

The Effects of Music on Student Psychology

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ABSTRACT: While many would agree that music affects us, details of the effects of music on intellectual, psychological, physiological, social, and physical processes of humans are not common knowledge. Recent studies have shown that the use of music can enhance or detract from the completion of many tasks, including eating, sleeping, exercising, driving, reading, writing, math, and social interaction. It can also affect mood and our abilities to behave, remain on task, and focus. Adolescents naturally seem to use music to monitor and manipulate mood, motivation, and task completion, but understanding the effects of music could enable them to make appropriate decisions concerning musical choices. It is vital to understand how music is beneficial and avoid the use of music for situations in which it may be distracting. Also important are the effects of music we do not choose, but are subjected to through our environment choices such as restaurants and stores. Research in these areas has shown that certain elements of music, especially tempo and loudness, have significant effects on tasks in various areas. This article provides practical, research-based information that will assist the reader in meeting K-4 national standard 9c.

Music affects us. It can give us chills, bring us to the edge of our seats, or move us to tears. But how does music affect our ability to perform various tasks? Can it help students study more effectively, or does it distract from the completion of homework? Can we use music to help us work more efficiently or drive more safely? In a culture where music is constantly playing all around us, it is important for parents, students, and teachers to understand how music may help or hinder us in the completion of our tasks. This knowledge should become part of contemporary music education, and is in fact referenced in our National Standards for Music Education. In the K-4 standards, 9c states that “Students identify various uses of music in their daily experiences and describe characteristics that make certain music suitable for each use.”ⁱ Music educators should become informed of and teach students and other educators about the psychological and physiological effects music can have in areas such as mood and arousal manipulation, academic task performance, and practical task performance.

Theories: Causes of Musical Arousal

Several theories propose explanations for arousal or excitement caused by music. One theory is based on the Yerkes-Dobson law, which states that “the arousal level of the individual increases performance up to an optimal level beyond which over-arousal leads to a deterioration in performance.”ⁱⁱ When applied to listening to background music, this means that any given person has an optimal level of arousal at which he will perform certain tasks most effectively, and music can help him achieve that optimal level. The optimal level of arousal varies across time and depends on the complexity of the task.

An alternate theory suggests that music may simply help people focus their attention and ignore noise or other novel distractions in the environment.ⁱⁱⁱ This may be because, while listening to music, beta waves are created and alpha waves are decreased. The presence of increased beta waves demonstrates additional “attending activity by the cerebrum”; conversely, alpha waves indicate a relaxed state.^{iv}

A third theory suggests that the effects of music on task performance are made through mood management. The theory of mood management states that “persons are motivated to make entertainment choices that will help them to diminish or terminate negative moods and to extend and enhance good moods.”^v According to this theory, whether consciously or subconsciously, people choose entertainment – including music – that will initiate, enhance, or extend good moods.^{vi} Based on these theories, music selected appropriately by the informed teacher or student could enhance student arousal, focus ability, and mood, perhaps both in and out of the classroom.

Positive Effects of Background Music

In a 1991 article, Giles states that “Intervention programs for children at risk could use music to help them relax, build their self-esteem, and help them deal with their emotional problems.”^{vii} Based on a study of first and second grade students, she categorized many songs into specific mood categories for use at different times of the day. Much of the music is classical, drawn especially from the Baroque era, but music from Disney movies can also be very effective. The music can be used to calm children when they are overly active, or to arouse them when they seem sleepy or disinterested.

Adolescents may not usually prefer to listen to classical or Disney music, but some middle and high school students do not need research studies to be aware of the phenomenon of musical manipulation of moods. Music is a large part of life for adolescents, and many use music in their everyday lives to manipulate their moods. In a recent national essay competition, 1155 American adolescents submitted essays acknowledging the benefits of listening to, performing, and studying music as an academic subject in school.^{viii} Two-thirds of the students said they listened to or performed music for personal enjoyment, expression, and to release or control negative emotions. They agreed that relating to the lyrics, whether writing, singing, or listening, let them know they were not alone, and helped them cope with difficult times in their lives. Students claimed that musical study helped them hone their study skills, which applied to other academic areas. Some also claimed that it had kept them from sinking too deeply into depression or attempting suicide, as some of their non-musical friends had done. Clearly, some musically inclined adolescents understand the power of music based on their own experiences, but various types of music can have different effects on how people function in certain situations. Teaching students to be aware of how music affects them can equip them to make smart decisions about the types of music they elect to listen to while they go about their daily activities.

