children in a private school. Factor analysis of affective indicators revealed four discrete dimensions of experience similar to those found in previous flow studies and included: affect, potency, self-concept, and comfort. Factor analysis of behavioral indicators resulted in three dimensions specific to young children: behavior, challenge, and imitation. Regression analysis showed that potency, self-concept, behavior, and challenge significantly predicted flow. Additional findings suggest that the most flow occurs during the following circumstances: the longest activities (7 minutes), moderately familiar activities (of two to four weeks), during one-on-one social context, and at the keyboard location for individual students. Activities characterized by multi-sensory environments, unambiguous feedback, and perceived opportunities for action facilitated the most flow.

A related study explored the role of flow and Vygotsky’s concept of “scaffolding” in a Kindermusik classroom (St. John, 2004). Eight 75 minute sessions, videotaped across a 15 week semester were analyzed using Custodero’s Flow in Music Activities Form (R-FIMA). The FIMA uses Behavioral and Affective indicators in order to measure flow in music learning environments. Factor analysis of the 9 behavioral indicators resulted in four experiential dimensions: flow, material strategies, personal strategies, and social strategies; and two discrete affective dimensions, affect and agency. Further analysis revealed that events in Opens Space over Singing Circle and Worktables, lasting three to four minutes, and within the five to six week range of familiarity were the most flow facilitating.
Comparing experiential dimensions revealed Movement and Instrument play activities as producing the most optimal experiences. Social Strategy/Peer Awareness was robust to influences across several categories. The researcher concluded that simply being engaged in collective music making is conducive to the flow experience.

The experience of flow in musical groups has also been the subject of various studies. Sutton (2004) looked at peak and transcendent experiences in the context of three performing ensembles: The Chiara String Quartet, Early Music Southwest, and The Iridium Saxophone Quartet. The study specifically explored experiential reporting of peak experiences related to groups and compared them to flow related constructs. An emergent themes analysis revealed several factors, including submergence of the ego, trust, role of the audience, and desire to share music for a worthwhile purpose. All three groups reported feeling a “group consciousness” at the moment of peak performance with personal ego submerged relative to the group.

In a study by Steckel (2001), flow was investigated in relationship to participation in collegiate marching bands. Based on responses to a questionnaire, results indicated that participants experience six to nine dimensions associated with flow experiences. The dimension experienced with most frequency was the autotelic experience, and loss of self consciousness was the least experienced dimension. Kraus (2003) studied flow among students participating in a collegiate wind ensemble. The researcher used observations, videotapes, participant interviews, and field notes from rehearsals. Findings suggested that flow is experienced during wind ensemble rehearsals. Specifically, “students report non-flow conditions in early and middle rehearsals, flow experiences are more likely in late rehearsals that involve longer periods of performance activity, frequent rehearsal stops disrupt flow experiences, autotelic traits of ensemble members contribute to flow experiences in rehearsal, experience is dependent upon actions and abilities of others in the group, older more experienced students are apt to define personal goals and create challenges in rehearsal, and younger and less experienced students have a tendency to set less specific personal goals and rely more upon the goals of the conductor.”

Rybak (1995) explored flow experiences among older adults participating in leisure music activities. Participants included musicians aged sixty and older from the metropolitan Phoenix area. Four groups were investigated: banjo players, recorder players, handbell ringers, and instrumentalists/vocalists. A postpositivist research paradigm was used, with observation, interview, and stimulated recall integrated as strategies for data collection. Twenty one participants were administered a flow questionnaire and a researcher designed Leisure Music Experience Scale (ALMES)
measure. Evidence of Csikzentmihalyi’s flow model was reported in relationship to clear goals, concentration, loss of self-consciousness, and challenge-skill ratios. Results of the ALMES indicated that environment and leadership skills were most important to enjoyment of participation. Results of the data also suggest that people with less developed rhythmic or melodic skills tend to disrupt flow.
CHAPTER 3

METHOD

Pilot Studies

For the purposes of exploring the functionality of the proposed experimental protocol, two pilot studies were administered to a population of music students at Florida State University (N=17). The pilot studies were designed to address what the potential effects of a brief twenty minute mindfulness meditation task would be on perceptions of attention, aesthetic response, and flow as measured by questionnaire, CRDI, and free-response.

Pilot study #1.

In the initial pilot study (n =10), a questionnaire was designed for the purposes of collecting demographic data and for ascertaining perceptions of attentional magnitude throughout various stages of the experimental task. The demographic questions read as follows:

1. What is your primary instrument?
2. Do you have any previous experience with any kind of formal meditation practice? Yes/No
3. If your answer was yes, how many years?

After completing these questions, participants were directed to complete the following questions using a 10 point Likert-type scale with numerical values representing a range of low (1), through high (10).

1. How would you describe your ability to maintain focus or pay attention for extended periods of time?
2. How would you describe your level of focus or attention right now?

Upon completing these questions, participants were directed over to a small station containing a chair, a table, a CRDI, and a set of headphones. After a brief orientation on how to use the CRDI, participants were directed to put on the headphones and listen to a 19 minute guided mindfulness meditation task while sitting comfortably in the chair. The 19 minute audio presentation was extracted from the website of the University of Vermont’s Center for Health and Wellbeing: Mindfulness Practice Center. The audio content included a series of guided tasks which are commonly used in mindfulness
training contexts including: (1) instructions to remain focused on somatic sensations of breathing regardless of mental distractions, and (2) remaining cognitively or emotionally unattached to any content which may arise in awareness.

At the conclusion of the mindfulness task, participants were asked to listen to a 10 ½ minute version of Act I of Giocomo Puccini’s Opera, *La Bohème*. The excerpt came from a 1974 recording of the London Philharmonic with George Solti conducting. The singers on the recording included soprano Montserrat Caballe, and tenor Placido Domingo. The stimulus was selected based upon its frequency of use in previous studies on affective response and focus of attention (Madsen et al. 1993; Madsen, 1997; Byrnes, 1997; Southall, 2003; Madsen & Geringer, 2008; Napoles & Madsen 2008).

Music from the first act was played in its original order, and included *Che gelida manina* (tenor aria), *Mi chiamano Mimi* (soprano aria), *Ehi! Rodlofo!* (transitional interlude), and *O soave fanciulla* (soprano and tenor duet). All excerpts were played in their entirety except for the final aria, *O soave fanciulla*. Only the first minute and thirty-four seconds of this aria was used for the stimulus excerpt. As in Southall’s (2003) study, the entire excerpt reflected a 10 ½ minute truncated version of the main arias from the first act, presented without interruption. Participants were directed to move the CRDI dial in response to their perceived aesthetic response, ranging from “less” to “more”.

At the conclusion of the musical response task, participants were asked to turn their questionnaires over to the next page and answer the following questions:

3. How would you describe your level of focus or attention during the meditation CD?
   - Low (1-2-3-4-5-6-7-8-9-10)
   - High

4. How would you describe your level of focus or attention after the meditation CD and before the music excerpt?
   - Low (1-2-3-4-5-6-7-8-9-10)
   - High

5. How would you describe your level of focus or attention during the music excerpt?
   - Low (1-2-3-4-5-6-7-8-9-10)
   - High

6. Did you have what you consider to be an aesthetic experience(s) while listening to the music?
   - YES
   - NO
   - SEVERAL
7. How long did the experience last? (Check all that apply)
   All of the act ____  Parts of the act ___
   Arias ____       Parts of the arias ___
   Other ____

8. What was the magnitude of this musical experience as compared with others you have had?
   Low         High
   1  2  3  4  5  6  7  8  9  10

Items six through eight are adopted from previous research on aesthetic response and CRDI, and represent measures of (1) experience of the construct as defined by each participant, (2) indications of the temporal length of the composite experience, and (3) a summative measure of the magnitude of the overall experience. For the final section of the initial pilot study, participants were asked to answer the following question:

Please reflect on your experience during the musical and/or meditation portion of this study. If there is anything you would like to share about your experience, please do so.

**Flow pre-pilot and pilot.**

As no previous research exists on flow as a metric for continuous response, a pilot study was conducted to ascertain the feasibility of the construct as an experimental variable. Thus, the pilot study sought to (1) ascertain familiarity and impressions of the term flow among collegiate level musicians, (2) develop a tentative operational definition for the purposes of future research, (3) implement a study using the proposed operational definition in a manner comparable to previous research on affective responses.

