International Journal of Multidisciplinary Research And Studies

Available online at https://ijmras.com/

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY RESEARCH AND STUDIES

ISSN: 2640 7272

Volume:04; Issue:01 (2021)

Page no.-17/17

DOES A PLAYING COMPLEX INSTRUMENT BOOST COGNITIVE PERFORMANCE IN STUDENTS

Sonali

M.Phil., Roll No.: 150583 Session-2015-16

Department of Psychology, B.R.A. Bihar University, Muzaffarpur, India

E-mail: sonali30683@gmail.com

ABSTRACT

There is no doubt that music has always played an important part in the development of human civilization, and that it is also an essential component of each and every community on the face of the globe. Making music has been one of the most essential activities that humans have participated in ever from the earliest times. There is no official record of early music because it was not passed down from generation to generation; however, flutes carved from bones have been recovered, which suggests that there was a musical presence in early society (O'Donnell 1999). This is due to the fact that early music was not passed down from generation to generation. It is common knowledge that the simple act of listening to music can cause changes in a person's state of mind, behaviour, and the easily measurable physiological processes of the body, such as the rate at which a person breathes, the pace at which a person's heart beats, and the blood pressure. These changes can be positive or negative depending on the type of music that is being listened to. (O'Donnell 1999).

Sonali *, *Department of Psychology, B.R.A. Bihar University, Muzaffarpur, India.*

E-mail: sonali30683@gmail.com

Keyword: Essential Activities, Essential Component, Human Civilization.

INTRODUCTION

The degree of expertise of the listener, in addition to their familiarity with the speed and the genre of music that is being heard, may also have an effect on how they perceive music and how they respond to it. It is hard to argue against the fact that music has a significant impact on our society; even the most prominent educational institutions place a significant amount of attention on musical participation and education (O'Donnell 1999). To be more specific, one of the most popular topics in neuroscience research over the past several decades has been the effect of actively participating in music by playing an instrument, particularly at a young age. This has been one of the most popular topics because it has been shown to have positive effects on the brain. It has been shown that learning to play a musical instrument may improve one's cognitive abilities by enhancing the neural connection that occurs between the left and right hemispheres of the brain. This results in positive effects on learning, memory, fine motor skills, verbal reasoning, and non-verbal reasoning, which ultimately results in an overall more capable brain that can be applied in a variety of different contexts.

There is a direct connection between intellectual achievement and musical excellence that can be seen all the way down through the annals of history. Thomas Jefferson found that listening to music and playing his violin helped him find the right words to write in the Declaration of Independence when he was having problems coming up with the right phrases to write. With the help of music, Jefferson was able to write down his thoughts and get them out of his brain and onto paper. Albert Einstein, often considered to be among the most cerebral persons who have ever lived, was also an accomplished violinist. His mother bought him a violin while he was in elementary school, and he attributes his brilliance to the fact that he is able to play works on the violin that were composed by Mozart and Bach. Einstein's friend G.J. Withrow is quoted in O'Donnell 1999 as saying that the genius addressed problems in mathematics and other fields by improvising musical ideas on the violin. Moving forward in time to the present day, developments in neuroscience technology such as positron emission tomography (PET),

Sonali *, *Department of Psychology, B.R.A. Bihar University, Muzaffarpur, India.*
E-mail: sonali30683@gmail.com

magnetic resonance imaging (MRI), and functional magnetic resonance imaging (fMRI) imaging have significantly improved our capacity to understand the effect that music has on the brain.

According to research conducted in the disciplines of psychology and neuroscience, the participation of children in musical education is associated with an increase in sound sensitivity, as well as an elevation in language capacities and general thinking capabilities. [Citation needed] Recent studies in the area of auditory cognitive neuroscience have begun to provide light on the structural and functional brain plasticity that is the driving force underlying these effects. However, it is still unclear how much the intensity and duration of training on an instrument, as well as other factors such as family history, extracurricular activities, attention, motivation, or teaching methods, contribute to the benefits for brain development. Moreover, it is unclear how much of a role family history plays. Other aspects like as one's family history, extracurricular activities, level of attention, and level of motivation are all potential contributors. There is an association between training in music and plastic changes in the auditory, motor, and sensorimotor integration areas of the brain. Training in music may also lead to changes in other parts of the brain. However, the current state of the study does not justify reaching the conclusion that music training is the single element responsible for the changes that have been seen (Merrett et al., 2013).

