

OVEREXCITABILITY RELATED TO MUSICAL APTITUDE AND TALENT

*SOBRE-EXCITABILIDADE (OVEREXCITABILITY) CORRELACIONADA À APTIDÃO
E TALENTO MUSICAL*

*SOBREEXCITABILIDAD (OVEREXCITABILITY) CORRELACIONADA CON LA
APTITUD Y EL TALENTO MUSICAL*



Fabiana Oliveira KOGA¹

e-mail: fabianapsicopedagogiamusical@gmail.com



Rosemeire de Araújo RANGNI²

e-mail: rose.rangni@ufscar.com

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¹ Federal University of São Carlos (UFSCar), São Carlos – SP – Brazil. Postdoctoral fellow at the Department of Psychology.

² Federal University of São Carlos (UFSCar), São Carlos – SP – Brazil. Associate Professor 2. PhD in Special Education (UFSCar).

ABSTRACT: The present research aims to study the production of (inter)national literature with regard to over-excitability associated with musical aptitude and talent and to characterize, describe and analyze it based on the last ten years (2012 to 2022). A search was carried out in six (6) databases, qualitative analysis, and meta-analysis (descriptive statistics and comparison of means/T Student). Studies (N=11) were found (N=4 empirical and randomized and N=7 theoretical), and none of them was Brazilian. The United States came first in the ranking of productions and the sources of publication were in the areas of Music, Arts in general, Education, Psychology, and Humanities. The two (2) randomized trials showed significant differences between singers and dancers ($t(144)=1.636$; $p>0.05$), dancers and athletes ($t(109)=4.554$; $p<0.05$), and musicians and not musicians ($t(210)=1.170$; $p<0.05$). It was concluded that talented individuals in Music present greater over-excitability when compared to other groups.

KEYWORDS: Special Education. Musical aptitude. Musical talent. Overexcitability.

RESUMO: A presente pesquisa tem como objetivo estudar a produção da literatura (inter)nacional em relação à sobre-excitabilidade associada à aptidão e ao talento musical e caracterizá-la, descrevê-la e analisá-la tomando por base os últimos dez anos (2012 a 2022). Empreendeu-se a busca em seis (6) bases de dados, análise qualitativa e meta-análise (estatística descritiva e comparação de médias/T Student). Foram encontradas N=11 pesquisas (N=4 empíricas e randomizadas e N=7 teóricas), nenhuma delas era brasileira. Os Estados Unidos ficaram em primeiro no ranking das produções e suas fontes eram das áreas da Música, Artes em geral, Educação, Psicologia e Humanidades. As duas (2) pesquisas randomizadas mostraram diferenças significativas entre cantores e bailarinos ($t(144)=1,636$; $p>0,05$), bailarinos e atletas ($t(109)=4,554$; $p<0,05$) e músicos e não músicos ($t(210)=1,170$; $p<0,05$). Concluiu-se, que indivíduos talentosos em Música apresentam maior sobre-excitabilidade quando comparados com outros grupos.

PALAVRAS-CHAVE: Educação Especial. Aptidão musical. Talento musical. Sobre-excitabilidade.

RESUMEN: La presente investigación tiene como objetivo estudiar la producción de la literatura (inter)nacional en relación con la sobreexcitabilidad asociada a la aptitud y el talento musical y caracterizarla, describirla y analizarla con base en los últimos diez años (2012 a 2022). Se realizó búsqueda en seis (6) bases de datos, análisis cualitativo y metanálisis (estadística descriptiva y comparación de medias/T de Student). Se encontraron N=11 estudios (N=4 empíricos y aleatorizados y N=7 teóricos), ninguno de ellos brasileño. Estados Unidos ocupó el primer lugar en el ranking de producciones y sus fuentes fueron en las áreas de Música, Artes en general, Educación, Psicología y Humanidades. Los dos (2) ensayos aleatorizados mostraron diferencias significativas entre cantantes y bailarines ($t(144)=1,636$; $p>0,05$), bailarines y deportistas ($t(109)=4,554$; $p<0,05$) y músicos y no músicos ($t(210)=1,170$; $p<0,05$). Se concluyó que los individuos con talento en la Música presentan mayor sobreexcitabilidad en comparación con otros grupos.