To ascertain familiarity with the term “flow”, a pre-pilot survey was conducted among a sample of undergraduate and graduate musicians (N=15) at Florida State University. Participants were asked to respond freely to the following questions:
The word “flow” has been used by psychologists to describe a “state in which people are so involved in an activity that nothing else seems to matter, the experience itself is so enjoyable that people will do it even at great cost for the sheer sake of doing it.”

(1) Before today, were you familiar with the term “flow” as described above?  
(2) Based on the provided description, have you experienced “flow” while listening to music?  
(3) If so, please describe, to the best of your ability, what the experience felt like to you. Additionally, if possible, could you describe what the experience felt like using one to two words?

Results of the pilot study indicated that nine out of the 15 respondents were familiar with descriptions of flow as provided. The given description was extracted from an often cited quote on flow used by psychologist Mihalyi Csikszentmihalyi (1990). For the second question, 14 out of 15 participants indicated that they had experienced flow while listening to music. For the third question, responses reflected various themes in relationship to flow experiences. A heuristic analysis of the responses suggests the following themes: (1) experiences dealing with altered time and space - “I forgot who I was and where I was, it was almost like I was right there on stage with the musicians”, (2) experiences dealing with heightened concentration – “I was concentrating so heavily on the music I didn’t even hear the people around me calling my name”, (3) physiological experiences – “I had chills all over my body”, (4) spiritual themes – “… this is what heaven must feel like, to be like that all the time”, (5) positive emotional experiences – “I just feel so happy when I listen to music, I can’t think of anything else that makes me feel like that”.

Finally, nine respondents chose to provide a definition of the experience using one to two words. A frequency analysis of words that were used more than once are included in Table 1 below.
Table 1
Frequency of terms describing Flow

<table>
<thead>
<tr>
<th>Word</th>
<th># of times used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Focused</td>
<td>5</td>
</tr>
<tr>
<td>Concentrated</td>
<td>2</td>
</tr>
<tr>
<td>Happy</td>
<td>3</td>
</tr>
<tr>
<td>Absorbed</td>
<td>2</td>
</tr>
<tr>
<td>Involved</td>
<td>2</td>
</tr>
<tr>
<td>Joyful</td>
<td>2</td>
</tr>
</tbody>
</table>

Based on the results of the pre-pilot, it appeared that the experience of flow as described would be familiar to musicians, and thus was feasible as a construct for response. Additionally, numerous studies cited in the current review of literature establish that dimensions of the flow experience have been reported throughout a broad range of musical settings. In the current survey, similar dimensions were evident throughout.

Due to the relatively small number of participants who had indicated familiarity with flow previously to the survey, a tentative operational definition was developed to reduce the possibility of confusion in future studies. As flow is a term used after the fact to describe a composite range of related experiences, the literature was examined for the purposes of providing a concise definition which might be useable for response purposes. As the existing literature does not provide an agreed upon definition, various sources along with results from the current survey were examined to determine an adequate definition. Thus, for the purposes of the pilot, flow was described as “a mental/emotional state partially characterized by the feeling of being fully immersed, focused, and involved in a given task.”

After the pre-pilot, participants in the flow pilot (n=7) engaged in the exact procedural protocol as the aesthetic response group, but with the term “aesthetic response” replaced with “flow”, and with an operational definition included in the directions.
**Results and analysis of pilot studies.**

Responses to question 1 in relationship to CRDI and questionnaire data suggested no apparent relationship based on primary instrument upon attention, aesthetic response, or flow using the available measures. Consequently, this question was removed from the subsequent main study.

Responses to questions 2 through 5 in conjunction with other data seemed to indicate a subjective heightening effect based on meditation as reflected in self-reported attention measures, and on music listening as reflected within verbal responses. Verbal responses suggested that the meditation task had allowed some participants to enter into a deep state of relaxation and heightened attention. Additionally, some respondents reported (1) noticing characteristics in the music which they would not normally perceive, and (2) a decrease in distractions resulting in increased concentration on the music. Since measures of self-reported attention and verbal responses seemed to indicate a beneficial effect due to meditation, this variable was deemed worthy of future investigation.

As with previous studies, no one reported having an aesthetic or flow experience for the entirety of the music selection, but all participants indicated having either an aesthetic or flow experience at some point while listening to the music. The self-reported magnitude of these experiences was consistent with previous research, evidencing an overall mean of 7.32 when data from both groups were combined. As these questions provide necessary indications of individual construct and instrument validity, as well as summative measures of response magnitude, they were maintained in the subsequent study.

Graphs of combined CRDI responses comparing the aesthetic response and flow response groups to previous studies using the same 10 1/2 minute stimulus revealed no noticeable difference in regards to the locations of peaks, valleys, and plateaus. Since the number of participants in the pilot study was relatively low, no comparisons of overall magnitude were made based upon the available data. Combined CRDI responses to *La Bohème*, however, appear to have some global characteristics; thus the stimulus was deemed appropriate for comparing differences between constructs in the main study.

**Independent and Dependent Variables**

In the present study, the constructs of aesthetic response and flow as well as a 15 minute mindfulness induction task will serve as independent variables. Dependent variables will include Likert-type as well categorical questionnaire responses, CRDI data, and verbal free responses. The specific way in which each variable will be implemented and measured is listed below.
Aesthetic and flow response.  
Aesthetic response and flow will serve as independent variables through their function as constructs for focus of attention during responses to the musical stimulus. To determine the suitability of each construct for analysis, the following questions will be asked of all participants:

1. Occurrence of the response (did participants have an experience/s of the attendant construct)
2. Reliability between the construct response and the instrument of measurement (how accurate was the CRDI in registering participant response to the given construct)
3. Length and location of the response in relationship to the stimulus (in what section of the music did the respective construct occur and for how long)

The temporal response aspects of each construct will be interpreted using CRDI data, and the overall summative magnitude of the response will be measured using a 10 point Likert-type scale.

Mindfulness
Mindfulness will serve as an independent variable implemented through a 15 minute guided audio task. The effects of mindfulness will be determined using summative perceptions of attentional magnitude (baseline, during a mindfulness task, after the task, and during music listening under either of the two constructs – mindfulness and aesthetic response), along with questions designed to ascertain (1) whether the mindfulness task affected listener response to the musical stimulus in any way, and (2) if so, how? Finally, the effect of mindfulness in conjunction with either flow or aesthetic response will be interpreted through responses in the CRDI data.

Demographic variables.
For the purposes of determining future areas of research, demographic data pertaining to meditation type experiences as well as recency of participation will be collected.

Qualitative Responses
The general differences between the phenomenological characteristics of flow and aesthetic response will be explored through an open-ended question at the conclusion of each study along with data from composite CRDI graphs.

Main Study
Participants.
Participants were undergraduate and graduate students enrolled in music classes or ensembles at Florida State University (N=132). The researcher solicited volunteers for participation during regularly scheduled music classes and ensembles, as well as through electronic mail. Although no systematic
method was used to collect demographic data, it is reasonable to assume that participants for this study represented a variety of disciplines within the College of Music, including a modest amount of musically “sophisticated” non-majors.

**Design and variables.**

Participants were randomly assigned to one of either four groups: mindfulness induction and aesthetic response (n=34), mindfulness induction and flow response (n=35), aesthetic response (n=32), or flow response (n=31). For all groups, a questionnaire was used to gather data on self-reported measures of attention, aesthetic response, and flow. Additionally, all participants were asked to manipulate a Continuous Response Digital Interface which registered either their aesthetic or flow response to a 10 ½ minute audio excerpt of Giacomo Puccini’s opera *La Bohème*. In groups in which a mindfulness induction was used, participants were asked to listen to a previously recorded fifteen minute guided mindfulness audio presentation.

**Musical stimulus.**

The musical stimulus used for this study was the first act of Giacomo Puccini’s opera *La Bohème* as described in the pilot studies. Specific details are included under the pilot study section of this document.