The cognitive, emotional, and social processes involved in the creation and perception of music

Listening to music involves particular perceptual skills, such as pitch discrimination, auditory memory, and selective attention, in order to detect the temporal and harmonic structure of music, in addition to its emotive components. In addition to this, the act of listening to music activates a widespread network of brain areas (Peretz and Zatorre, 2005). In contrast to the vast majority of other motor activities, playing music requires not only the precise sequencing of a large number of actions that are organised hierarchically but also the control over the creation of pitch intervals. [Case in point:] (Zatorre et al., 2007). The sound of music, similar to the sound of any other sound, evolves throughout the course of time. Therefore, the auditory cognitive system needs to rely on processes of working memory that enable a stimulus to be retained on-line in order to be able to link one component of a sequence to another component that takes place later.

Sonali *, *Department of Psychology, B.R.A. Bihar University, Muzaffarpur, India.*
E-mail: sonali30683@gmail.com

This is necessary in order to be able to link one component of a sequence to another component that takes place later. The process of music recognition requires both accessing and choosing many potential predictions that have been stored in a perceptual memory system. This is an essential phase in the process (Dalla Bella et al., 2003; Peretz and Zatorre, 2005). In contrast to speech, music is not tied to a preconceived semantic system; nonetheless, it is still feasible for music to express meaning via the use of systems such as emotional evaluation and associative memory.

In addition to this, it is common knowledge that one's mental state may be profoundly impacted by listening to certain types of music. Studies using neuroimaging techniques have shown that the brain regions involved in the production of musically induced emotions are extremely similar to those involved in the production of non-musical basic emotions. The reward system, the insula, and the orbitofrontal cortex, in addition to the amygdala and the hippocampus, are all examples of areas in the brain that fall under this category (Blood and Zatorre, 2001; Koelsch et al., 2006; Salimpoor et al., 2011; Trost et al., 2012). Not only may participation in musical performance be experienced as very emotional in the case of stage fright (Studer et al., 2011), but it can also be seen as incredibly satisfying. This is due to the fact that listening to music and performing it both have the potential to have a significant influence on one another's feelings (de Manzano et al., 2010; Nakahara et al., 2011). Additionally, it has been hypothesised that engaging in musical activities together in a social situation could promote communication, coordination, cooperation, and even empathy between members of the same group (Koelsch, 2010). As a consequence of this, it is not difficult to comprehend how an individual's experience with music throughout their infancy and adolescence might potentially contribute favourably to the individual's general health as well as the development of their social life.

Training on an instrument is an activity that often begins at a young age and is a learning experience that utilises many senses and a wide range of motor abilities. The ability to play an instrument calls for a wide variety of skills, including reading a complicated symbolic system (musical notation) and translating it into sequential, bimanual motor activity dependent on multisensory feedback; developing fine motor skills coupled with metric precision; memorization of long musical passages; and improvisation within given musical parameters. The

Sonali *, *Department of Psychology, B.R.A. Bihar University, Muzaffarpur, India.*
E-mail: sonali30683@gmail.com

ability to play an instrument requires a wide range of talents, some of which are listed below. Contrary to the majority of other motor activities, playing music requires precise timing of a number of actions that are organised hierarchically as well as control over the creation of pitch intervals. This is in addition to the fact that performing music requires a high level of concentration (Zatorre et al., 2007). In order to read sheet music by sight, a musician must be able to concurrently and progressively process a large amount of information in a very short amount of time for immediate application. Reading sheet music by sight is an essential skill for musicians. This endeavour requires, at the very least, the interpretation of the pitch and duration of the notes (written on the two staves of a piano score) in the context of the predetermined key signature and metre, the detection of familiar patterns, the anticipation of what the music ought to sound like, and the generation of a performance plan that is suited for motor translation. The development of a set of attentional and executive processes, which have both domain-specific and universal implications, is one of the outcomes of participating in formal musical education. Depending on the circumstances, these repercussions might have either a good or a negative impact.

