

AN ANALYSIS OF RESEARCH THAT EXAMINES THE CORRELATION
BETWEEN THE STUDY OF MUSIC, OVERALL LEARNING SUCCESS
AND PERSONAL WELL-BEING

by

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A Research Paper

Submitted in partial Fulfillment of the
Requirements for the
Master of Science Degree
With a Major in

Education

Approved: 2 Semester Credits

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University of Wisconsin-Stout
August, 2002

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ABSTRACT

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An Analysis of Research that Examines the Correlation Between the Study of Music,
Overall Learning Success and Personal Well-Being

Education Dr. Ed Biggerstaff, Research Advisor August 2002 41 pages

American Psychological Association Publication Manual

The purpose of this study was to explore the relationship between the study of music and a student's overall learning success and general well-being. After analysis of relevant literature, recommendations were made for teachers and administrators who were seeking validation for the inclusion of the study of music in school curriculum. Parents and individuals could also benefit from the conclusions and recommendations drawn from the study.

The research component of this study was two-fold. First, the relationship between the study of music and success in overall learning was researched. This involved a comprehensive review of neuromusical research and psychological studies involving music and learning. Review of the literature on this subject provided concrete,

scientific evidence that the study of music can and does enhance the learning of other subjects, particularly mathematics and spatial reasoning. Second, the relationship between the study of music and the physical, mental and emotional well-being of people was researched. Studies on this topic conducted by educators and medical professionals including physicians, psychologists, and psychiatrists were reviewed and analyzed. These studies also revealed a positive relationship between music and health, both physical and mental. The subject of emotional well-being as it relates to music was more difficult to research, perhaps because of the very nature of emotions in our human make-up. The literature review did, however, reveal strong personal biases on the value of music to emotional well-being. Studies by experts in music education certainly supported a strong link between music and emotions. A positive relationship was also observed and recorded by health care professionals such as music therapists and caretakers of the disabled and elderly.

ACKNOWLEDGEMENTS

I must thank my best friend and personal advocate for his unwavering love and constant support not only as I completed this project, but throughout our marriage. My husband Howard has been a source of inspiration to me. He has been my sounding board, cheerleader, taskmaster, and soul mate through all that 32 years have brought our way. Thanks How.

Thanks also to my loyal companion Jerry. He accompanied me on every trip from the computer to the coffee pot, refrigerator, and bathroom. He was always there to lift my spirits when I was down, as well as there to celebrate with me at each victory. He supervised every word of research, writing and proofreading, laying at my feet under the desk.

Dr. Ed Biggerstaff deserves much credit for steering me toward this topic in a very kind and diplomatic way. His listening and probing led me to research this vital and pertinent topic. On a personal note, I also want to thank Dr. Biggerstaff for his help with a personal issue earlier this year. That kindness was very much appreciated and was more helpful than he knows.

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CHAPTER ONE

Introduction

Music is not always viewed as an essential subject in school curriculums. In today's economy public school budgets are scrutinized carefully and music teachers are being called upon to justify the study of music in schools. Administrations and school boards are looking for more than the personal opinion of music teachers and supportive music parents as validation for the inclusion of music in schools. Naturally there are administrators who are ardent supporters of music, but many regard music as fluff, extracurricular, expensive and expendable. The ever increasing emphasis on athletics and topics like accountability and testing in the academic subjects tend to make music seem less important also. If music is going to expect inclusion in the modern school curriculum, music advocates must supply evidence that music is essential and critical to the well-being of students.

Research has been conducted that supports the premise that music training may be more valuable to the development of general intelligence than previously theorized. The emerging evidence suggests that making music may affect the organization of the brain, which could positively impact achievement in many disciplines. New research studies designed to investigate the effectiveness of specific activities on the brain's development are casting a positive light on the development of music competence. Some suggest that "the act of making music may be correlated with enhanced brain function in areas having to do with math and reading achievement" (Kay, 2000, p.53). "The production of music involves nuances that require on-line interactions of brain modules. Fundamental

psychological processes, mental competencies, and attitudes toward learning are also involved. These include processes that certainly are of general applicability in life, such as creative thinking; problem solving; mentally constructing solutions and plans; and organizing thought, feeling, and knowledge into action” (Weinberger, 2000, p.9).

Excellent educators are passionate about their subject matter. Sadly, excellent music educators need more than passion for music to gain equal footing with the teachers of core subjects like mathematics, science, history and literature. Music educators need to provide current research findings that validate the study of music. Evidence needs to be brought to light that correlates the study of music with overall learning success and personal well-being.

Statement of the Problem

This study will explore the relationship between the study of music and a student’s overall learning success and general well-being.

Purpose of the Study

The purpose of this study will be to identify and examine the evidence pertaining to the relationship between the study of music and overall learning success. This study will also examine the relationship between the study of music and the physical, mental and emotional well-being of people. The study will be conducted through a comprehensive review and critique of the research and literature focused on the topic. Based upon critical analysis of the research and literature, the researcher will draw conclusions and make recommendations that could be used by educators to substantiate the inclusion of music in the school curriculum.

Research Questions

This study will focus on the following research questions:

1. Is there a relationship between the study of music and overall learning success?
2. Is there a relationship between the study of music and the physical, mental and emotional well-being of people?

CHAPTER TWO

Literature Review

Introduction

This chapter will discuss the study of music as it relates specifically to two topics: one, learning success; and, two, the general well-being of people. It will include a review of literature on the subjects of brain research and music education. Much supposition exists about how the study of music affects other learning and general well-being. This review will search for scientific evidence that substantiates a claim that the study of music is directly related to overall learning success and physical, mental and emotional well-being.