**Mindfulness stimulus.**

A 15 minute guided mindfulness audio recording was used as a stimulus for participants in the mindfulness and aesthetic response group as well as mindfulness and flow response group. A script of the task is reproduced in Appendix A. The recording is a shortened version of a 20 minute guided meditation task available for public dissemination on the website of Duke University’s Counseling and Psychological Services department. The audio excerpt was selected due to its overall sound quality and because it contained no specific reference to meditation or any other type of Eastern religious or philosophical practice. These criteria were used after participants in the pilot study reported feeling distracted by the relatively low-quality of the recording used, as well as previous associations with the term “meditation” which they felt may have altered their responses to the study. In order to ascertain the sound quality of the excerpt, three participants were asked to compare the selected excerpt with the one used in the pilot study along with one other similar excerpt and report on their perceptions of overall sound quality. The mean for the excerpt used in the study was 8.2 out of 10 possible points, compared to 5.7 for the excerpt used in the pilot, and 6.9 compared to a second excerpt.
The aim of the audio excerpt was to engage participants in fully or “mindfully” attending to physical sensations as prescribed by a progressive body scan task. Throughout the task, participants were also periodically reminded to attend to their breathing, as well as bring their awareness back to either physical sensations or breathing when they became aware that their attention was wandering from the task. This type of body scan technique is a common mindfulness training exercise, and has been used by previous researchers in varying formats (Kabat-Zinn, 1994).

**Experimental procedures.**

The study took place in a relatively sound-proof room on the basement level of a building at the College of Music. The room included four individual stations, each containing a Continuous Response Digital Interface dial as well as headphones connected to audio playback equipment. Audio equipment used in this study included AKG K99 high fidelity skin compatible headphones attached to a Shure SA-1 model splitter/amplifier. The Shure amplifier was in turn connected to an RCA DRC Digital Audio Player.

Upon entering the room, participants were greeted and directed to one of the four experimental stations. Before beginning the study, participants were asked to review a consent form and printed directions affixed to each experimental station previous to their arrival. Participants were also prompted to ask any questions they might have pertaining to the study at that time. After forms were reviewed and potential questions answered, participants who agreed to the terms of the study were requested to sign their name on the consent form. Participants were also reminded that if they did not wish to participate in the study for any reason, they could leave the room at that time or during any portion of the study without penalty.

Each station was partitioned so that participants’ written and verbal responses were not visible to other persons in the room, including the researcher or proctor. For each group, a specific set of instructions was posted in the experimental station and read aloud by either the researcher or a proctor (see Appendix B). Lighting in the room was also dimmed to create a relaxing and appropriate environment for the experiment.

Although instructions varied somewhat between groups, general instructions were as follows:

This experiment involves attention and music listening. The experiment is in three parts and takes approximately 30 minutes to complete.
Part I
Please answer the two questions on the 1st page of the questionnaire provided. DO NOT TURN THE QUESTIONNAIRE OVER OR ANSWER ANY OTHER QUESTIONS AT THIS TIME.

Part II (for groups using mindfulness induction only)
You will now listen to a 15 minute guided “mindfulness” exercise. Before beginning the exercise, please follow the following directions.
1) Sit upright in your chair.
2) If you are comfortable doing it, please close your eyes
3) Listen carefully to the recording and follow the directions to the best of your ability.
4) Put the headphones on and the exercise will begin shortly
At the end of the exercise, you will be asked to fill out the next page of the questionnaire.

Part III (for all aesthetic response groups)
Now you are going to hear a 10 ½ minute excerpt of Act I of Puccini’s La Bohème. This portion of the study is concerned with measuring the degree of felt aesthetic response to music. In front of you is a Continuous Response Digital Interface dial that will register your varying aesthetic response. Before beginning, please place the dial in the extreme left position indicating no response. During the presentation, if you experience any aesthetic response, please move the dial towards the left if you wish to indicate a decrease in response or to the right if indicating an increase in response. Following the experiment, you will be asked to fill out the rest of the questionnaire. Thank you for your time.

Part III (for all flow response groups)
Now you are going to hear a 10 ½ minute excerpt of Act I of Puccini’s La Bohème. This portion of the experiment involves measuring the degree of “flow” experienced while listening to music. “Flow” is a mental/emotional state partially characterized by the feeling of being fully immersed, focused, and involved in a given task. In front of you is a Continuous Response Digital Interface dial that will register your varying “flow” responses. Before beginning, please place the dial in the extreme left position indicating no “flow”. During the presentation, if you experience any “flow” experience please move the dial towards the left if you wish to indicate a decrease in response or to the
right if indicating an increase in response. Following the experiment, you will be asked to fill out the rest of the questionnaire. Thank you for your time.

Before beginning the CRDI portion of the study, participants were asked if they had any questions concerning the use of the device, and were allowed to manipulate the dial briefly for practice.

**CRDI procedures and data collection.**

Individual CRDI responses were collected on an HP Pavilion dv6000 laptop computer and transferred into Excel software for analysis. Two CRDI overlays were used in the study, one each for the aesthetic response group and the flow response group.

Figure 3. Continuous Response Digital Interface with “Aesthetic Response” Overlay
Figure 4. Continuous Response Digital Interface with “Flow Response” Overlay
CHAPTER 4
RESULTS

Questionnaire Data

Descriptive data for the questionnaire portion of the study is included in Appendix C. Participants in all groups were asked to respond to a set of 11 questions dealing with self-reported measures of attention, aesthetic or flow experience, and responses to the CRDI. In order to ascertain responses to the mindfulness induction, four additional questions were administered to participants in the two mindfulness groups. The four groups referred to in this section are Mindfulness and Aesthetic Response (MA, n=34), Mindfulness and Flow (MF, n=35), Aesthetic Response (A, n=32), and Flow (F, n=31).

The first five questions dealt with ascertaining self-reported measures of attention. The range of response for each question was 1-10, with 1 being the lowest possible response and 10 being the highest. Means and standard deviations for Question 1, “How would you describe your ability to maintain focus or pay attention for extended period of time?”, were as follows; MA (M = 7.35, SD = 1.51), MF (M = 7.14, SD = 1.57), A (M = 6.88, SD = 1.47), F (M = 7.25, SD = 1.32). For question 2, “How would you describe your level of focus or attention right now?”, responses were; MA (M = 7.21, SD = 1.61), MF (M = 6.43, SD = 1.63), A (M = 6.59, SD = 1.47), F (M = 7.03, SD = 1.69). Responses to question 3, “How would you describe your level of focus or attention during the mindfulness task?”, were collected from just the two mindfulness group, MA and MF. Means and standard deviations for each group were (M = 7.59, SD = 1.61) for MA, and (M = 7.69, SD = 1.97) for MF. Question 4, “How would you describe your level of focus or attention right now?”, was also only asked of participants in the two mindfulness groups immediately after they had participated in the task. For the MA group, the mean was 8.35 and standard deviation was 1.36. For the MF group the mean was 8.09 with a standard deviation of 1.50. All groups received the fifth question, “How would you describe your level of focus or attention during the music excerpt?” Means and standard deviations for this question were MA (M = 8.14, SD = 1.76), MF (M = 7.82, SD = 1.52), A (M = 7.85, SD = 1.46), F (M = 7.77, SD = 1.2).

Question 6, “Did you have what you consider to be an aesthetic/flow experience(s) while listening to the music?”, was slightly modified by group. The word “flow” was used for participants in the MF and F groups, and the term “aesthetic response” was used for those in the MA and A groups. Participants could select one of three answer; several, yes, or no. For the MA group, 21 respondents said that they had several flow/aesthetic experiences, 11 responded “yes”, and 2 responded “no”. In the
MF, 21 respondents selected “several”, 13 selected “yes”, and 1 selected “no”. Responses for the A group were as follows; 19 selected “several”, 12 selected “yes”, and 1 selected “no”. For the F group, 15 selected “several”, 16 selected “yes”, and none selected “no”. Overall, 58% of respondents selected “several”, 39% selected “yes”, and 3% selected “no”.