Given that musical activities involve a wide variety of cognitive processes, it would seem to stand to reason that the neural networks that support these tasks would display increased flexibility in highly skilled musicians. This is due to the fact that participating in musical activities engages several brain processes all at once. The effects of musical training on the adaptability of the brain have been the focus of scrutiny in a number of recent research that have been conducted in the form of reviews. The neuroimaging data that has been accumulated up to this point serves as the foundation for these articles (Herholz and Zatorre, 2012; Barrett et al., 2013; Moreno and Bidelman, 2013). In addition to anatomical differences in auditory and motor cortices, it has been reported that there are structural differences (typically in the form of increased grey matter volume) also in somatosensory areas, premotor cortex, inferior temporal and frontal regions, as well as the cerebellum in the brains of musicians when compared to the brains of non-musicians. These differences have been found in musicians' brains when compared to the brains of non-musicians (see Barrett et al., 2013). Over the course of a variety of different longitudinal investigations, it has been demonstrated that there is a correlation between the length of musical training and the degree of structural change in white matter tracts (Bengtsson

Sonali *, *Department of Psychology, B.R.A. Bihar University, Muzaffarpur, India.*
E-mail: sonali30683@gmail.com

et al., 2005), particularly in the corpus callosum. This association was found to exist between the two variables.

It is possible that it will not come as a surprise that structural and functional differences are found in those regions of the brain that are closely linked to skills learned during instrumental music training (such as independent fine motor movements in both hands and auditory discrimination), but the differences that are found outside of these primary regions are particularly interesting. [Citation needed] (for instance, in the inferior frontal gyrus in Sluming, 2002). According to the findings, plasticity may take place in some regions of the brain that either have control over core musical functions or operate as multimodal integration regions for musical talents. This may have an effect on the ability to transfer musical training to other skills. A recent study, for example, used fMRI to compare the resting-state activity of musicians with non-musicians. The results indicated that musicians exhibited stronger functional connectivity in motor and multi-sensory areas of the brain than non-musicians did (Luo et al., 2012). This study illustrates that even in research designs in which no task is offered to the participants, long-term training in music may have an affect on functional brain connectivity. It also draws attention to the fact that as a consequence of this training, musicians' motor and multi-sensory networks may be better taught to function together. This was shown to be the case.

In recent years, there has been a growing degree of scientific interest in the activity of learning to play a musical instrument, which is a multimodal endeavour that presents a number of challenges. In particular, there has been a continuing interest for a very long time in the probable repercussions of musical education on other, nonmusical areas of functioning, such as cognitive ability (Hetland, 2000; Moreno, 2009; Overy, 1998; Swaminathan & Schellenberg, 2021). (Hetland, 2000; Moreno, 2009; Overy, 1998; Swaminathan & Schellenberg, 2021). The present study was an observational study that addressed the question of whether or not a person's level of proficiency in playing a musical instrument is related to changes in that person's general cognitive ability throughout the course of their lifetime.

The findings of observational studies that compare the cognitive performance of adult musicians and nonmusicians often suggest that musicians have an edge over nonmusicians in terms of their cognitive abilities. It has been shown that this advantage is present across a broad variety of

Sonali *, *Department of Psychology, B.R.A. Bihar University, Muzaffarpur, India.*
E-mail: sonali30683@gmail.com

cognitive tests, including evaluations of one's general cognitive ability (for reviews, see Costa-Giomi, 2015; Swaminathan & Schellenberg, 2014). Observational studies done on children have shown similar favourable correlations between experience in musical education and cognitive capacity. These relationships have been found to have positive implications for cognitive ability. For example, Schellenberg (2006) found that in a cross-sectional study of children aged 6 to 11 years old, after controlling for factors such as family income, parents' education, and participation in nonmusical extracurricular activities, duration of musical training was found to have a positive correlation with general cognitive ability, accounting for 6% of the variance in cognitive test scores. This finding was based on the findings of a study that controlled for factors such as family income, parents' education, and participation in nonmusical extracurricular activities. A research in which the youngsters were evaluated for their cognitive abilities came to this conclusion.