Scientists are beginning to take music seriously. Many scientists today believe that music is no longer a frivolous sideline, but something that is at the core of what it means to be a human being. Wilson states that “all of us have a biologic guarantee of musicianship, the capacity to respond to and participate in the music of our environment” (Wilson, as cited in Hodges, 2000, p.18). Hodges (2000) outlines the five basic premises that have been derived from neuromusical research. These premises establish a link between the human brain, the ability to learn and the capacity for resilient health. This research substantiates the long held supposition that music is beneficial to human beings. Hodges states:

- The human brain has the ability to respond to and participate in music.
- The musical brain operates at birth and persists throughout life.
- Early and ongoing musical training affects the organization of the musical brain.

- The musical brain consists of extensive neural systems involving widely distributed, but locally specialized regions of the brain: cognitive components, affective components, and motor components.
- The musical brain is highly resilient. (p. 18)

Studies in anthropology indicate that all people in all times and in all places have engaged in musical behaviors. Now, neuroscientific research offers mounting and incontrovertible evidence of the ubiquity of human musicality. Science is beginning to recognize the brain mechanisms that make human musicality possible. In fact, neuromusical research supports the notion that music is a unique mode of knowing.

Hodges (2000) tells us:

By studying the effects of music, neuroscientists are able to discover things about the brain that they cannot know through other cognitive processes. Likewise, through music we are able to discover, share, express, and know about aspects of the human experience that we cannot know through other means. Musical insights into the human condition are uniquely powerful experiences that cannot be replaced by any other form of experience. (p. 21)

Neuromusical research is in its infancy compared to the study of language.

However, the studies that do exist offer reason to believe that continued efforts along these lines will provide significant applicable information in the future with regard to the effect of music on both cognition and health.

The Study of Music and Overall Learning Success

Cultures as early as the ancient Greeks recognized an intimate association between music and language. Renaissance thinkers deemed vocal music the only kind of serious music making because of the intimate relationship between words and music. As

instrumental music started to emerge in the eighteenth century, music itself was being described as a kind of human language. In 1746 Batteux described it as “a language of the heart” (Batteux, as cited in Swain, 1997, p.54). Later Rousseau believed that “music began as a chant signifying both thought and feeling” (Rousseau, as cited in Swain, 1997, p.54). Music has been linked to language and communication throughout many centuries and cultures. It is only through modern scientific research methods that we are beginning to understand why music is linked so closely to other learning. Swain concludes:

If spoken language engages a singular mental activity, even, as some would have it, a particular module of cognition, then music engages a parallel module, a parallel kind of mental activity that share cognitive mechanisms, strategies, and just plain habits, conscious and unconscious, that language depends on.

Moreover, it is a mental activity with a universal social dimension: every culture talks and every culture sings. (p. 168)

Brain research is providing the information needed to successfully analyze the link between music and other brain activities like language, learning and memory.

Extensive research has been done on growth in the infant brain. The infant brain has fewer synapses (connections between nerve cells) than the adult brain. These numbers reach adult levels by age 2, surpass adult level from ages 4 to 10, and then drop to typical adult level by age 16 (Chugani, as cited in Wade, 1998). Chugani says that the explosion in the growth of synapses is concurrent with synaptic death. In other words, experiences determine which synapses live or die. Synapses which do not get used die. Shrager, a neuroscientist at the University of Pittsburgh says that the infant brain “seems to organize itself under the influence of waves of so-called trophic factors--chemicals that promote the growth and interconnections of nerve cells. These factors are released so that

different regions of the brain become connected sequentially, with one layer of tissue maturing before another and so on until the whole brain is mature” (Shrager, as cited in Wade, 1998, p. 161).

Neuromusical scientists Flohr, Miller, and DeBeus (2000) document that active musical engagement early in a child’s life is also a factor in brain development. Since children typically have up to twice as much neural activity and twice as many connections in their brains as adults, environmental influences at a young age have been shown to increase brain efficiency. When these environmental influences include music, studies show that the children who received early music instruction exhibited more profuse and efficient connections in the brain. Evidence then points to the fact that the brain expends less energy when confronted with a challenging task.

An electroencephalogram (EEG) measures and records the brains’ electrical activity. Used initially in the 1920’s, this technique is now used to examine cognitive processing, including music processing. According to Flohr, Miller, and DeBeus (2000) EEG data is analyzed in three ways. First, the brain’s electrical activity is mathematically transformed into specific frequencies. When the brain is resting the dominant frequencies are within the slower Alpha and Theta bands. When presented with a difficult cognitive task, the brain produces dominant frequencies within the Beta wave band. Second, the brain’s function can be measured in power. Power indicates how much brain electrical activity is being produced at a given frequency. The brain works harder at new tasks than familiar ones. Third, coherence reflects the number and strength of connections between different brain locations. The EEG data is complex but Flohr, Miller and DeBeus (2000) report findings from all three EEG measurements that point to the benefits of music training with children. The studies were not conducted exclusively

to identify a relationship between the study of music and learning success. Their findings do, however, indicate that music actually increases certain brain functions that improve other cognitive tasks. Malyrenko (Malyrenko, as cited in Flohr, Miller, and DeBeus, 2000) that found that an exposure to music of one hour per day over a sixth month period had an effect on the brain electric activity in four-year-old children. Brain bioelectric activity data indicated that listening to music resulted in an enhancement of the coherence function. Wechsler's Object Assembly test (Wechsler, as cited in Flohr, Miller, and DeBeus, 2000) indicated that children who received seven weeks of music instruction at age four produced less Beta power in the right posterior region of the brain when performing the cognitive portion of the test. The music training groups showed higher power and increased Delta activity than the control group. Increased Delta activity has been found to be related to internal attention processing during the performance of a mental task. For instance, music instruction helps with the ability to assemble puzzles, thus less energy is expended on such tasks (Flohr, Miller, and DeBeus, 2000).