PALABRAS CLAVE: Educación Especial. Aptitud musical. Talento musical. Sobreexcitabilidad.

Introduction

The concept of overexcitability, theorized by Dabrowski (2016), is part of the Positive Disintegration Theory (PDT), which brings together the study of personality associated with emotions with progressive human development, which can be positive when there is individual growth of the individual and negative with regression of the personality and emotional field (DABROWSKI, 2016).

TDP can be correlated with the area of talent (OLIVEIRA *et al.*, 2015; SANZ, 2004; SISK, 2021), as it is an area inserted in Special Education with the denomination of high skills or giftedness and ensuring students receive specialized educational services (BRASIL, 1996), this is because components such as special skills and talents, autonomous factors and over-excitability can potentiate and affect personality development in TDP, which can be observed at different levels (DABROWSKI, 2016; OLIVEIRA *et al.*, 2015; SISK, 2021).

If it is level I, primary integration will configure egocentric behaviors with some degree of altruism. Unilevel disintegration represents individuals sensitive to social opinion, as they bring a significant feeling of shame and guilt, however, these feelings do not make the individual reflect and hierarchize values. In spontaneous multilevel disintegration, in turn, the growth process is more conscious, as there is a considerable presence of empathy, self-knowledge and self-control. Secondary integration is a level marked by self-esteem, authenticity, empathy and where cognitive and emotional aspects merge (DABROWSKI, 2016; OLIVEIRA *et al.*, 2015; SANZ, 2004; SISK, 2021).

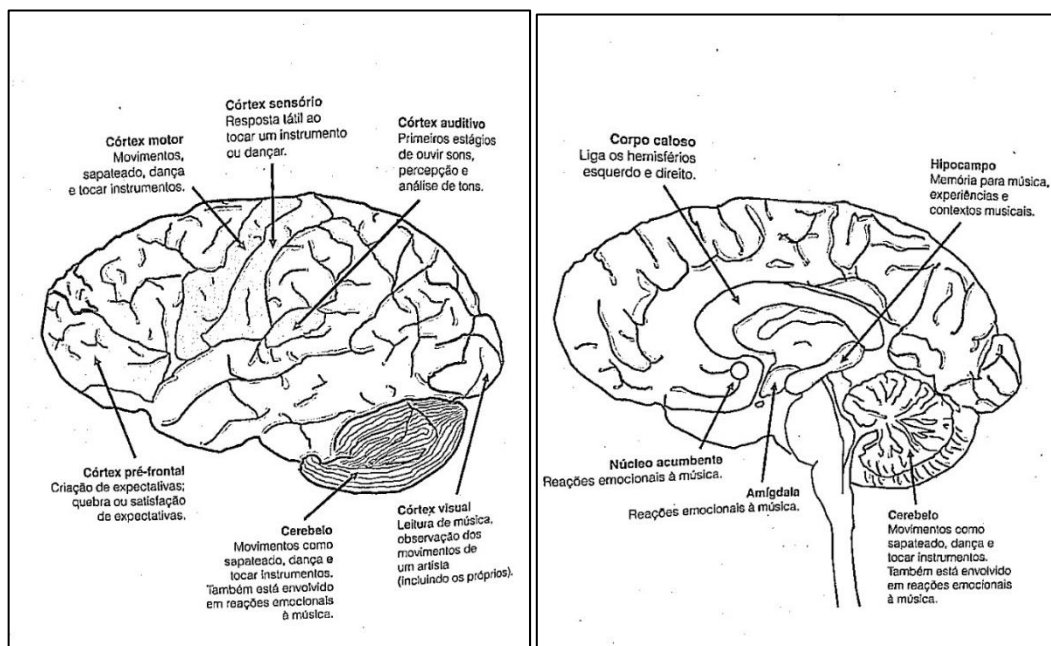
Thus, over-excitability can be defined as the individual's tendency to react with extreme intensity and sensitivity to external and internal stimuli, as they can be psychomotor when emotional tensions and internal conflicts are translated into a motor response via the neuromuscular system (agitation, restlessness, anxiety, etc.). It is sensory if the individual has intolerance to certain sounds, and may even overreact to some stimuli. Imaginative over-excitability is present when the individual mixes dreams with reality, but also demonstrates inventiveness and even fear of the unknown. Intellectual over-excitability, on the other hand, is configured in the need-to-know things, to question and concern with theoretical/scientific issues, philosophical reflections, among other aspects. Finally, emotional over-excitability is characterized by affective relationships and interactions, especially because it involves feelings of empathy, passion and social responsibility (DABROWSKI, 2016; NIXON, 2016; OLIVEIRA *et al.*, 2015; SANZ, 2004; SISK, 2021).