REVIEW OF LITERATURE

Locker 2014, Recent studies have demonstrated that youngsters who actively learn to play an instrument have improved neurophysiological capabilities that allow them to better distinguish between sounds. Their brains are trained to recognise and comprehend sounds that are unique to the experience of playing music, but just listening to music does not provide them with this training on its own. This is excellent news for developing brains because, as the brain continues to expand, it rewires the traditional course of neuronal transmission. As a result, the path gets more convoluted in connecting the left and right hemispheres of the brain, which is why this news is so positive. The final result is a brain that is better able to process information that is very complex. There is a close connection between the motor, sensory, auditory, visual, and emotional aspects of a person's central and peripheral nervous systems when that person plays an instrument (PCO, accessed 2016). This full brain mental workout involves artistic and aesthetic aspects of learning, which is a unique characteristic of playing an instrument that an individual cannot stimulate by any other activity, including athletics. Playing an instrument is the only activity that can stimulate this aspect of a person's brain. Playing an instrument is the sole pursuit that can give this kind of cerebral exercise for the brain, therefore it is highly recommended that you take up this pursuit. The coming together of cultural and linguistic elements It is possible to

Sonali *, *Department of Psychology, B.R.A. Bihar University, Muzaffarpur, India.*
E-mail: sonali30683@gmail.com

train the right hemisphere of the brain, which is in charge of imaginative and novel activities, to work in tandem with the left hemisphere of the brain, which is in charge of the precise execution of mathematical operations. Because of this, there will be a rise in activity in the corpus callosum, which will make it possible for impulses to transmit throughout the brain more rapidly and over a greater number of different routes (Collins 2014). The increased capacity of musicians to solve problems in academic and social settings in a manner that is both more productive and creative is a direct result of the increased communication that may occur between the two hemispheres of the brain. This improvement in musicians' problem-solving abilities has been linked to their increased ability to play music (Collins 2014).

PCO, accessed in the year 2016 After consuming the supplement, it was stated in many papers that there was an improvement in both learning and memory. Playing a musical instrument for as little as 15 months during a child's formative years may result in a variety of structural changes in the brain, according to study that was carried out by the Portland Chamber Orchestra. These alterations are associated with increases in a variety of motor and auditory capabilities, and there is a link between the two. For example, when a child takes part in musical education over the course of their development, the hippocampus, which is involved in learning and memory, has an increase in neuronal connection and neurogenesis. This occurs despite the fact that the child is still developing. Because of this, cognitive processes that are associated with learning and memory are facilitated to a greater extent. Amusia is a form of tone deafness that prevents basic musical skills and perception. Studies on people with amusia have shown that they have less white matter in regions of the brain compared to normal subjects, particularly those who are highly involved with music. This is especially true for those people who have amusia. This provides further evidence that supports the idea.

RESEARCH METHOLODOGY

When it comes to the decision of whether or not to begin playing an instrument at age 8 or earlier, there is some logic behind the insanity. Our computation is based on the conditional independence assumption provided that we do not see any external fluctuations in the number of students enrolled in music lessons. This is because we do not observe any external fluctuations in the number of students enrolled in music lessons. To the extent that this is required for us to be

Sonali *, *Department of Psychology, B.R.A. Bihar University, Muzaffarpur, India.*
E-mail: sonali30683@gmail.com

able to estimate the effect that music has on the production of skills, we make the assumption that the choice to learn a musical instrument is uncorrelated with any unobserved characteristics that also have an influence on the development of skills. This is because we want to be able to estimate the impact that music has on the production of skills. to the degree that they do not demonstrate any link with the visible traits that were accounted for in this investigation.

We estimate the influence of commencing musical instrument training at least between the ages of 8 and 17 years old. There are two stages of the selection process for participants in the treatment when randomization is not used. It is extremely conceivable that parents will have a big effect on their children's decision to begin taking music lessons at a young age. Because of this, our principal specification takes into account a considerable number of elements relating to the adolescent's parents. These are aspects that were appraised while the teenager was still a young kid. In addition, there may be additional individual qualities that impact a person's possibility of continuing to practise music up until the age of 17 or later. We address this second stage of selection in the sensitivity tests that are presented in Section 6 by including the predicted probability to give up music as well as the type of secondary school as additional control (or mediator) variables. These two factors were included as control variables because they were found to have a direct influence on the outcome of the study. Because of this, we are able to investigate the consequences of the second step of the selection process.