For question 7, respondents were asked, “Did you feel the movement of the CRDI roughly corresponded to variations of the above aesthetic/flow experience?” Similarly to the previous question, the term “flow” or “aesthetic response” was used depending upon group. Responses were as follows; MA (Yes=31, No=3), MF (Yes=27, NO=8), A (Yes=29, No=2, No Response=1), F (Yes=29, No=2). Overall, 89% of respondents selected “yes”, and 11% selected “no”. Question 8 asked, “How long did the experience last?” Five categories were presented for selection; “all of the selection”, “parts of the selection”, “specific arias”, “parts of the arias”, and “other”. Participants could select more than one category. Responses by group were as follows; MA (“all of the selection”=10, “parts of the selection”=21, “specific arias”=10, “parts of the arias” = 15, “other”=7), MF (“all of the selection”=2, “parts of the selection”=27, “specific arias”=4, “parts of the arias” = 22, “other”=2), A (“all of the selection”=2, “parts of the selection”=25, “specific arias”=2, “parts of the arias” = 18, “other”=5), F (“all of the selection”=3, “parts of the selection”=17, “specific arias”=4, “parts of the arias” = 21, “other”=6).

The relative magnitude of the aesthetic/flow experience was ascertained through question 9, “What was the magnitude of this aesthetic experience as compared with others you have had?” Means and standard deviations were as follows, MA ($M = 6.56, SD = 1.68$), MF ($M = 6.26, SD = 1.69$), A ($M = 5.75, SD = 2.04$), F ($M = 6.51, SD = 1.64$).

Question 10 asked, “Do you feel that the mindfulness exercise changed the way you listened to the musical excerpt in any way?” Responses from the mindfulness groups were, MA (Yes=21, No=11), MF (Yes=23, No=11). For both groups combined, 64% responded “yes”, and 36% responded “no”. Question 11 asked participants who responded “yes” to question 10 how they believed the mindfulness induction may have affected how they responded to the musical excerpt. Responses for this question will be used for the purposes of contextualizing CRDI data, and are examined further within the discussion section.

Question 12 asked, “Do you have previous experience with any kind of formal meditation practice? This may include tai-chi, yoga, or other related practices.” Each group responded as follows; MA (Yes=14, No=19), MF (Yes=20, No=14), A (Yes=16, No=16), F (Yes=11, No=20). Question 13
requested data on the amount of time participants had participated in mindfulness related practices, “… how many years, months, weeks, or days?” All responses were coded using the following categories; none, less than six months, six months to one year, over one year through five years, over five years through ten years, over 10 years through 20 years, and over 20 years. Results for each category by group are included in Appendix C. For question 14, “When was the last time you practiced any of these techniques on a regular basis”, means and standard deviations for each group representing years of practice were as follows; MA ($M = 1.25, SD = .43$), MF ($M = 1.71, SD = 1.83$), A ($M = 1.94, SD = 1.95$), F ($M = 2.09, SD = 3.3$)

For question 15, respondents were provided a free response section in which they were allowed to describe phenomenological characteristics of either their flow or aesthetic experiences, and what they believed may have caused the experience. An analysis of these responses is included in the discussion section of this document.

**Quantitative Analysis of Questionnaire Data on Self-Reported Attention**

The effects of the mindfulness and focus of attention task (aesthetic response or flow) on self-reported attention were analyzed using several analysis of variance tests on selected questions. Raw data consisted of Likert-type responses of 1-10 for each question. To determine if baseline self-reported attention (Question 2) was different between groups, a one way ANOVA was administered. Results indicated no significant differences between the four groups, $F (3, 128) = 1.78, p = 0.15$ (see Table 2). Since no significant differences were found in baseline attention, means for self-reported attention from baseline through the musical task were compared to determine any possible effects due to either the mindfulness induction or focus of attention task.
Table 2
One Way Analysis of Variance of Groups based on Self-Reported Baseline Attention

<table>
<thead>
<tr>
<th>Source</th>
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<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
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</thead>
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<tr>
<td>Response Cond.</td>
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<td>3</td>
<td>4.48</td>
<td>1.78</td>
<td>.15</td>
</tr>
<tr>
<td>Error</td>
<td>322.81</td>
<td>128</td>
<td>2.52</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Total</td>
<td>336.26</td>
<td>131</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

For the mindfulness induction groups, a two factor analysis of variance test with repeated measures on one factor was conducted (Questions 2-5). Results indicated a significant difference for the within subject factor of attention, \( F(3, 201) = 16.87, p < .001, \eta_p^2 = .20 \) (see Table 3). Pair-wise comparisons for each group were conducted using Tukey HSD post-hoc tests. For the MA group, results indicated significant differences at the .01 level on attention between baseline \((M = 7.21, SD = 1.61)\) and after the mindfulness task \((M = 8.35, SD = 1.61)\), baseline and music listening \((M = 8.14, SD = 1.76)\), and at the .05 level during the mindfulness task \((M = 7.59, SD = 1.61)\) compared to immediately after its conclusion. For the MF group, results indicated significant differences at the .01 level on attention between baseline \((M = 6.43, SD = 1.63)\) and during the mindfulness task \((M = 7.69, SD = 1.97)\), baseline and after the mindfulness task \((M = 8.09, SD = 1.50)\), and baseline and music listening \((M = 7.82, SD = 1.52)\). All other comparisons were non-significant.
Table 3

Two Way Analysis of Variance with Repeated Measures on one Factor of Groups based on Self-Reported Attention – Mindfulness and Aesthetic Response, Mindfulness and Flow, Baseline through Music Listening

<table>
<thead>
<tr>
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<th>df</th>
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<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Response Cond</td>
<td>6.91</td>
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<td>6.91</td>
<td>1.15</td>
<td>.28</td>
</tr>
<tr>
<td>Error</td>
<td>401.5</td>
<td>67</td>
<td>5.99</td>
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</tr>
<tr>
<td>Attention Tasks</td>
<td>78.5</td>
<td>3</td>
<td>26.15</td>
<td>16.87</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Res/Att</td>
<td>6.7</td>
<td>3</td>
<td>2.22</td>
<td>1.43</td>
<td>0.23</td>
</tr>
<tr>
<td>Error</td>
<td>312.4</td>
<td>201</td>
<td>1.55</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Total</td>
<td>805.7</td>
<td>275</td>
<td>--</td>
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</tr>
</tbody>
</table>

For the two groups without mindfulness induction, a 2X2 two factor analysis of variance test with repeated measures on one factor was conducted (Questions 2-3). Significant differences were found for the within subject factor of attention, $F(1, 61) = 21.98, p < .001, \eta^2_p = .26$ (see Table 4). For both the A and F group, means were significantly higher after music listening; A ($M = 7.85, SD = 1.46$), F ($M = 7.77, SD = 1.2$), compared to baseline; A ($M = 6.59, SD = 1.47$), F ($M = 7.03, SD = 1.69$).
Table 4

Two Way Analysis of Variance with Repeated Measures on one Factor of Groups based on Self-Reported Attention – Aesthetic Response and Flow, Baseline through Music Listening

<table>
<thead>
<tr>
<th>Source</th>
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<tr>
<td>Response Conditions</td>
<td>1.69</td>
<td>1</td>
<td>1.69</td>
<td>0.58</td>
<td>.449</td>
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<tr>
<td>Error</td>
<td>179.02</td>
<td>61</td>
<td>2.93</td>
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<tr>
<td>Attention Tasks</td>
<td>28.5</td>
<td>1</td>
<td>28.57</td>
<td>21.98</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Res/Att</td>
<td>1.35</td>
<td>1</td>
<td>1.35</td>
<td>1.04</td>
<td>0.311</td>
</tr>
<tr>
<td>Error</td>
<td>79.08</td>
<td>61</td>
<td>1.30</td>
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</tr>
<tr>
<td>Total</td>
<td>289.71</td>
<td>125</td>
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</tr>
</tbody>
</table>

To compare overall self-reported attention during music listening tasks by group (Question 5), a one way analysis of variance was conducted. No significant differences were found between groups, $F(3, 128) = .5$, $p = .682$ (see Table 5).

Table 5

One Way Analysis of Variance of Groups based on Self-Reported Attention During Music Listening

<table>
<thead>
<tr>
<th>Source</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Response Cond</td>
<td>3.40</td>
<td>3</td>
<td>1.13</td>
<td>.50</td>
<td>.68</td>
</tr>
<tr>
<td>Error</td>
<td>293.15</td>
<td>128</td>
<td>2.29</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Total</td>
<td>296.56</td>
<td>131</td>
<td>--</td>
<td>--</td>
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</tr>
</tbody>
</table>
Quantitative Analysis of Self-Reported Summative Magnitude of Response between Groups

Self-reported summative magnitude of overall aesthetic/flow response was compared using a one way analysis of variance. Raw data consisted of Likert-scale responses from 1(lowest) – 10 (highest) to the question, “What was the magnitude of this aesthetic/flow experience compared with others you have had?” Results indicated no significant differences between groups, $F (3, 128) = 1.42, p = 0.24$ (see Table 6).