Campbell (2000), author of numerous books on the effect of music on the body and mind, became prominent in the 1980's with his assertion that listening to the music of Mozart could make your child smarter. He cites scientific studies that provide visible evidence of the fact that music literally changes children's brains. Campbell states:

At birth, a child's brain is in a remarkably unfinished state. Most of its hundred billion neurons are not yet connected into networks. As the child begins to form attachments to his parents, family members, and other caregivers, and to explore his world, junctions-- called synapses-- are created by the thousands. If these synapses are used repeatedly in the child's day-to-day life, they are reinforced and become part of his brain's permanent circuitry. A high percentage of

environmental input is provided through the years. As your child is born and progresses through the years, music will enhance his physiology, his intelligence, and his behavior.

- Music can calm or stimulate the movement and heart rate of a baby in the womb.
- Premature infants who listen to classical music in their intensive care units gain more weight, leave the hospital earlier, and have a better chance of survival.
- Young children who receive regular music training demonstrate better motor skills, math ability, and reading performance than those who don't.
- High school students who sing or play an instrument score up to 52 points higher on SAT tests than those who do not.
- College students who listen to ten minutes of Mozart's Sonata for Two Pianos in D major tend to score higher on the spatial-temporal portion of IQ tests immediately afterward.
- Adult musicians' brains generally exhibit more EEG coherence than those of nonmusicians--and even differ anatomically in cases when the musicians began their training before age seven. (p. 14-15)

Campbell (2000) also addresses the issue of attention deficit disorder (ADD) and attention deficit hyperactivity disorder (ADHD). Symptoms include emotional over-sensitivity, anxiety, an inability to concentrate, difficulty relating to peers, and a general incoherence of thought. Scientists still disagree on the exact causes of these disorders but they do appear to be brain related. He further cites research that supports the contention that "highly organized music such as Mozart's can greatly affect both

children and adults who suffer from these disorders” (Campbell, 2000, p. 183-184).

Researchers compared two groups of students with ADD or ADHD. One group listened to recordings of Mozart compositions. The other group did not listen to any music. All children had thrice-weekly neurofeedback sessions. Those who listened to Mozart reduced their theta brain waves in exact rhythm to the underlying beat of the music, and displayed improved focus, mood control, and social skills. Seventy percent of the subjects who improved maintained that improvement for at least six months afterward. Thompson states, “Mozart is an ideal transition from a world of noise to an orderly and organized thinking process” (Thompson, as cited in Campbell, 2000, p. 184).

The evidence presented thus far linking the study of music to learning success has relied primarily on technology using EEG, PET and MRI test results. One professional musician in Winston-Salem NC carried the testing one step further. Campbell (2000) relates the experiment of Perret, music director of the Winston-Salem Triad Symphony Orchestra. In 1992 Perret heard on National Public Radio that learning to play an instrument at a very young age increased children’s academic performance. He surmised that children in most need of academic stimulation would be the least likely to get music lessons. He wondered whether just listening to music might have a similar effect. He arranged for a woodwind quintet to play at Bolton Elementary School every school day for three years. The first year, the musicians performed two or three half-hour programs per week for each first grade classroom. The second year, they played for both first and second grade students, and for all first through third grade students during the third year. These students were not high achievers. The economic status of 70% of the students was low enough for them to receive free or reduced-price lunches. Prior to the quintet’s arrival, the average composite IQ score among second through fifth graders was 92.

After just three weeks into the first year, the first grade teacher observed a marked improvement in the children's ability to listen. The children who had listened to the music were tested after three years. The year before, fewer than 40% of the school's third graders had tested at or above their grade level. The group of third graders who had been exposed to the quintet music for three years scored considerably higher. Eighty-five percent of this group tested above grade level for reading and 89% tested above grade level for math (Perret, as cited in Campbell, 2000). It would seem difficult to attribute this marked academic improvement to coincidence.

Similar results were recorded in a 1993 study at University of California-Irvine where Rauscher and Shaw (Rauscher and Shaw, as cited in Wilcox, 1999) tested 115 college students' spatial reasoning ability. They reported that the group of students who listened to 10 minutes of a Mozart Sonata prior to testing scored 30% higher on a spatial reasoning test of fitting objects together. Their theory was that virtually perfect music tunes up and organizes the neuropathways in the brain. This study showed only short-term effect because the exposure to the music was passive rather than active. In another Rauscher and Shaw study (Rauscher and Shaw, as cited in Wilcox, 1999) preschoolers who were given daily piano lessons registered 35% higher scores on IQ tests than the group that did not receive lessons. Both of their studies reinforce the contention that music develops neuropathways, exercises them and makes them stronger.

Dowling, a renowned music researcher (Campbell, 2000) believes learning music positively affects other kinds of learning for an entirely different reason. Music, he says combines two forms of mental processing, declarative memory and procedural memory. Declarative memories are more mind-related and procedural memories belong to the body. Music combines mind and body processes into one experience. It is this

combination that facilitates and enhances the learning process. Dowling states, “Procedural learning influences in a very fundamental way how we perceive and understand the world. By integrating mental activities with sensory-motor experiences (moving, singing, or participating rhythmically in the acquisition of new information), children learn on a much more sophisticated and profound level” (Dowling, as cited in Campbell, 2000, p. 173). Hannaford adds “that singing stimulates the nerves to the vestibular system, the eyes, ears, and vocalization areas, thus waking up the brain to new learning and optimally taking in sensory information” (Hannaford, as cited in Campbell, 2000, p. 173-4). Brain research is providing the information needed to successfully analyze the link between music and other brain activity like language, learning and memory.

There is one more aspect of studying music that is being shown to have an impact on learning in general. Educators recognize critical thinking as a crucial life skill. Educators, parents, and mentors strive to teach students how to think, not just to regurgitate information. This mindset is prevalent in the classrooms of outstanding music educators as well as in the classrooms where core subjects are being taught. A dedicated music teacher needs to address the need to teach performance students to think about music rather than just rehearse it. Carpenter, director of choral studies at Waukesha South High School in Wisconsin (1994) believes that by giving students a chance to make some of their own decisions, you are teaching them to take ownership in what they do. This is one step in becoming self-sufficient musicians and independent thinkers. Critical thinking can be fostered in the music room if the teacher will step back from directing and give students dialogue possibilities. Carpenter suggests:

Question students about why there is an accent here, why the composer suggests a ritard there, whether the piece should be slower or faster and why, and so on.