We apply a technique known as "propensity score matching" so that we can take into account the non-random character of the decision to learn an instrument. This choice to learn an instrument is quite common. The use of the estimator was carried out in the way that is described in the following paragraphs. To get things started, we are going to evaluate the likelihood of becoming skilled on a musical instrument by using a probit model. The score that is given in relation to this probability is referred to as the propensity score. In an ideal world, the model for selection would take into consideration each and every element that influences an individual's decision about whether or not to enrol in music lessons. It's possible that factors such as convenience and individual taste were major contributors to this decision. Eide and Ronan (2001) and Lareau (2011) found that parents have a tendency to view music instruction as an investment in their child's future success. In addition to the immediate usefulness or joy that one obtains from

Sonali *, *Department of Psychology, B.R.A. Bihar University, Muzaffarpur, India.*
E-mail: sonali30683@gmail.com

producing music, parents tend to view music instruction as an investment in their child's future success (Eide and Ronan, 2001; Lareau, 2011). In addition, parents may choose to enrol their child in music lessons because of their own prior experience or habit of consuming arts, which may have led them to develop a taste for the arts. This is consistent with the learning-by-consuming theory, which postulates that parents develop a taste for the arts through their own experiences (Garboua and Montmarquette, 1996). This is a distinct possibility due to the fact that parents could acquire a liking for the arts as a result of their personal experiences or routines involving the consumption of arts. If we adopt the premise that people with greater levels of education are better suited to enjoy creative production and consumption (Lunn and Kelly, 2009), then the degree to which an individual has an appreciation for the arts is also dependant on their level of education. Last but not least, it's possible that parents who have completed further levels of education are more likely to enrol their children in music classes. This is due to the fact that the imaginative pursuits that are provided for children are geared toward satisfying the inclinations of parents who have completed higher levels of education (Lunn and Kelly, 2009).

DATA ANALYSIS

demonstrates that there are disparities in outcomes at age 17 between teenagers who have received music instruction and those who have not. The differences are assessed using a method called propensity score matching, which takes into account a vast variety of individual and family traits that have been observed. We take into account factors such as the child's socioeconomic background, the parents' personalities, the level of participation the parents have in their child's academic progress, and the child's preference for the arts. 12 To qualify for the therapy, a patient must demonstrate that they have played a musical instrument between the ages of 8 and 17 and have also participated in private music instruction. According to the information that we have, the only people who may be considered treated are those who have been performing musically for at least nine years. Because we are interested in the impacts that music training has over a longer period of time, we have decided to impose this limitation. In Section 6, we will talk about the implications of the treatment definition for a causal interpretation of our findings.

Sonali *, *Department of Psychology, B.R.A. Bihar University, Muzaffarpur, India.*
E-mail: sonali30683@gmail.com

COGNITIVE ABILITIES, ACADEMIC ACCOMPLISHMENT

In each column, we provide an estimate of the influence that music has on a distinct result. Cognitive abilities, academic accomplishment, personality, effective use of time, and aspiration are the five areas that are used to classify the outcomes.

Standard deviations are used to quantify differences in a number of different factors, including cognitive abilities, academic grades, personality, and optimism towards future professional achievement. Differences in time utilisation and educational aspiration (whether the person wants a higher secondary school or university degree) \sare given in percentage points. 13

The following will go through each of the several sets of estimates that correlate to the various columns in the table. Column (1) reflects the baseline specification. In this section, we investigate the differences in outcomes between adolescents who have received music instruction and those who have not had such training throughout the full sample. Even after accounting for a huge number of different factors, the findings suggest that a significant portion of these disparities cannot be satisfactorily explained in any way. On the intelligence test, we can observe that children who learnt to play a musical instrument had scores that were, on average, one quarter of a standard deviation higher than the scores of other children.

This effect is more than twice as large as the one that Felfe et al. (2011) discovered for athletic participation. The difference can be traced back to the significantly higher scores obtained for word analogies and figures. As a result, it is possible that verbal and spatial abilities are affected to a greater extent than mathematical abilities. Not only do adolescents who have received music instruction have an edge in their cognitive abilities, but their academic performance is also superior to that of other students by one sixth of a standard deviation. Note that the maximum possible grade on the German grading system is a one, and that the range goes from one to six (failing).