<table>
<thead>
<tr>
<th>Source</th>
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<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Response Cond</td>
<td>13.37</td>
<td>3</td>
<td>4.45</td>
<td>1.42</td>
<td>&lt;.23</td>
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<tr>
<td>Error</td>
<td>402.81</td>
<td>128</td>
<td>3.14</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Total</td>
<td>416.18</td>
<td>131</td>
<td>--</td>
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</tr>
</tbody>
</table>
Figure 5. Composite Response Graph for All Groups

In order to describe an overall group response per condition, individual CRDI responses were aggregated per second into one overall response graph (see Figure 5). Each graph represents participants’ responses to a specific construct (flow and aesthetic, with and without mindfulness) in a range of 0-255.

A visual description of the graph suggests a number of noticeable characteristics. For each group graph, peaks and valleys appear in similar positions relative to time. In respect to magnitude height, the relative order of highest to lowest is mostly consistent throughout the peaks and valleys as well as stable responses throughout. An exception to this pattern occurs intermittently between the mindfulness and flow condition versus the aesthetic response condition. In certain instances throughout the second half of Rodolfo’s aria, the aesthetic response group temporarily falls beneath the mindfulness and flow group.
during four minor valley points. This relationship remains moderately consistent until approximately one minute into Mimi’s aria. At that point, the relationship reverses and is consistent until the end of the graph.

Comparisons between the four groups indicate that overall subject response was highest in the flow condition group throughout the entirety of the task. The lowest responses occurred within the mindfulness and flow group and aesthetic response group. In respect to differentiation between stable or plateau responses versus peaks and valleys, it appears that the mindfulness and flow group remained the least susceptible to immediate and drastic changes in response magnitude. Summative means and standard deviations for overall magnitude of response by groups were as follows; F ($M = 129.14$, $SD = 25.89$), MA ($M = 118.54$, $SD = 24.51$), A ($M = 108.81$, $SD = 25.90$), MF ($M = 105.79$, $SD = 22.04$).

![Flow - Composite Response Graph with Standard Deviations](image)

Figure 6. Flow Composite Response Graph
Although the general temporal contours of each graph were similar, in this study, each of the four groups exhibited response patterns which were unique in relationship to magnitude characteristics. For the flow group, the general magnitude of the overall response and overall peaks were highest in comparison to other groups (see Figure 6). In respect to valleys, responses for this group remained relatively high compared to other groups. Additionally, plateaus were maintained throughout two of the largest valley points in the data (at approximately the 4 min. 30 sec. mark and 9 min 30 sec. mark in the stimulus).

Figure 7. Mindfulness Induction and Flow Composite Response Graph and Standard Deviations

For respondents in the mindfulness and flow group, patterns were lowest overall in respect to peak magnitude. Additionally, responses rarely ascended to the same peak magnitude of the other groups, and during the first aria, plateaus were maintained throughout several of the overall minor valley points. In the second aria, responses indicated that plateaus were maintained throughout all but the
largest overall peak (at 7 min. 30 sec.), and then remained consistently lower than all other responses throughout the remainder of the musical sample (see Figure 7).

![Aesthetic Composite Response Graph and Standard Deviations](image)

**Figure 8. Aesthetic Composite Response Graph**

In the aesthetic response group, response magnitude was third highest throughout all of the major peaks in the first aria, and lowest overall during each valley. Plateaus were relatively short and often very unstable. During the second aria, response patterns in the first few minutes indicated a very low plateau, then a gradual rise where responses matched all of the other groups for the first full peak. After the peak, response patterns decreased to a low plateau, then continued a similar pattern until the conclusion of the task (see Figure 8).
In the mindfulness and aesthetic response group (see Figure 9), responses were almost identical to those of aesthetic response, except that peaks tended to be higher (except for last peak), and valleys rarely descended as low as in the control group. Generally, response magnitude for this group would decrease at the same time as other groups for major valley points, and then maintain a slight plateau.

Figure 9. Mindfulness and Aesthetic Composite Response Graph
CHAPTER 5
DISCUSSION

The primary purpose of the present study was to investigate the effects of a brief mindfulness induction on perceptions of attention, aesthetic response, and flow during a subsequent music listening task. The effects of mindfulness were explored using three response variables:

1. Summative reports of perceived attentional magnitude
2. Verbal responses to a question regarding the perceived effect of mindfulness during music listening
3. Patterns of response within composite CRDI graphs. Additionally, possible differences between aesthetic response and flow were explored heuristically using verbal responses in conjunction with CRDI data.

Regarding attention, results of the current study suggest that both mindfulness and music listening during conditions of either aesthetic or flow response were sufficient as a means of heightening participants’ perceived magnitude of attention. Additionally, the majority of participants who had engaged in mindfulness described the task as beneficial to their music listening experience, and CRDI graphs for these participants evidenced unique patterns of response. In general, these results suggest that arousal or “magnitude characteristics of attention” may be heightened using either task but that mindfulness may have provided a unique subjective effect which was not apparent in the summative data. Furthermore, the reasons why mindfulness would have functioned differently under conditions of aesthetic response and flow are unclear and suggest a variable worthy of further examination.

In a practical sense, the current study provides some evidence that mindfulness might be helpful as an antecedent to engaged music listening. A cursory analysis of verbal responses indicated that participants experienced several cognitive benefits from the task, including decreased mental distraction, increased awareness of musical characteristics, and improvements in focus. These results are consistent with previous research on the effects of long-term mindfulness practice, and reinforce recent studies suggesting that even short periods of engagement might be beneficial in the areas of focus and attention (Arche & Craske, 2006; Lutz et al., 2008). However, as qualitative data on attention was not collected among participants who had not engaged in mindfulness, it is not possible to determine if any unique effects might be attributable to mindfulness compared to other strategies. Future studies should address how mindfulness compares with other tasks as a means of heightening attention and if it provides further benefits not addressed in the current study.
The cause of differences in CRDI response patterns between the participants in groups who had engaged in mindfulness compared with those who had not presents a difficult area of interpretation, especially when considering the additional factor of differences attributable to the construct used for focus of attention (aesthetic response or flow). Previous research suggests that mindfulness affects a variety of psychological responses, including both attention and emotion. Generally speaking, mindfulness tends to decrease rumination, increase awareness, and improve focus. Additionally, studies also suggest that mindfulness decreases reactivity to negatively valenced stimuli (Greeson, 2009). Before examining the possible effects of mindfulness in the context the present response conditions, differences between aesthetic response and flow will be ascertained below.

A secondary focus of this study explored if any general differences might exist between experiences of aesthetic response and flow. In the context of the CRDI data, differences between responses were evidenced primarily in relationship to plateaus and valleys. Specifically, flow responses demonstrated extended plateau type characteristics during valleys in aesthetic response. Additionally, a heuristic analysis of verbal descriptions of flow evidenced themes dealing mostly with attentional properties such as engagement, immersion, focus, and involvement. In descriptions of the aesthetic experience, themes revolved around emotional qualities such as sadness, happiness, beauty, and joy.

If contextualized within these findings, it is possible that the extended plateaus evidenced in flow graphs might be representative of either focused attention or heightened awareness, and the attenuated properties of peaks that occurred during mindfulness might be representative of decreased distraction or reaction to intensity properties of the musical stimulus. For aesthetic response, the increased peaks during mindfulness might be indicative of heightened awareness to perceived emotional or acoustical properties in the stimulus, and the attenuated valleys might represent resistance to distraction or reaction based upon less arousing or interesting sections. These response properties, if substantiated throughout future research, might suggest a differing hierarchy of importance in regards to cognitive versus emotional responses between flow and aesthetic responses.