Give them 'wait time' for their responses--don't take the first, or most immediate, answer. Give them wait time after their answers as well, which can be minutes, a week, or even a month. Wait time after their answers allows the creative process of incubation to take place. If we teach our students to think about the music they make, they will be making music long after they graduate from our performing group. (p. 43)

The same can be said for critical thinking in general. Once this skill is learned, it can be used in life situations outside of the classroom. Naturally, critical thinking skills can be taught in a variety of settings, but the music classroom provides an environment that can be very conducive to this type of instruction.

The study of music can also foster creative thinking. Some general characteristics of a creative person include risk taking, a sense of humor, attraction to ambiguity, open-mindedness, a capacity for fantasy, and perceptiveness. These traits can all be nurtured in a music classroom perhaps more easily than in an academic setting. Like anything that is learned in the classroom, creative thinking patterns taught and implemented in music can transfer into other genres of learning. Hickey and Webster (2001) point out that the creative process is the thinking that takes place as a person is planning to produce a creative product. They maintain that we are all born with the ability to think, act, and live creatively. Music composition and improvisation study and performance release creativity in a venue that is not available in all classrooms. Allowing students the license to create music by making aesthetic decisions teaches how music cognitively engages the intellect and the emotions. When skill building and creative thinking merge in the music

classroom, the student is actively exercising Gardner's theory of multiple intelligence. In 1983, Gardner suggested that "intelligence be redefined as the ability to solve problems and create products that are valued in one or more cultural settings" (Gardner, as cited in Kay, 2000, p. 51). Gardner and contemporary theorists purport that "what we commonly call 'intelligence' is really an amalgam of many separate intelligences. Linguistic, logical, mathematical, spatial, and bodily-kinesthetic are some of the areas that have been proposed as separate intelligences, or unique ways of knowing. Among these, no higher or lower in importance than any other, is music" (Gardner, as cited in Demorest and Morrison, 2000, p. 34). Since 1983, a number of studies have indicated that music training may be more valuable to the development of general intelligence than previously theorized. (Kay, 2000) Gardner suggests the possibility that each way of knowing the world has its own inherent value and is worthy of study for its own sake.

The belief in a link between the study of music and improved achievement in other areas of schooling is not a new idea. In 1919 Earhart, president of the Music Supervisors National Conference (now MENC) claimed that "knowledge in such disparate areas as mathematics, geography, and vocational training was enhanced by a strong musical education" (Earhart, as cited in Demorest and Morrison, 2000, p. 34). The following quotes were taken from the website of the Music Educators National Conference (MENC):

Success in school and in society depends on an array of abilities. Without the intense ongoing debate about the nature of intelligence as a basic ability, we can demonstrate that some measures of a child's intelligence are indeed increased with music instruction. Once again, this burgeoning range of data supports a

long established bias of anecdotal knowledge to the effect that music education makes kids smarter. What is new and especially compelling, however, is a combination of tightly controlled behavioral studies and groundbreaking neurological research that show how music study can actively contribute to brain development:

- Music training is far superior to computer instruction in dramatically enhancing children's abstract reasoning skills, the skills necessary for learning math and science.
- In the Kindergarten classes, children who were given music instruction scored 48% higher on spatial-temporal skill tests than those who did not receive music training.
- Children given piano lessons significantly improved in their spatial-temporal IQ score (important for some types of mathematical reasoning) compared to children who received computer lessons, casual singing, or no lessons.
- Pattern recognition and mental representation scores improved significantly for students given piano instruction over a three-year period. They also found that self-esteem and musical skills improved for the students given piano instruction.
- Sight-reading music scores and playing music both activate regions in all four of the cortex's lobes and that part of the cerebellum is also activated during those tasks. (www.menc.org)

The U. S. Department of Education lists the arts as subjects that college-bound middle and junior high school students should take. "It is well known and widely recognized

that the arts contribute significantly to children's intellectual development”

(www.menc.org). On the subject of success in school this website goes on to say:

Success in society, of course, is predicated on success in school. Any music teacher or parent of a music student can call to mind anecdotes about effectiveness of music study in helping children become better students. Skills learned through the discipline of music, these stories commonly point out, transfer to study skills, communication skills, and cognitive skills useful in every part of the curriculum. Another common variety of story emphasizes the way that the discipline of music study--particularly through participation in ensembles--helps students learn to work effectively in the school environment without resorting to violent or inappropriate behavior. And there are a number of hard facts that we can report about the ways that music study is correlated with success in school:

- Students with coursework or experience in music performance and music appreciation scored up to 104 points higher on the SAT than students with no arts participation.
- Music participants receive more academic honors and awards than non-music students, and the percentage of music participants receiving As, As/Bs and Bs was higher than the percentage of non-participants receiving those grades.
- Students who can be classified as “disruptive” total 12% of the total school population. In contrast, only 8% of students involved in music classes meet the same criteria as disruptive” (www.menc.org).