Outcome differences between adolescents with and without music training or alternative activities

Sonali *, *Department of Psychology, B.R.A. Bihar University, Muzaffarpur, India.*
E-mail: sonali30683@gmail.com

	Effects of music training from age 8 to 17				Effects of alternative activities		
		Differences by socio-economic status (SES)			Sports	Dance	
	Full sample (1)	*Low SES* (2)	*High SES* (3)	*Difference* (4)	*Full sample* (5)	*Full sample* (6)	*Sample size*
Cognitive skills							
Average cognitive skills	0.24*** (0.08)	0.20 (0.14)	0.24** (0.10)	0.04 (0.17)	0.11 (0.07)	0.08 (0.06)	1,772
Analogies	0.28*** (0.09)	0.23 (0.14)	0.29** (0.11)	0.05 (0.19)	0.04 (0.07)	0.05 (0.06)	1,772
Figures	0.19** (0.09)	0.19 (0.13)	0.18 (0.11)	-0.02 (0.17)	0.04 (0.07)	0.06 (0.06)	1,772
Maths operators	0.11 (0.09)	0.07 (0.15)	0.12 (0.11)	0.05 (0.18)	0.15** (0.07)	0.07 (0.06)	1,772
School achievement[1]							
Average school grade	-0.17*** (0.06)	-0.17 (0.11)	-0.16** (0.08)	0.01 (0.14)	0.02 (0.05)	-0.05 (0.05)	3,364
German grade	-0.16** (0.06)	-0.11 (0.11)	-0.17** (0.07)	-0.06 (0.14)	0.04 (0.05)	-0.02 (0.05)	3,364
Foreign language grade	-0.14** (0.06)	-0.10 (0.11)	-0.15^{+} (0.08)	-0.05 (0.14)	0.10^{+} (0.05)	-0.01 (0.05)	3,364
Mathematics grade	-0.09 (0.07)	-0.17 (0.12)	-0.06 (0.08)	0.11 (0.15)	-0.08 (0.05)	-0.06 (0.05)	3,364
Personality							
Conscientiousness	0.28*** (0.09)	0.21 (0.15)	0.31*** (0.12)	0.10 (0.20)	-0.02 (0.07)	0.09 (0.07)	1,753
Openness	0.33*** (0.09)	0.39*** (0.14)	0.29** (0.12)	-0.10 (0.19)	-0.10 (0.07)	0.20*** (0.06)	1,753
Agreeableness	0.18^{+} (0.09)	0.19 (0.14)	0.17 (0.12)	-0.02 (0.18)	0.02 (0.07)	-0.09 (0.06)	1,753
Perceived control	0.07 (0.06)	0.16 (0.11)	0.03 (0.07)	-0.13 (0.14)	0.05 (0.05)	0.20*** (0.05)	3,364
Time use							
Watch TV daily	-0.13*** (0.03)	-0.09^{+} (0.05)	-0.14*** (0.04)	-0.05 (0.06)	0.01 (0.02)	-0.03 (0.02)	3,364
Read books daily	0.08** (0.03)	0.07 (0.05)	0.08^{+} (0.04)	0.02 (0.07)	-0.02 (0.02)	-0.04^{+} (0.02)	3,364
Ambition							
Aim Abitur	0.15*** (0.03)	0.21*** (0.05)	0.11*** (0.03)	-0.10 (0.06)	0.05** (0.02)	0.05** (0.02)	3,364
Aim university	0.18*** (0.03)	0.21*** (0.06)	0.16*** (0.04)	-0.06 (0.07)	0.04^{+} (0.02)	0.07*** (0.02)	3,364
Job success likely	0.07 (0.06)	0.08 (0.10)	0.06 (0.07)	-0.02 (0.12)	0.16*** (0.05)	0.14*** (0.05)	3,364
Desired profession likely	0.07 (0.06)	0.17^{+} (0.10)	0.03 (0.07)	-0.14 (0.12)	0.14*** (0.05)	0.09^{+} (0.05)	3,364

Teenagers who have received music instruction tend to have dramatically different personalities than their peers who have not. They are more open and conscientious than others by a margin that is more than one quarter of a standard deviation. 14

There is no correlation between proficiency in a musical instrument and increased agreeableness. In conclusion, contrary to what one would anticipate, children who learn to play a musical instrument do not develop a greater sense of mastery over their lives as a result of this experience.

When we compare the two groups with regard to how they use their time and the goals they have for their schooling, we find that there are significant variances. Children are 13 percent less likely to watch television every day if they have the ability to play an instrument. In addition to this, they have a 15% greater likelihood of intending to get a degree from an upper secondary school (Abitur), and an 18% greater likelihood of intending to enter a university.