Regardless of the construct used for focus of attention, a vast majority of respondents described phenomenological characteristics consistent with previous accounts of peak experiences. In general, these results suggest different ways of engaging in music for the purposes of enjoyment. As most of the research on affective response to music involves emotion and related constructs, the possibility of an enjoyable “attentional” or cognitive response to music would seem an area worthy of future research.
Along with findings relating to the primary research questions in the present study, other incidental findings are worthy of note. First, in contrast to previous studies on affective response, participants in the present study reported that they had experienced an aesthetic or flow experience for the entirety of the music listening task. This occurred among ten participants in the mindfulness and aesthetic response group, and represents a highly unusual finding in comparison to previous studies. Additionally, several participants in the mindfulness and flow group reported that the movements of the CRDI dial did not accurately reflect variations in their response. Both groups represent individuals who had participated in a mindfulness task, and their feedback further suggests the possibility that mindfulness may produce unique effects in relationship to music listening.

**Summary**

The present study represents an initial attempt at exploring the effects of mindfulness on music listening. Although a great deal of research has focused upon mindfulness in both clinical and psychological settings, there do not appear to be any studies involving mindfulness and its relationship to musical experiences. As music listening represents one of the most commonly sought after activities for the purposes of enjoyment, exploring ways in which this experience might be purposefully enhanced may be of benefit to many people. Results from the present study indicate noticeable differences in music listening experiences among individuals who engaged in a brief mindfulness induction. If these results are replicable, then mindfulness might be useful as a means of increasing concentration and awareness during cognitive and affective tasks relating to music, and might provide other unknown benefits in relationship to psychomotor and creative activities.

Although the findings in relationship to differences between flow and aesthetic response in the present study are speculative, the possibility of an affective response of a primarily cognitive nature (flow) presents an issue worthy of investigation. Among the various ways in which human beings interact with music, there are contexts such as composition, conducting, teaching, research, performance, and just thinking about music in which enjoyment might be more a product of cognition rather than of emotional arousal. Being “washed away” by intense emotional experiences might actually be counterproductive when focused engagement is required to do the aforementioned tasks. Still, some type of cognitive enjoyment must surely be a motivating factor for continued participation in one’s musical involvement in these contexts, whether it be of an amateur or a professional level. Thus, the further study of flow as a unique type of affective response seems a worthy avenue of pursuit.
APPENDIX A

AUDIO SCRIPT FOR MINDFULNESS TASK

Settle comfortably into your chair, allow your eyes to close.

Take two or three deep breaths … and then allow your breath to become normal, easy, and relaxed, don’t try to change or force it.

And as you continue to breathe easily, bring your awareness to your feet, and just begin to notice the sensations of your feet, resting against the floor.

Noticing the weight, the pressure …

As you continue to breathe easily, allow your awareness to move up your legs, noticing any sensations in the muscles of your calves.

Become aware of any sensations in your knees … moving your awareness up to the muscles on your thighs, noticing again any sensations. If you notice any tightness or tension, see what happens when you try to release that, using the exhalation to carry away, any unnecessary tightness, or tension.

Continue to breathe easily, and regularly, now move your awareness to your hands, just notice the sensations of your hands, resting in your lap.

Notice if you feel any tingling or pulsations, if there is any tension. Allow the exhalation to carry any unnecessary tension away.

Now move your awareness slowly up your arms, noticing the sensations in your forearms, in your biceps. Again, releasing any unnecessary tension or tightness …

Move your attention up to your shoulders, and your neck, just notice what you feel, look deeply into the sensations. Is there tightness, do you feel air moving across the back of your neck, just notice what’s there, and use the exhalation, to carry away any unnecessary tension or tightness. Now move
your awareness down your spine, become aware of your posture, become aware of your muscles along
the side of your spine. Notice that your posture can be upright and relaxed at the same time. If you
notice any unnecessary tightness or tension, see what happens when you try to release that, letting the
tension or tightness release on the exhalation.

Now move your awareness, your attention, back up your spine, to the base of your skull, noticing
sensations there.

And as you continue to breathe easily, move your awareness to the muscles on your face, and your jaw.

Become aware of your jaw muscles, noticing sensations, releasing any unnecessary tension or tightness,
letting your teeth fall just slightly apart. Notice the muscles around your mouth, notice how they feel.

Notice what happens in you soften, relax those muscles. Move your awareness to the muscles around
your eyes, can you soften those muscles? As you breathe easily, realizing tension, relaxing into the
present moment. Notice the muscles in your forehead, then move your awareness to the top of your
head, becoming aware of the sensations there, the muscle, the skin, the hair. Just feeling that place at the
very top of your head.

Now take a few moments, and scan your awareness through your entire body, from the very top of your
head to the very tips of your toes, and as you move your awareness gently through your body, notice if
there are any places of remaining tightness or tension. And if you find a place like that, let your
awareness settle there for just a few moments, as you breathe in or out, seeing if you can release that
tension, looking deeply into your experience in this moment.
Now allow your awareness to focus more fully on your breath. As you continue to watch the breathing
in and breathing out, see if you can find in your body, the one place where you most easily can
experience the sensations of your breath. It may be the rise and fall of your belly or your chest, or you
may notice the sensation of the air moving in and out the tip of your nose, or across the back of your
throat. As you watch your breath, try to find that place, where it seems most clear to you. And let your
awareness settle there gently, watching the rise and fall of your breath. See if you can look deeply into the
sensations of your breath. Can you notice the sensations of an entire in-breath? Can you be fully
present for an entire out-breath? What do you notice between the in-breaths and the out-breath? As you watch your breath, you will notice, how quickly, your mind wanders, and begins generating thoughts, making plans, making judgements … remembering.

See if you can just notice the thoughts. Maybe very gently begin to notice the type of thinking … are you planning, judging, worrying? Then practice just letting those thoughts go … releasing them.

Bringing your awareness back to your breath, with an attitude of patience, and relaxed acceptance, focusing again, on the present moment, experience of your breathing.

As you continue to watch your breath, you will find that your mind continues to wander, again and again. Just see if you can notice it, and bring it back, bring it back, bring it back, with an attitude of patience and acceptance, as you train your mind to focus, with ease, on your present moment experience, as you train your mind to look deeply, into the sensations of the present moment.

When you hear the sound of the bell, make a commitment, to continue to bring this level of awareness, and attention, to all of your experiences.

(Soft bell rings and fades away)
APPENDIX B
GROUP INSTRUCTIONS

Instructions- Mindfulness and Flow Response Group
This experiment involves attention and music listening. The experiment is in three parts and takes approximately 30 minutes to complete. Please follow the directions below.

Part I
Please answer the two questions on the 1st page of the questionnaire provided. DO NOT TURN THE QUESTIONNAIRE OVER OR ANSWER ANY OTHER QUESTIONS AT THIS TIME.

Part II
You will now listen to a 15 minute guided “mindfulness” exercise. Before beginning the exercise, please follow the following directions.

1) Sit upright in your chair.
2) If you are comfortable doing it, please close your eyes
3) Listen carefully to the recording and follow the directions to the best of your ability.
4) Put the headphones on and the exercise will begin shortly

At the end of the exercise, you will be asked to fill out the next page of the questionnaire.

Part III
Now you are going to hear a 10 ½ minute excerpt of Act I of Puccini’s La Bohème. This portion of the experiment involves measuring the degree of “flow” experienced while listening to music. “Flow” is a mental/emotional state partially characterized by the feeling of being fully immersed, focused, and involved in a given task. In front of you is a Continuous Response Digital Interface dial that will register your varying “flow” responses. Before beginning, please place the dial in the extreme left position indicating no “flow”. During the presentation, if you experience any “flow” experience please move the dial towards the left if you wish to indicate a decrease in response or to the right if indicating an increase in response. Following the experiment, you will be asked to fill out the rest of the questionnaire. Thank you for your time.
**Instructions- Flow Response Group**

This experiment involves attention and music listening. The experiment is in two parts and takes approximately 20 minutes to complete. Please follow the directions below.

**Part I**

Please answer the two questions on the 1st page of the questionnaire provided. **DO NOT TURN THE QUESTIONNAIRE OVER OR ANSWER ANY OTHER QUESTIONS AT THIS TIME.**

**Part II**

Now you are going to hear a 10 ½ minute excerpt of Act I of Puccini’s *La Bohème*. This portion of the experiment involves measuring the degree of “flow” experienced while listening to music. “Flow” is a mental/emotional state partially characterized by the feeling of being fully immersed, focused, and involved in a given task. In front of you is a Continuous Response Digital Interface dial that will register your varying “flow” responses. Before beginning, please place the dial in the extreme left position indicating no “flow”. During the presentation, if you experience any “flow” experience please move the dial towards the **left** if you wish to indicate a **decrease** in response or to the **right** if indicating an **increase** in response. Following the experiment, you will be asked to fill the rest of the questionnaire. Thank you for your time.
**Instructions – Aesthetic Response Group**

This experiment involves attention and music listening. The experiment is in two parts and takes approximately 20 minutes to complete. Please follow the directions below.