In an experimental study of music as a tool for mood management, 116 undergraduate students had their moods manipulated and their subsequent music listening choices recorded.^{ix} The students were placed into good, neutral, or bad moods by a computer-generated test for which they were given inaccurate results of their testing accuracy. The participants were then given ten minutes to listen to music of their choice from a list of twenty familiar songs, each of which was classified as high or low in energy and joyfulness. Finally, the participants completed a survey of their mood state at the conclusion of the study. The results showed that, as

hypothesized by the theory of mood management, the respondents that were placed in a bad mood preferred exposure to highly energetic and joyful music more strongly than did the neutral- or good-mood participants; the neutral-mood participants preferred the highly energetic and joyful music more strongly than the good-mood participants, and the sampling frequency of the good-mood participants was the highest, possibly indicating that these participants felt more at liberty to sample a variety of music since they did not need to alter their mood.

Music also creates certain effects on students in classroom situations. In a study of the effects of background music on students with emotional or behavioral issues, ten children of nine and ten years of age were observed in their classroom environment.^x The students were highly disruptive, including destructive and aggressive behavior, and several of the students were also hyperactive. In several of the observations, when “mood calming” music, as defined by Giles,^{xi} was played during individual work time, rule-breaking incidences significantly decreased; in several others, there was no significant difference. After the first session, when students were likely adjusting to having music played, there was no negative effect on behavior. The calming music had the greatest effect on the hyperactive children, while the improvement of some of the other children could have come from the lack of distracting behavior from these peers.

In another study, Cripe studied eight males, ages six to eight, with Attention Deficit Disorder.^{xii} The participants had free-play and guided-activity sessions, both with and without rock music played over headphones. The rock music had a distinguishable melody line, but was heavily rhythmic and repetitive. The results of the study indicated that, at least for this small sample of children with ADD, hyperactivity was significantly decreased and attention span significantly increased with the presence of rock music, both individually and as a group.

In some cases, music can be positively used to enhance learning in the classroom. In a 2001 study of 5th grade school children, Davidson and Powell studied the effects of background music on the on-task-performance of the students in their science classrooms.^{xiii} On-task-performance – also referred to as attending behavior, time-on-task, and student-engaged time – has been associated with student achievement. Easy-listening background music, defined as “music which has a melodic melody line over non-dissonant chordal structures and as nonpercussive in beat,”^{xiv} was used in this study, and silence was used as the control. When working independently with background music, the boys in the class had significantly increased on-task-performance; the girls had only slightly increased on-task-performance, but this was due to the ceiling effect – most of the girls were on task 99% of the time in the silent atmosphere, so they had very little room for improvement.

In a similar study of ten-and eleven-year-old students, Hallam, Price, and Katsarou studied the effects of background music on accurate completion of math problems.^{xv} Thirty-one children took part in the study, and researchers recorded their number of attempted problems, correctly answered problems, and accuracy rates. The music used was of the mood-calming type as defined by Giles.^{xvi} The results of the study showed that, although there was no increase in accuracy with the background music playing, there was a significant increase in the number of problems the students completed. Students completed math problems more quickly with the background music playing than in silence, and their faster rate of completion did not negatively affect accuracy.

In a similar study of emotionally or behaviorally challenged nine- and-ten-year-old students, Hallam and Price found that music had a significant positive effect on both the number of problems completed and the accuracy of the students’ answers.^{xvii} Again, the music used was

mood-calming as defined by Giles.^{xviii} The greatest improvements, as noted in the behavioral improvements earlier, came from the students considered to be hyperactive.

In addition to considering the effects of music on math, researchers have studied the effects on reading comprehension. In a study of forty-five 4th-8th grade students, three treatment groups were applied: rock music, classical music, and no music.^{xix} The results indicated that the students reading with classical music outperformed both the rock music and no music conditions, and the students in the silent reading group outperformed the students in the rock music condition. The researchers concluded that soft, slow-tempo classical music might be an effective addition to classroom reading, but cautioned that music might become ineffective if used consistently.

In a similar study, Hall observed 245 junior high students, using music selected according to the standards used for music in industrial situations.^{xx} The results indicated that music played in the background during reading comprehension tests facilitated improvement in both speed and accuracy, with an average gain of 2.37% in accuracy. Results also suggested that boys improved more with music than girls, and that those whose intelligence was ranked in the lower part of the classes improved most. The music assisted in helping students becoming calm and focused at the beginning of school and after lunch, and in energizing students in the afternoon when fatigue tends to set in. These times are similar to when music is most effective in industry production, as well.

A final reading comprehension study focused on the difference in effects of low information-load music versus high information-load music on reading comprehension.^{xxi} Kiger defines information-load factors as loudness, variety, complexity, and tonal range. In his study of

133 high school students, Kiger found that the reading comprehension scores in the low information-load condition were significantly higher than both the high information-load and silent reading conditions. He postulated that this could be because low information-load music is easier to block, whereas high information-load music has many different stimuli competing for attention from the brain, which causes interference. Alternatively, he offers the arousal theory that high information-load music over-stimulates most people for all but simple, routine tasks, but low information-load music lowers arousal for a better performance of more complex tasks.