The study of music and physical, mental and emotional well-being of people

William Shakespeare said, “The man that hath no music in himself, nor is not moved with concord of sweet sounds, is fit for reasons, stratagems and spoils; The motions of his spirit are dull as night, and his affections dark as Erebus: let no such man be trusted” (Shakespeare, as cited in Lautzenheiser, 1993, p. 119). Legendary jazz great Art Blakey stated, “Music washes away the dust of everyday life from your feet” (Blakey, as cited in Marsalis, 1995, p. 137). Ortiz, a practicing psychologist (1997) who has combined music with therapy successfully for over twenty years asserts, “Music enables the observing self to reach new levels of awareness while providing the guiding structure for inner, personal exploration. Music can energize people; it helps us cleanse our minds. Music, therefore, can be instrumental in helping us:

- Alter our thoughts and reprogram old, dysfunctional tunes or negative messages;
- Modify our beliefs and attitudes, allowing us to perceive, and believe, our value as human beings;
- Begin setting realistic and achievable goals;
- Counter psychological noise, which in turn clears the way to help us reexamine self-imposed expectations, as well as to challenge internal and external assumptions;
- Move toward modifying inner messages, particularly those shrouded in “shoulds and musts”, or self-defeating, no-win quandaries;
- Eliminate the dissonant, negative, and self-destructive dialogues haunting our minds;

- Let go of guilt feelings, unresolved angers, resentment, and destructive self-images we may be harboring;
- Let go of false standards which represent our own misperception of others' thoughts about how one "should" or "ought" to be;
- Examine and rid ourselves of unrealistic, self-imposed standards that can manifest in anxiety, hostility, and/or depression, and result in a poor self-image. (p. 41-42)

Lingerman has been trained as a college teacher, counselor, nonsectarian minister, and author. In the latest revision of his 1980 book on the healing energies of music, Lingerman prefaces his book with the simple statement, "I have observed music improve people's physical health, emotional stability, mental focus, and spiritual sensitivity" (Lingerman, 1995, vii). It seems clear that man through the centuries has recognized that music affects people. Though the data that would substantiate this belief may not register in brain scans or on IQ test scores, the positive effects of music on man are indeed documented. These positive effects are recorded in hospital operating rooms, nursing homes, college campuses, elementary schools, psychologist offices, aerobic studios, and in the privacy of homes. Historically, studies have shown that music is used universally to increase awareness, relieve stress, activate energy, release pain, express joy, heal mental as well as physical hurts, increase focus, cross barriers, alter moods, slow aging, increase mastery of motor skills, develop discipline and build self-esteem.

Recent brain research has established that young children are able to hear music even before birth. Huffaker, a neonatologist at Kaiser Permanente-Los Angeles says, "Clinically, it's apparent that babies respond to sound stimuli by the third trimester of pregnancy" (Haffaker, as cited in Wilcox, 1999, p.31). "Based on studies of music perception, along with observations of behavioral responses to music from infants in

cultures all over the world, it is very clear that babies are musical, that they have innate musical behaviors, and they use music as meaningful communication in their earliest years of development” (Weinberger, as cited in Fox, 2000, p.24). Science has established that human beings respond to music before birth and that they exhibit similar responses worldwide. Anthropologists say that all people in all times and in all places have engaged in musical behaviors. Neuroscientific literature supports the ubiquity of human musicality. All human beings are musical. Music is not restricted to those with talent or money. Music is not restricted by culture. “All members of our society, from cradle to grave, stand to benefit from being musically involved” (Hodges, 2000, p. 18). Based on the evidence that all human beings are musical, even before birth, the implications of this inherent musicality on the total person will now be examined.

Music and Physical Well-Being

“The ancient Greeks, and the Egyptians before them, viewed music and medicine as a unit. Throughout the Middle Ages and the Renaissance, musicians and physicians shared classes, discussions, and the same initial curriculum” (Pratt, 1991, p. 3). Today medical records document how music heals or aids in the healing process at all ages. Music medicine research is making effective use of music to reduce fear and anxiety in surgical and pain patients. Experiments show that hearing music affects the biochemistry of the blood, which in turn may cause affective changes. For example, physicians are able to reduce drug dosages and speed up recovery times by using music in certain medical procedures. Music is more than a psychological distracter. It elicits actual physical changes in the system. Abundant research data indicate that both physiological and physical responses occur during the receptive mode of music listening. Physiological responses include changes in heart rate, blood pressure, and a host of other systems. The

natural responses to music such as foot tapping or head nodding are being used in a process called “Rhythmic Auditory Stimulation” to enable Parkinsonian and stroke patients to regain walking and motor skills. (Hodges, 2000, p. 20-21)

Roehmann (1991) reports growing recognition of the interaction between musicians and researchers from the biomedical sciences. The “music-and-medicine” movement studies the connection between music and medicine. “Life and human aspirations can no longer be described or understood within the framework of any single, traditionally defined discipline” (Roehmann, 1991, p. 22). Neurologists are beginning to understand “the connection between the human nervous system and the ways that people interact with music” (Roehmann, 1991, p. 22). Neurologist and author Sacks (1983) told of a Parkinson’s patient who was a former music teacher:

She would find herself frozen, utterly motionless, deprived of the power, the impulse, the thought of any motion . . . until the music came to mind . . . With the imagining of music the power of motion and action would suddenly return. Just as suddenly, her inner music would cease, and she would fall instantly, once again, into a Parkinsonian abyss. (Sacks, as cited in Roehmann, 1997, p. 24-25)

Many older adults are reaping the benefits of making music. Gerontologists know that when social opportunities decrease people feel more isolated and their health can decline. Music can provide an opportunity to meet new friends who share common interests and goals. A recent study at the University of Miami School of Medicine (Ernst, 2001) along with six other universities found that older adults who made music enjoyed measurable health benefits. Participants experienced decreased feelings of loneliness and isolation, an increased sense of well-being, and improvements in their immune systems. This study reinforces the “use it or lose it” principle with regard to our minds as well as

our bodies. “The constant intellectual challenge of music supports good mental abilities” (Earnst, 2001, p. 48)

In an interview with Hodges (2000), Spintge from Germany reported findings from clinical research and treatment of patients since 1977 as being twofold. First, selected music significantly decreased the psychological and somatic stress response to acute stressors and acute pain in surgery, dentistry, labor and childbirth, and intensive care. Second, specifically designed music significantly decreased chronic pain in patients suffering from syndromes such as musculoskeletal pain, low back pain, headache, and rheumatic pain. Listening to selected music mediates pain because music stimulates the release of pain-controlling hormones such as endorphins. This can enhance normal physiological rhythmicity. Using music in these ways, they have observed a reduction of costs associated with length of treatment in ICUs and general hospital stays, a decrease in the quantity of drugs needed, and improved patient compliance in following of the treatment plan. (Spintge, as cited in Hodges, 2000, p. 42)