**Part I**

Please answer the two questions on the 1st page of the questionnaire provided. DO NOT TURN THE QUESTIONNAIRE OVER OR ANSWER ANY OTHER QUESTIONS AT THIS TIME.

**Part II**

Now you are going to hear a 10 ½ minute excerpt of Act I of Puccini’s *La Bohème*. This portion of the study is concerned with measuring the degree of felt aesthetic response to music. In front of you is a Continuous Response Digital Interface dial that will register your varying aesthetic response. Before beginning, please place the dial in the extreme left position indicating no response. During the presentation, if you experience any aesthetic response please move the dial towards the *left* if you wish to indicate a *decrease* in response or to the *right* if indicating an *increase* in response. Following the experiment, you will be asked to fill out the rest of the questionnaire. Thank you for your time.
APPENDIX C
DESCRIPTIVE DATA FROM QUESTIONNAIRE

List of Questions

1. How would you describe your ability to maintain focus or pay attention for extended periods of time?
2. How would you describe your level of focus or level of attention right now?
3. How would you describe your level of focus or attention during the mindfulness CD?
4. How would you describe your level of focus right now (after mindfulness)?
5. How would you describe your level of focus or attention during the music excerpt?
6. Did you have what you consider to be an aesthetic/flow experience while listening to music?
7. Did you feel the movement of the CRDI roughly corresponded to variations of the above aesthetic experience?
8. How long did the experience last?
9. What was the magnitude of this aesthetic experience as compared with others you have had?
10. Did you feel the mindfulness exercise changed the way you listened to the musical excerpt in any way?
11. Do you have previous experience with any kind of formal meditation practice? This may include Tai-Chi, Yoga, or other related practices.
12. If your answer was yes, how many years, months, weeks, or days?
13. When was the last time you practiced any of these techniques on a regular basis?

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APPENDIX D
PARTICIPANT SURVEYS

Mindfulness and Aesthetic Response Group

For the following questions, circle the number that best describes your answer.

1. How would you describe your ability to maintain focus or pay attention for extended periods of time?
Low  High
1  2  3  4  5  6  7  8  9  10

2. How would you describe your level of focus or attention right now?
Low  High
1  2  3  4  5  6  7  8  9  10

STOP HERE AND LISTEN FOR INSTRUCTIONS. DO NOT TURN TO THE BACK OF THE SHEET UNTIL YOU ARE INSTRUCTED TO DO SO. (NEW SHEET)

3. How would you describe your level of focus or attention during the mindfulness CD?
Low  High
1  2  3  4  5  6  7  8  9  10

4. How would you describe your level of focus or attention right now?
Low  High
1  2  3  4  5  6  7  8  9  10

STOP HERE AND LISTEN FOR INSTRUCTIONS. DO NOT TURN TO THE BACK OF THE SHEET UNTIL YOU ARE INSTRUCTED TO DO SO. (NEW SHEET)

5. How would you describe your level of focus or attention during the music excerpt?
Low  High
1  2  3  4  5  6  7  8  9  10
6. Did you have what you consider to be an aesthetic experience(s) while listening to the music?
YES  NO  SEVERAL

7. Did you feel the movement of the CRDI roughly corresponded to variations of the above aesthetic experience?
YES  NO

8. How long did the experience last (Check all that apply)
   All of the selection  ____  Parts of the selection  ____
   Arias  ____  Parts of the arias  ____
   Other  ____

9. What was the magnitude of this aesthetic experience as compared with others you have had?
Low  1  2  3  4  5  6  7  8  9  10  High

GO TO THE NEXT PAGE (NEW SHEET)

10. Do you feel that the mindfulness exercise changed the way you listened to the musical excerpt in any way? Yes/No

11. If yes, briefly describe how so? If no, please skip to question 12.

12. Do you have previous experience with any kind of formal meditation practice? This may include Tai-Chi, Yoga, or other related practices. Yes/No

   If the answer to the previous questions was no, please skip the next two questions.

13. If your answer was yes, how many years, months, weeks, or days? _______________________

14. When was the last time you practiced any of these techniques on a regular basis?
______________________________________
15. If you had what you considered to be an aesthetic experience(s) during any portion of the music listening task, please describe (a) what you believe may have been the cause of that experience(s), and (b) what did the experience(s) feel like to you. (SPACE)

Thank you for participating in this study.
Mindfulness and Flow Group
For the following questions, circle the number that best describes your answer.

1. How would you describe your ability to maintain focus or pay attention for extended periods of time?
   Low       High
   1  2  3  4  5  6  7  8  9  10

2. How would you describe your level of focus or attention right now?
   Low       High
   1  2  3  4  5  6  7  8  9  10

STOP HERE AND LISTEN FOR INSTRUCTIONS. DO NOT TURN TO THE BACK OF THE SHEET UNTIL YOU ARE INSTRUCTED TO DO SO. (NEW SHEET)

3. How would you describe your level of focus or attention during the mindfulness CD?
   Low       High
   1  2  3  4  5  6  7  8  9  10

4. How would you describe your level of focus or attention right now?
   Low       High
   1  2  3  4  5  6  7  8  9  10

STOP HERE AND LISTEN FOR INSTRUCTIONS. DO NOT TURN TO THE NEXT PAGE UNTIL YOU ARE INSTRUCTED TO DO SO. (NEW SHEET)

5. How would you describe your level of focus or attention during the music excerpt?
   Low       High
   1  2  3  4  5  6  7  8  9  10

6. Did you have what you consider to be a “flow” experience(s) while listening to the music?
   YES    NO    SEVERAL
7. Did you feel the movement of the CRDI roughly corresponded to variations of the above “flow” experience?
YES  NO

8. How long did the experience last (Check all that apply)
   All of the selection ____  Parts of the selection ___
   Specific Arias ____  Parts of the arias ___
   Other ___

9. What was the magnitude of this “flow” experience as compared with others you have had?
   Low        High
   1  2  3  4  5  6  7  8  9  10

GO TO THE NEXT PAGE (NEW SHEET)

10. Do you feel that going through the mindfulness exercise changed the way you listened to the musical excerpt in any way? Yes/No

11. If yes, briefly describe how so? If no, please skip to question 12.

12. Do you have previous experience with any kind of formal meditation practice? This may include Tai-Chi, Yoga, or other related practices. Yes/No
   If the answer to the previous questions was no, please skip the next two questions.

13. If your answer was yes, how many years, months, weeks, or days? _________________________

14. When was the last time you practiced any of these techniques on a regular basis?
   _________________________
15. If you had what you considered to be a “flow” experience(s) during any portion of the music listening task, please describe (a) what you believe may have been the cause of that experience(s), and (b) what did the experience(s) feel like to you. (SPACE)

Thank you for participating in this study.
**Aesthetic Response**

For the following questions, circle the number that best describes your answer.

1. How would you describe your ability to maintain focus or pay attention for extended periods of time?
   
   Low 1 2 3 4 5 6 7 8 9 10
   
   High

2. How would you describe your level of focus or attention right now?
   
   Low 1 2 3 4 5 6 7 8 9 10
   
   High

**STOP HERE AND LISTEN FOR INSTRUCTIONS. DO NOT TURN TO THE BACK OF THE SHEET UNTIL YOU ARE INSTRUCTED TO DO SO. (NEW SHEET)**

3. How would you describe your level of focus or attention during the music excerpt?
   
   Low 1 2 3 4 5 6 7 8 9 10
   
   High

4. Did you have what you consider to be an aesthetic experience(s) while listening to the music?
   
   YES  NO  SEVERAL

5. Did you feel the movement of the CRDI roughly corresponded to variations of the above aesthetic experience?
   
   YES  NO

6. How long did the experience last (Check all that apply)
   
   All of the selection  
   Parts of the selection  
   Arias  
   Parts of the arias  
   Other
7. What was the magnitude of this aesthetic experience as compared with others you have had?