Negative Effects of Background Music

In a 1994 study, Took and Weiss investigated the correlation between heavy metal or rap music and adolescent turmoil.^{xxii} Adolescents and their parents were surveyed about their musical preferences and academic and psychological functioning. Although the study suggested a significant correlation between heavy metal or rap music and lower-than-average grades in school, this could actually be a result of students underachieving in elementary school and then gravitating toward these types of music as a way to establish identity in a group with low expectations. In this case, intervening with students underachieving in elementary school before they turn to such music as a substitute would be the most effective approach to helping them. The heavy metal and rap music was not proven to cause either turmoil or lower-than-average grades in the listeners.

Fogelson conducted a research study with 14 eighth-grade reading students classified by their teachers as either bright or non-bright.^{xxiii} The music selected for this study was a recording of instrumental arrangements of popular show tunes, and students took a reading test under

silent control conditions as well as the music condition. Fogelson found that playing popular instrumental music while the students took the reading test adversely affected their scores, with the music having a much greater effect on non-bright students' scores than the bright students' scores.

A similar study of reading efficiency focused on college undergraduate students. This study had three testing conditions: popular music, classical music, and silence.^{xxiv} All of the music selected was chosen for its popularity and familiarity. The results of the study indicated that familiar popular music had a significant negative effect on the paragraph section of the test, but did not impact the vocabulary section. The familiar classical music did not influence the students' scores either positively or negatively in either test section. The authors suggest that the complexity of the task as well as of the music may be factors in how distracting music becomes on task performance.

In 1997, Furnham and Bradley designed a study to determine whether introverts and extroverts perform differently on cognitive tests with and without background music.^{xxv} Both reading comprehension and memory recall were assessed for twenty college undergraduate students; ten of the students were classified as introverts and ten were extroverts. The music used was an excerpt of popular music from the radio played at a quiet loudness level. Many of the extroverts claimed that they often worked with the radio on, while the introverts preferred a quieter atmosphere for studying. The results suggested that, when background music was played, introverts scored lower than extroverts in both the reading comprehension and memory recall test areas.

Effects of Background Music on Practical Task Performance

In some cases, consumers have no choice over the music they hear. Milliman observed shoppers in one U.S. supermarket to see what effect no music, slow music, or fast music would have on the time spent in the store or the amount of purchases consumers made.^{xxvi} He used instrumental music for the study, and he also took note of whether the consumers noticed whether there was music playing in the store as they shopped. Milliman's findings suggest that the tempo of music can significantly affect the pace of shopping and the amount of products a customer purchases. The slow tempo music was consistently associated with a slower pace of movement through the store and a greater amount of products purchased, while the fast tempo music was associated with a faster pace and fewer products purchased. The no-music condition created a pace between the fast and slow tempo music paces. The customers were equally divided in their ability to accurately recall whether there was music playing in the store, possibly indicating that the musical influence was on an subconscious level.

Food intake and meal duration can also be affected by non-self-selected music. Stroebele and Castro studied seventy-eight undergraduate students in Georgia as they recorded what they ate, whether music was playing or not, and whether they ate with anyone else.^{xxvii} The results showed that food intake increased when music was played while eating, but fluid intake decreased. Fat intake was also higher when music was playing than when it was not, and meals with music were, on average, about ten minutes longer than meals consumed without music. The speed and loudness of the music did not appear to affect the meal size or duration, but the presence of other people tended to increase meal time.

Self-selected music can also enhance or detract from various tasks. Beh and Hirst studied the effects of high-intensity and low-intensity music on forty-five undergraduate students split

into three test conditions: no music (environment 38-43 decibels), low-intensity (55-57 decibels) music, and high-intensity (85-87 decibels) music.^{xxviii} Heavy metal dance music of the 1990's was played for both the low-intensity and high-intensity music groups. The findings suggest that people respond to stimuli faster in a music condition than a non-music condition, and that the low-intensity music facilitates faster responses than the high-intensity music. High-intensity music seems to increase the speed of reaction times to stimuli that are centrally located, but it slows reactions to stimuli in peripheral areas, which is problematic when driving. Low-intensity music appears to improve driving performance by facilitating faster response times across all tasks tested. The author postulates that low-intensity music may keep people's thoughts focused externally, on music and the environment, rather than internally. In a similar study, Brodsky noted that the tempo of music affected simulated driving speed and perceived driving speed, with drivers reaching greater speeds with faster tempo music; faster music also correlated with increased frequency of virtual traffic violations and collisions.^{xxix} However, in this study, the subjects did not have access to a speedometer; given that they could not self-monitor their speed, the results of the study have questionable applications for authentic driving experiences.