Campbell (2000) has written numerous books and music tapes which all center on the relationship of the mind, body and music. His taped music Collectors Series on Music and Sound Healing (2000) mentions two more physical reactions to music. Slow Baroque music has been shown to slow brain activity so that less anesthetic is required for surgery. With regard to the number of surgeries that are performed worldwide, especially on older adults, one would wonder how many operating rooms are taking advantage of this information. Another common phenomenon today is the aerobic workout craze. Of course fast paced music is blaring in every room. There is actually a scientific reason for that particular music in that particular setting. Fast, rhythmic music

heightens awareness without caffeine. We can repeat what we could not repeat alone. The music actually helps prolong activity.

Lingerman (1995) has over 20 years of experience with the concepts of the healing energies of music. He also conducts classes and workshops using the concepts covered in his book. It has been printed five times and has been translated in German, Swedish, and Portuguese. He has received letters from around the world with favorable personal responses to his ideas. Clearly he believes that music can be a catalyst for good in our world. Lingerman states, "I deeply value the transforming power of beautiful music! I believe that great music, carefully selected and experienced, can be a unique agent for healing, for partnering joy and sorrow, for empowerment, attunement, and inspiration, and for expanding one's spiritual consciousness" (Lingerman, 1995, p. vii). He elaborates on this belief by stating:

In my work I have been able to observe many situations in which music has been a powerful factor for change and improvement, both for individuals and for groups. Certain pieces of music, played with appropriate timing and good taste, have helped to alter behavior and awareness. Musical selections have helped to calm the heartbeat and nervous system, have promoted greater relaxation, have deepened constructive attitudes and brought a willingness to listen and to be receptive to new directions. I have also observed how specific musical selections can contribute to changing the mood of an environment or a relationship. I remember, for example, several patients in nursing homes who sat inert and unresponsive in their seats until a certain piece of music was played to them. Then, suddenly, they began to move, clapping their hands, smiling, humming, singing, talking with each other, and keeping time with their feet. (p. 2-3)

Lingerman (1995) says that music can energize and inspire all levels of your being. The four categories of the human make-up named by Lingerman are: physical, emotional, mental, and soul. In his experience, certain types of music elicit certain types of responses in humans. He suggests seeking out the kind of music you need to balance and awaken your whole being:

1. Physical Body-brass, percussion (drums), heavy bass notes; electronic music and amplified sounds,
2. Emotional Body-woodwinds and strings.
3. Mental Body-strings.
4. Soul Body-high strings, harp, bells, organ (very powerful and stimulating to all the bodies), and wind chimes. (p. 11)

As a music teacher, performing musician and music consumer this researcher concurs wholeheartedly with this evaluation. The concept of balance is so interesting and so relevant to our society. Balance in life is important to overall health just as balance in music is important to overall expression. Note how the four categories entail every type of musical instrument as well as every aspect of life. From the physical category, Lingerman (1995) notes that music with strong, regular rhythm tends to activate the body, while also coordinating and focusing the mind. He gives extensive lists of compositions that can be used to energize, relax, and motivate as well as to relieve anger, stress, and boredom.

Ortiz (1997) details similar techniques that use music to change your life. In this author's words, "This book is about movement. In other words, it's about growth, change, and making creative choices to better our lives and the lives of those around us. It is also about stillness. It is about self-empowerment. It is about knowing when to let

go, learning how to breathe and relax, and recognizing--as well as accepting--our limitations” (Ortiz, 1997, p. xvii). Ortiz describes the need for balance in life in terms similar to those used by Lingerman.

With specific regard to the physical, Ortiz (1997) addresses pain, sleeplessness, exercise and aging. On the subject of pain he writes, “The state in which music holds the brain’s attention may explain why listening to music can block pain. Pain and tension are intimately connected; pain leads to tension which leads to pain. Soothing music can short-circuit this pain cycle, which is why some dentists use Beethoven or Bach as a kind of aural anesthesia” (p. 31). For the problem of sleeplessness Ortiz cautions the reader to seek medical help if the problem persists for longer than two weeks or begins to cause significant interference with daily functioning. However, for occasional sleeplessness, he makes the usual recommendation of less caffeine, less napping in the daytime, and more exercise. Music is then introduced with a tape especially designed for each patient to eliminate the psychological noise that usually functions as anxiety provoking thoughts causing sleeplessness. Ortiz’s concepts on exercise as it relates to music are very similar to Lingerman’s. He points out that the effect which music has upon repetitive physical actions is predominantly rhythmic. “Breathing, walking and the heartbeat are all rhythmical aspects of our physical being” (Storr, as cited in Ortiz, 1997, p. 151). Gfeller’s University of Iowa study found 97% of young adults studied indicated that music made a difference in their aerobic fitness performance. Ninety-seven percent also responded that “music improves mental attitude toward physical activity” and 79% indicated that “music aids in pacing, strength, and endurance” (Gfeller, as cited in Ortiz, 1997, p. 153). Ortiz’s observations on aging are simple yet profound. He states, “Some of the biggest and most significant catalysts of the aging process include stress, worry,

anxiety, depression, low self-esteem, lack of exercise, and weakened, vulnerable immune systems. By counteracting, minimizing, or eliminating any or all of the above with the help of music we may help to slow down, or even reverse the aging process” (Ortiz, 1997, p. 141).