Low 1 2 3 4 5 6 7 8 9 10  High

8. Do you have previous experience with any kind of formal meditation practice? This may include Tai-Chi, Yoga, or other related practices. Yes/No

If the answer to the previous questions was no, please skip the next two questions and go to question 11.

9. If your answer was yes, how many years, months, weeks, or days? _________________________

10. When was the last time you practiced any of these techniques on a regular basis?
__________________________

11. If you had what you consider to be an aesthetic experience during any portion of the music listening task, please describe, to the best of your ability, any aspects or characteristics of that experience that you wish to share.  (SPACE)

Thank you for participating in this study. Use back if you choose
**Flow Response**

For the following questions, please circle the number that best describes your answer.

1. How would you describe your ability to maintain focus or pay attention for extended periods of time?
   - Low
   - High
   1  2  3  4  5  6  7  8  9  10

2. How would you describe your level of focus or attention right now?
   - Low
   - High
   1  2  3  4  5  6  7  8  9  10

STOP HERE AND LISTEN FOR INSTRUCTIONS. DO NOT TURN TO THE BACK OF THE SHEET UNTIL YOU ARE INSTRUCTED TO DO SO. (NEW SHEET)

3. How would you describe your level of focus or attention during the music excerpt?
   - Low
   - High
   1  2  3  4  5  6  7  8  9  10

4. Did you have what you consider to be a “flow” experience(s) while listening to the music?
   - YES
   - NO
   - SEVERAL

5. How long did the experience last (Check all that apply)
   - All of the selection
   - Parts of the selection
   - Arias
   - Parts of the arias
   - Other

6. What was the magnitude of this “flow” experience as compared with others you have had?
   - Low
   - High
   1  2  3  4  5  6  7  8  9  10
7. Did you feel the movement of the CRDI roughly corresponded to variations of the above “flow” experience?
YES  NO

8. Do you have previous experience with any kind of formal meditation practice? This may include Tai-Chi, Yoga, or other related practices. Yes/No

If the answer to the previous questions was no, please skip the next two questions and go to question 11.

9. If your answer was yes, how many years, months, weeks, or days? _________________________

10. When was the last time you practiced any of these techniques on a regular basis?
_________________________

11. If you had what you consider to be a “flow” experience during any portion of the music listening task, please describe, to the best of your ability, any aspects or characteristics of that experience that you wish to share.

Thank you for participating in this study. Use back if you choose
APPENDIX E

IRB APPROVAL & PARTICIPATION CONSENT FORM

Office of the Vice President for Research
Human Subjects Committee
Tallahassee, Florida 32306-2742
(850) 644-8673 · FAX (850) 644-4392

APPROVAL MEMORANDUM

Date: 1/28/2010

To: Frank Diaz

Address: 3986 Remer Court
Dept.: MUSIC SCHOOL

From: Thomas L. Jacobson, Chair

Re: Use of Human Subjects in Research
An investigation on the effects of a mindfulness based breathing induction on self-reported measures of attention, flow, and aesthetic response.

The application that you submitted to this office in regard to the use of human subjects in the proposal referenced above have been reviewed by the Secretary, the Chair, and two members of the Human Subjects Committee. Your project is determined to be Expedited per 45 CFR § 46.110(7) and has been approved by an expedited review process.

The Human Subjects Committee has not evaluated your proposal for scientific merit, except to weigh the risk to the human participants and the aspects of the proposal related to potential risk and benefit. This approval does not replace any departmental or other approvals, which may be required.

If you submitted a proposed consent form with your application, the approved stamped consent form is attached to this approval notice. Only the stamped version of the consent form may be used in recruiting research subjects.

If the project has not been completed by 1/26/2011 you must request a renewal of approval for continuation of the project. As a courtesy, a renewal notice will be sent to you prior to your expiration date; however, it is your responsibility as the Principal Investigator to timely request renewal of your approval from the Committee.

You are advised that any change in protocol for this project must be reviewed and approved by the Committee prior to implementation of the proposed change in the protocol. A protocol change/amendment form is required to be submitted for approval by the Committee. In addition, federal regulations require that the Principal Investigator promptly report, in writing any unanticipated problems or adverse events involving risks to research subjects or others.
By copy of this memorandum, the Chair of your department and/or your major professor is reminded that he/she is responsible for being informed concerning research projects involving human subjects in the department, and should review protocols as often as needed to insure that the project is being conducted in compliance with our institution and with DHHS regulations.

This institution has an Assurance on file with the Office for Human Research Protection. The Assurance Number is IRB00000446.

Cc: Clifford Madsen, Advisor
HSC No. 2009.3174
FSU Behavioral Consent Form
An investigation on the effects of a mindfulness based breathing induction on self-reported measures of attention, flow, and aesthetic response.”

You are invited to be in a research study on perceptions of “flow” and/or “aesthetic response” while listening to music. You were selected as a possible participant because you are a music major enrolled at the College of Music at Florida State University. We ask that you read this form and ask any questions you may have before agreeing to be in the study.

This study is being conducted by Frank M. Diaz, College of Music, Florida State University.

Background Information:
The purpose of this study is to gather information on whether focusing attention through a guided listening script may affect your perceptions on a subsequent music listening task.

Procedures:
If you agree to be in this study, we would ask you to do the following things:
1) Listen to an audio recording of a guided “focus of attention” task. 2) Listen to music while manipulating a dial designed to measure your perceptions while listening. 3) Fill out a brief questionnaire dealing with your perceived level of attention as well as experiences during the music listening task. The entire experiment lasts approximately 30 minutes. You may be assigned to a group that does not participate in the guided audio task; if so, the experiment should last approximately 15 minutes.

Risks and benefits of being in the Study:
The study has no known risks.

There are no known individual benefits for participating in this study.

Confidentiality:
The records of this study will be kept private and under lock and key in private storage cabinet at the college of music, to the extent permitted by law. In any sort of report we might publish, we will not include any information that will make it possible to identify a subject. Additionally, no personally identifiable information such as name, gender, or year or school is being recorded for this study. Research records will be stored securely and only researchers will have access to the records.

Voluntary Nature of the Study:

Participation in this study is voluntary. Your decision whether or not to participate will not affect your current or future relations with the University. If you decide to participate, you are free to not answer any question or withdraw at any time without affecting those relationships.

Contacts and Questions:

The researcher conducting this study is Frank M. Diaz, a graduate student at Florida State University. You may ask any question you have now. If you have a question later, you are encouraged to contact me at Florida State University College of Music, 850-644-3554, fmd07@fsu.edu. You may also contact my major professor, Clifford K. Madsen, 850-644-3554, cmadsen@fsu.edu.

If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher(s), you are encouraged to contact the FSU IRB at 2010 Levy Street, Research Building B, Suite 276, Tallahassee, FL 32306-2742, or 850-644-8633, or by email at humansubjects@magnet.fsu.edu.

You will be given a copy of this information to keep for your records.

Statement of Consent:

I have read the above information. I have asked questions and have received answers. I consent to participate in the study.

__________________________  ________________
Signature                  Date

__________________________  ________________
Signature of Investigator  Date

REFERENCES


during the initial minutes of high school rehearsals. *Journal of Research in Music Education, 44*, 6-14.


Flowers, P. J. (1984). Attention to elements of music and effect of instruction in
vocabulary on written descriptions of music by children and undergraduates. *Psychology of Music, 12, 17-24.*


patients based on the practice of mindfulness meditation: Theoretical considerations and preliminary results. General Hospital Psychiatry, 4, 33-47.


BIOGRAPHICAL SKETCH

Name: Frank M. Diaz

Birthplace: Havana, Cuba

Date of Birth: September 29, 1975

Higher Education:

Florida State University
Tallahassee, FL
Major: Music Education
Degree: BME (1998)

University of South Florida
Tampa, FL
Major: Instrumental Conducting/Trombone Performance

Florida State University
Tallahassee, FL
Major: Music Education
Degree: PhD (2010)

Professional Experience:

School District of Philadelphia
Philadelphia, PA
1998-1999
Instrumental Music Teacher

Octorara Area High School
Atglen, PA
1999-2001
Director of Bands

Satellite High School
Satellite Beach Florida
2003-2007
Director of Orchestras/Associate Director of Bands

University of Oregon
Eugene, OR
Fall 2010
Assistant Professor of Music Education