In the next stage, we will investigate the heterogeneity of these outcome differences in relation to the socioeconomic status of the participants. Given that education is a significant factor in determining cultural preference (Lunn and Kelly, 2009) and that wealth is connected with

Sonali *, *Department of Psychology, B.R.A. Bihar University, Muzaffarpur, India.*
E-mail: sonali30683@gmail.com

education, we distinguish socio-economic background according to the level of education attained by the parents. We classify parents as having a lower socio-economic position if they have not completed any level of secondary education or have completed just up to the medium level of secondary education (Hauptschule or Realschule). On the other hand, parents who have completed either an advanced level of secondary education or have a degree from a university are seen to have a better socio-economic position. According to this criteria, our sample consists of 1885 people who have a low socioeconomic position, as well as 1484 people who have a high socioeconomic status. Only 5.4 percent of the former group's adolescents, or 102 of them, learn to play a musical instrument between the ages of 8 and 17, whereas 18.2 percent of the latter group's adolescents, or 270 of them, do so. Due to the fact that relatively few children from low-income families study a musical instrument, there is unfortunately no way to differentiate further between the children who come from these families.

The impacts of training in music on teenagers of low and high socioeconomic class, as well as the disparity between these effects, are shown in Table 4, Columns (2) to (4), beginning with the leftmost column. Because of the limited size of the sample, many of the coefficients in column (2) cannot be considered significant. Despite this, we find that the severity of the outcome disparities between adolescents who have received music instruction and those who have not are comparable, regardless of their socioeconomic background. The aspiration to get a degree from an upper secondary school is the only consequence that varies considerably across the two socioeconomic categories.

Everyone has a considerable benefit of music instruction on such aspirations, but the effect is magnified double among teenagers of lower socio-economic level. It should not come as much of a surprise that there is such a disparity when one considers the fact that already 66 percent of adolescents from families with a high socio-economic status have the goal of obtaining a degree from an upper secondary school, while only 31 percent of the other group does so. Consequently, teenagers from poorer socioeconomic backgrounds have a greater amount of ground to make up.

One of the questions that immediately comes to me is whether or not the significant disparities in outcome between teenagers who have received music instruction and those who have not is solely attributable to music. To put it another way, do we detect comparable outcome disparities

Sonali *, *Department of Psychology, B.R.A. Bihar University, Muzaffarpur, India.*
E-mail: sonali30683@gmail.com

when we compare adolescents who participate in one sort of leisure activity to those who do not participate in any type of leisure activity at all? Even while the advantages of learning music are likely to be more profound, columns 5 and 6 demonstrate that participating in other hobbies may also have a good impact on one's life. We run the same estimates as the baseline specification that is shown in column (1), but we substitute other activities for musical instruction from the ages of 8 to 17 throughout the model. The benefits of being physically active, which have been the subject of a great number of research investigations, are outlined in the fifth column. Those who have been athletic at least from the ages of 8 to 17 and who have routinely competed in sports events are the ones who we consider treated for the purpose of establishing constitute 15 percent of the active population. We were able to duplicate, to a certain extent, the results that Felfe et al. had obtained concerning cognitive abilities (2011).

.

4.2 DISCUSSION

Even after controlling for a large number of social background characteristics, we still find significant differences in terms of cognitive and non-cognitive skills between adolescents who learned a musical instrument during childhood and those who did not. This is the case regardless of whether or not the adolescents were exposed to music at a young age. In order to interpret these differences as the causal effects of music training, we need to rely on the assumption of conditional independence, rule out the possibility of reverse causality, and make one more assumption on the existence of partly treated individuals in the control group. All of these steps are necessary in order to accomplish our goal. In this part, we will explore these assumptions and determine the amount to which they are valid as well as the extent to which they may be evaluated.