Music and Mental and Emotional Well-being

The mental and emotional aspects of health are so closely related that they will be addressed jointly for the purpose of this review. At issue within this topic are the areas of self-confidence, self-esteem, stress, relaxation, communication, motivation, centering or focus, and mood or state of mind. Dealing with the physical impact of stress, as well as relaxation and motivation techniques, were addressed previously under music and physical well-being. The extensive brain research reports cited earlier in this chapter (Flohr, Miller, and DeBeus, 2000) touched on how certain music can increase concentration and focus. The human body and mind are so complex that complete compartmentalization of the physical, mental, and emotional aspects of life is difficult if not impossible.

Former president Bill Clinton has said, “Music is about communication, creativity, and cooperation, and by studying music in school, students have the opportunity to build on these skills, enrich their lives, and experience the world from a new perspective” (Clinton, as cited in Wilcox, 1999, p. 35). Former president Gerald R. Ford has said, “Music education opens doors that help children pass from school into the world around them--a world of work, culture, intellectual activity, and human involvement. The future of our nation depends on providing our children with a complete education that includes music” (Ford, as cited Wilcox, 1999, p. 35). In June 1991 the U. S. Department of Labor (Wilcox, 1999) published a report by the Secretary’s

Commission on Achieving Necessary Skills saying that thinking skills, the ability to solve problems and understand complex interrelationships, and the capacity to communicate, cooperate, and be creative are all skills that are especially needed in the future workplace. Music educators answer that all of these skills can be learned in the music classroom, because working as a team is a part of every ensemble, and creative solutions must be found for problems students face each day.

The Journal of Music Therapy, Spring 1992 reported that music therapists and physicians show that music can be used to help manage the effects of anxiety and stress in a variety of medical contexts. Music of choice has been documented as an effective component of pain-control therapy. (Journal of Music Therapy, as cited in Wilcox, 1999) Members of the medical community are starting to acknowledge what teachers and students of music have known to be true for a long time, that music can be therapeutic to the body and mind.

Music has the strong capacity to convey emotion. Campbell (2000) states, “Music offers an indispensable advantage to parents and their children--a power that parents have understood and honored since the beginning of time. That is music’s potential to convey feelings of love, delight, and security to the baby and its ability to bond family and newborn together in a warm, lifelong embrace” (p. 55). Music has conveyed feelings of love, delight, and security throughout recorded history. The research of Canadian psychologist Trehub found that “the actual music sung to infants shows many similarities across cultures; lullabies everywhere seem to employ few pitches, simple repeated melodic patterns, and rhythms linked to the rocking and swaying motions used to soothe a fussy child” (Trehub, as cited in Fox, 2000, p. 25). The musical connection parent and child seems to be universal.

The capacity of music to communicate is addressed on an entirely different level by a contemporary composer. Zwilich speaks of music's power to communicate in a 2001 personal interview.

I think there's something in music that goes beyond emotion and mood, that incorporates emotion and mood, but is much more all-embracing. It covers even more of human experience than we realize. But for me, all the best music-- whether it's classical, jazz, pop, or what have you--is music that not only has logic, reason, and wonderfully tight connections, but also moves you, has motion, has gesture, and has all of these things that exist in the performance of music. Music can cross so many barriers, I can suddenly find that somebody in another country is playing my music, somebody who doesn't speak my language, to whom I've never talked, and they're getting it. (Zwilich, as cited in Heidel, 2001, p. 45)

In speaking about the communicative power of music, Ortiz (1997) introduces a different point of view because of his clinical experience:

Communication is the essence of all successful relationships. In all communication the signal that transmits the information is a major determinant of the interpretation of the message by the receiver. Scientific evidence has demonstrated that music serves as an efficient signal in communicating emotional messages. Take the emotion out of a message and you might as well be imparting information or sharing your data base in Morse code. Based on findings gathered from a series of experiments, researchers have proposed that music provides a powerful means of increasing receptiveness and bridging discrepancies between any two individuals. In other words, it helps us to bond with one another. In

short, music helps us to get beyond vertical barriers, helping to enrich the meaning behind our intended message at emotional, psychological and thinking levels. (p. 165-166)

Less scientific data exists on the subject of music as it relates to self-esteem. Testimonials from music teachers lend validity to the claim that learning music builds self-esteem. Such testimonials do not, however, serve as scientific evidence that music builds self-esteem. Personal life stories of students whose caring music teacher gave them the confidence to grow are plentiful. Of course, music educators and their organizations extol the virtues of music education for a variety of reasons, including the building of self-esteem. In thirty-four years as a music teacher, this researcher has personally encountered numerous students to whom music made a difference, in fact THE difference in their lives. The personal accounts from teachers and students of how self-esteem was positively affected by involvement should not be discounted. Fortunately, a review of how music and self-esteem are related is not restricted to personal stories. Studies do exist on the subject of how music affects self-esteem.

The study of lifelong learning in music reveals that music is important to the older population. Older adults continue to find deeper meaning and a sense of purpose in their lives and for many, music provides the opportunity for expression and self-satisfaction. Achilles (1992) stresses the important role of music in providing a sense of accomplishment and pride for older persons. The New Horizons Band at Eastman School of Music is an outstanding example of music providing encouragement for older adults. “Although the musical benefits of the band are the most important, the social, mental, and physical benefits of participation by the seniors cannot be overlooked. The band replaces the workplace as a source of making new friends and gives a feeling of

attachment to a group that is important to a person's well-being" (Ernst, 1992, p. 32). Brady and Fowler report that adults' greatest levels of educational satisfaction occur when learning fulfills expressive needs. (Brady and Fowler, as cited in Myers, 1992) Adults are often more receptive to self-directed learning than children. "When guided and shared by faculty, self-directed learning promotes independence and self-confidence" (Myers, 1992, p. 24).