A second area that self-selected music can enhance is exercise. Kravitz cited four theories postulating why music facilitates exercise performance: it prevents focus on fatigue; it increases the level of mental arousal; it improves motor coordination; finally, it increases relaxation by dampening acidosis and elevated hormones that contribute to fatigue.^{xxx} A study by Szabo and colleagues in 1999 revealed that using music in which the tempo goes from slow to fast results in a higher exercise load than fast, slow, fast to slow, or no music.^{xxxi} A similar study by Edworthy and Waring tested the cross relationships between fast (200 bpm) and slow (70 bpm) tempo with soft (60 dB) and loud (80 dB) intensity levels using instrumental jazz selections.^{xxxii} Results

indicated that the use of music, as well as loudness and tempo, affected treadmill speed, exertion level, perceived exertion, heart rate, and affect. Tempo appeared to be the primary factor, with the fast tempo condition producing higher heart rate and exertion than slow, and intensity was a secondary factor. Louder music only produced enhanced results with fast-tempo music; additionally, both the fast/loud and slow/soft conditions produced increased treadmill speed over the ten-minute trial periods.

Self-selected music can also help troubled sleepers regulate and prolong their sleep schedules.^{xxxiii} Listening to slow classical music for 45 minutes at bedtime for three weeks helped 30 of 35 troubled sleep participants achieve a normal sleep schedule. During the study, participants experienced improved perception of sleep quality, sleep latency, and sleep efficiency; it also decreased depression symptoms in many participants. The effects of listening to music seemed to be cumulative, with significant improvement beginning in week 2 of the trial. Two other conditions, listening to audio books and no treatment, did not show any improvement.

Drawing Conclusions

A few general conclusions can be drawn from the research cited. First, music does have an effect on various types of task performance. The type of effect is determined by various factors of the music, including genre, tempo, familiarity, and loudness. Secondly, appropriately chosen music may enhance the performance of certain tasks, but the music selected must be appropriate to the goals for the tasks. In academic settings, slow and soft instrumental music may improve behavior, time on task, speed of problem completion, or accuracy in reading and math. However, certain types of music have adverse effects in academic settings, such as popular music, familiar music, or any music played too loudly. While driving, music played at a low-to-

moderate loudness level facilitates faster reaction times and better focus than driving with loud music or in silence. In restaurants, it may be beneficial to the business to play any kind of music, but for a supermarket owner, slow tempo music has greater benefits than fast tempo music.

Some adolescents seem to naturally use music to modify mood and behavior, but additional information about these effects will enable students to make better decisions regarding the music they choose to listen to when they are driving, doing homework, or listening for pleasure. This practical aspect of music education would enable students to be aware of the ways that music influences them regardless of whether they have chosen the music to listen to or they are passive listeners of music they *don't* choose. Stores, restaurants, and commercials use music to influence consumers to buy more, but becoming aware of this may decrease the subconscious influence.

Music educators are the ambassadors of educational music for their school districts; therefore, they must be well-informed about topics within the music education field. K-4 National Standard 9c puts the responsibility on music educators to teach students about the effects of music in their lives. The music teacher can also help other teachers, administrators, and parents understand the benefits and pitfalls of using music in various settings, and in this way, music education can benefit more students than ever.

ⁱ The National Association for Music Education. "The School Music Program: A New Vision." <http://www.menc.org/resources/view/the-school-music-program-a-new-vision>.

ⁱⁱ Hallam, Susan, John Price, and Georgia Katsarou. "The Effects of Background Music on Primary School Pupils' Task Performance." *Educational Studies* 28, no. 2 (2002): 111-122. <http://sb6nw2tx4e.scholar.serialssolutions.com/?sid=google&auinit=S&aulast=Hallam&atitle=The+effects+of+background+music+on+primary+school+pupils%27+task+performance&id=doi:10.1080/03055690220124551&t> (3 October 2010).

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^{iv} Cripe, Frances F. "Rock Music as Therapy for Children with Attention Deficit Disorder: An Exploratory Study." *Journal of Music Therapy* 23, no. 1 (1986): 30-37.

^v Knobloch, Silvia, and Dolf Zillmann. "Mood Management via the Digital Jukebox." *Journal of Communication* 52, no. 2 (2002): 352.

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^x Hallam, Susan, and John Price. "Can the Use of Background Music improve the Behaviour and the Academic Performance of Children with Emotional and Behavioural Difficulties?." *British Journal of Special Education* 25, no. 2 (1998): 88-91.

^{xi} Giles, Martha M. "A Little Background Music, Please." *Principal* November, (1991): 41-44.

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