CONCLUSION

The current research demonstrates that learning to play a musical instrument is linked to improved cognitive abilities and grades in school, in addition to higher levels of conscientiousness, openness, and aspiration. This was the case even after researchers controlled for a large number of differences in parental backgrounds. On a test of cognitive abilities,

Sonali *, *Department of Psychology, B.R.A. Bihar University, Muzaffarpur, India.*
E-mail: sonali30683@gmail.com

adolescents who have learnt to play a musical instrument between the ages of 8 and 17 have scores that are more than one quarter of a standard deviation higher than those of other youngsters. This advantage may be attributed more to linguistic abilities than to mathematical ones. Lessons in music cultivate a more thoughtful and receptive disposition in children and adolescents (more than one fourth of a standard deviation). They are more than 10% less likely to watch television on a daily basis, and they are around 15% more likely to have the goal of finishing upper secondary school and going to university. In addition, teenagers of low or middle socioeconomic class who have received musical instruction tend to have a more positive outlook on their potential for future achievement. Aside from that, the findings do not change according to the socioeconomic background of the participants. Alternate forms of recreation such as sports and dancing, which both contribute positively to skill development, are examples. Specifically, adolescents who participate in sports are just as driven to achieve their academic goals, such as graduating from secondary school or attending college, as those who have received musical training. In addition, research has shown that teenagers who participate in performing arts, such as theatre or dance, have a more positive outlook on the future and a greater sense of control.

REFERENCES

1. Almlund, M., Duckworth, A. L., Heckman, J. J., Kautz, T., 2011. Personality psychology and economics. In: Hanushek, E. A., Machin, S., Woessmann, L. (Eds.), Handbook of the Economics of Education. Vol. 4. Elsevier Amsterdam, pp. 1–181.

2. Andersen, P. L., Hansen, M. N., 2012. Class and cultural capital - the case of class inequality in educational perfor- mance. European Sociological Review 28 (5), 607–621.

3. BMBF, 2013. Kultur macht stark: über die initiative – bildungsarmut bekämpfen. Bundesministerium für Bildung und Forschung,

4. Bourdieu, P., 1986. The forms of capital. In: Richardson, J. G. (Ed.), Handbook of Theory of Research for the Soci- ology of Education. Greenwood Press, pp. 241–258.

Sonali *, *Department of Psychology, B.R.A. Bihar University, Muzaffarpur, India.*
E-mail: sonali30683@gmail.com

5. Cobb-Clark, D. A., Schurer, S., 2012. The stability of big-five personality traits. Economics Letters 115 (1), 11–15.
6. Covay, E., Carbonaro, W., 2010. After the bell: Participation in extracurricular activities, classroom behavior, and academic achievement. Sociology of Education 83 (1), 20–45.
7. Cunha, F., Heckman, J. J., 2007. The technology of skill formation. American Economic Review 97 (2), 31–47. Cunha, F., Heckman, J. J., 2008. Formulating, identifying and estimating the technology of cognitive and noncog-
8. Cunha, F., Heckman, J. J., Schennach, S. M., 2010. Estimating the technology of cognitive and noncognitive skill formation. Econometrica 78 (3), 883–931.
9. Donnellan, M. B., Lucas, R. E., 2008. Age differences in the big five across the life span: Evidence from two national samples. Psychology and Aging 23 (3), 558–566.
10. Felfe, C., Lechner, M., Steinmayr, A., 2011. Sport and child development. Economics Working Paper Series 1135, University of St. Gallen, School of Economics and Political Science.
11. FundaMusical, 2013. El sistema. Official Site of the Simon Bolivar Music Foundation FundaMusical Bolivar,
12. Heckman, J. J., Kautz, T., 2012. Hard evidence on soft skills. Labour Economics 19,
13. Heckman, J. J., Masterov, D. V., 2007. The productivity argument for investing in young children. Applied Economic Perspectives and Policy 29 (3),
14. Heckman, J. J., Stixrud, J., Urzua, S., 2006. The effects of cognitive and noncognitive abilities on labor market outcomes and social behavior. Journal of Labor Economics 24 (3),
15. Heineck, G., Anger, S., 2010. The returns to cognitive abilities and personality

Sonali *, *Department of Psychology, B.R.A. Bihar University, Muzaffarpur, India.*
E-mail: sonali30683@gmail.com

traits in germany. Labour Economics 17 (3),

16. Huber, M., Lechner, M., Wunsch, C., 2013. The performance of estimators based on the propensity score. Journal of Econometrics 175 (1),

Sonali *, *Department of Psychology, B.R.A. Bihar University, Muzaffarpur, India.*
E-mail: sonali30683@gmail.com