MENC staff journalist Wilcox (1999) posed this direct question, "What happens when children are exposed to a full, balanced, sequential music education?" In response to that question Shackford, a devoted Suzuki string teacher from Virginia stated unequivocally, "Children who receive early music study generally are different from the average child. Regardless of natural gifts, native intelligence, or family economics, most children who study music deeply eventually become more confident, more sensitive individuals, and they are usually better listeners" (Shackford, as cited in Wilcox, 1999, p. 33). Campbell (2000) also reports amazing success with special needs children when they become involved with the Suzuki teaching method. "The lives of autistic, blind, and deaf children, as well as those with Down's syndrome, have all been greatly enhanced by the flexible interactivity of the Suzuki Method" (p. 138).

Scientists have long known that human touch is essential to life. In fact normal, healthy human development is thwarted without human touch. Brain research documents how exposure to music in the early stages of life stimulates the formation of synapses in the brain. Music is also known to be an important part of the emotional bonding between infant and parent in the early years of life that are crucial to the development of a child's self-worth. As noted earlier, interaction with music is one of the primary ways

of communicating love and safety to an infant (Campbell, 2000). This fact makes music an important component in the development of self-esteem.

The value of music to a person's self-esteem must be considered on a personal level as well as scientifically. Senator Orrin Hatch of Utah speaks for those people who know that music impacted them in a very real and positive way. Senator Hatch said in a 1999 ceremony in Salt Lake City:

I am deeply honored and grateful for this recognition by the Utah Music Educators Association. I truly believe that all of the satisfaction and delight that music has brought to my life would not be possible if I had not had an early education which emphasized music. But music and learning music at an early age are important for other reasons as well...A number of studies have emphasized the importance of early musical education. It has been proven that music study contributes to an increased mastery of motor skills, coping, and control. Ultimately, the love of music is an end in itself...I want to say something that I should have said long ago to all of my music teachers growing up: Thank you...Thank you for challenging me to stretch beyond the safety of what I knew I could do, to try things I didn't know I could do. Thank you for your encouragement. And thank you for giving me a gift that I have been uplifted by every day of my life" (Hatch, 1999).

CHAPTER THREE

Introduction

This chapter summarizes information gathered from a comprehensive review of literature and research on the topic of the study of music as it relates to success in overall learning and personal well-being. After the summary, conclusions are drawn from the findings of the literature review. The chapter closes with recommendations that focus on constructive, usable ideas for teachers, administrators, parents, and individuals.

Summary

Researchers and educators generally agree that the study of music can improve general learning. The point of greatest disagreement is the extent to which learning is enhanced by the study of music. Studies by neuromusical scientists document that young children who receive music instruction exhibit more profuse and efficient synapse connections in the brain. This process produces higher brain efficiency when engaged in a challenging task. A more efficient brain learns more easily. EEG results clearly show that exposure to music increases brain functions that improve cognitive tasks and coherence functions. Other studies indicate that early music training improves motor skills, math ability, and reading performance. Older students who sing or play an instrument score on average 52 points higher on SAT tests than those who do not. There is no shortage of data supporting the premise that learning music is beneficial to learning success in general. What research has not shown yet is the degree to which learning is enhanced by the study of music. Even though experts do not agree on the extent of the correlation, they do agree that a correlation exists between learning music and success in other learning.

Thinkers as early as the Greeks and Egyptians recognized the value of music with regard to health. Now research substantiates scientifically that music can alter such physical functions as heart rate and blood pressure. Music has also been shown to reduce fear, anxiety, and pain. We are learning more about why this occurs as we understand more about the brain. Studies of the older population have revealed that music can break through dementia and even decrease feelings of loneliness and isolation. This increased sense of well-being can then trigger improvement in the immune system. Among virtually all professions and cultures, there is agreement that exposure to music and involvement with music is good for people. Music, when used properly, can contribute significantly to physical well-being. The positive effect that music has on mental health also directly improves physical health.

The correlation between music and mental and emotional well-being is more difficult to analyze. Studies on the subject do exist and they do indicate a positive impact of music on mental and emotional state of mind, but the data tends to be subjective rather than scientific. Music is known to relieve stress, increase motivation, heighten focus, build self-confidence, and improve communication. This has been known for across many cultures for centuries. These conclusions are primarily empirical but they are consistent and accepted in both the scientific and educational communities.

Conclusions

The study of music can and does improve success in other learning. This statement is supported by both brain research and educational studies. Young students who are exposed to music perform better in math and reading. They demonstrate better motor skills. Students with attention problems exhibit lasting improvement in focus, mood control, and social skills when they listen to the music of Mozart regularly. Music

does not make a person smarter. But, research does show decidedly that studying music stimulates and enhances brain functions that improve learning and academic performance in other subjects.

The study of music can and does promote better physical, mental and emotional health. Physicians and scientists report the biological healing effects of music. Musicians, teachers, and psychologists report that music can energize or relax, convey love, build self-confidence and improve depressed thinking. Music can improve well-being on every level, sometimes dramatically. Both the study of music and exposure to music enhance well-being. Every human being has a musical brain even before birth. It is only logical and wise to acknowledge that humans will become happier and healthier if they recognize the great potential for good that music has in their lives.

Recommendations

The literature reviewed for this study revealed many positive and valuable relationships between the study of music, success in learning and personal well-being. The researcher formulates the following recommendations regarding the evidence that was discovered and documented by this study:

1. It is recommended that music advocates learn facts about the positive impact of music on learning and well-being so they are adequately prepared to defend the study of music whenever necessary. Facts are needed to counteract the mindset that music is extracurricular, expensive and expendable.
2. It is recommended that music advocates use these facts to proactively support the study of music with regard to staffing, funding and validity.

3. It is recommended that music advocates share these facts with parents and students who are involved in music so that they are also able to become effective advocates for the importance of the study of music.
4. It is recommended that the medical community acknowledge the positive effects of music on physical, mental and emotional well-being. Music should then be used in the treatment of the whole human being. Each of these components of well-being are interrelated and music provides a key link between them.
5. It is recommended that individuals access the power of music to enhance learning and aid healing in their own lives.

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