With regard to aptitude and musical talent, it is possible to define it as a complex phenomenon with multiple nuances, among which are: musical intelligence, imagination, creativity (giftedness) and higher psychological functions, which can be observed in eminence, precocity, motricity, motivation, emotional aspects, whose elements are linked to personality and identity, musicality, as well as the characteristics of the relationship of both nuances presented with over-excitability (DABROWSKI, 2016; GARDNER, 1993; GAGNÉ; MCPHERSON, 2016; GORDON, 2015; HAROUTOUNIAN, 2002, 2019; HOLLINGWORTH, 1928; KIRNARSKAYA, 2018; TEPLOV, 1966; VYGOSTSKY; LÚRIA, 1996; WINNER, 1996; ABRAMO; NATALIE-ABRAMO, 2020; WILLEMS, 2011).

When discussing over-excitability, it becomes necessary to correlate it with research focused on the brain and emotion, with Music as a variable, as can be seen in the studies by Klineburger and Harrison (2015).

From this perspective, Levitin (2021) studied the brain of musicians in activities involving musical performance, using control and experimental groups. The results showed differences in the cortex, mainly related to psychomotricity, sensoriality and perception, emotions, cognition and decision-making (response to stimuli). Figures 1 and 2 illustrate the fruits of their studies.

Figures 1 and 2 – Image of the brain of musical individuals



Source: Levitin (2021, p. 260-261)

The images indicate arousal in the motor cortex, which is responsible for the movements of, for example, musicians and dancers, as the area is responsible for dancing and playing. The sensory cortex is very important for Music, since the musical language is made up of sensory stimuli, but the tactile stimulus is fundamental for instrumental performance. The auditory cortex concentrates the process of listening, as well as audiomotor coordination, which are fundamental for thinking about Music in sound images, “playing by ear”, composing, etc. The prefrontal cortex, on the other hand, guides creation and expectations, that is, self-control, while the cerebellum also controls movements, specifically speed and fine coordination, but also contributes to the control of emotions in Music. The visual cortex guides the reading of scores and internalization of the musical language, the observation and control of movements as well (visiomotor coordination) and, finally, the corpus callosum would be responsible for communication between the right and left hemispheres, extremely fundamental for a pianist or percussionist, for example.

Levitin (2021) states that in musicians the corpus callosum is larger and the hippocampus would be important for musical memory and experiences; while the *nucleus accumbens* concentrates emotional reactions. He also adds that the amygdala is responsible for emotional reactions and also stresses that the cerebellum is involved in the emotional process.

Willems (2011), in his studies, already mentioned the human dimension of music, stating that there was a physiological basis for sensoriality, musicality, affectivity and cognition, moving to the “spiritual” pole in terms of creative listening.

For Gordon (1997), there is a condensation of hemispheric domains in the brain, from sound representations, mental maps would be created in a way correlated to audiation, in this way, musical understanding is developed. This author points out that the musical language and its processing in the brain causes musicians to present cortical and synaptic differences, however, he reports that it is necessary to know more about the structure of musical thought (audiation) and emotions in the brain, because the concept of audiation consists in the ability to listen to music quietly with all the elements. These aspects are similar to what happened between language and thought, studied by Vygotsky and Lúria (1996). Gordon (2015) also asserts that audiation is the basis of musical aptitude and is the ability to predict the music before performing it (planning the performance/interpretation before performing it).

Teplov (1966) translates music as being an affective knowledge, as musical perception passes through feeling, but does not remain in it. Musical images are constructed and there is an attempt to master feelings and emotions so that they are used as a resource in music based on musical conceptual elements. This author points out that it is mainly affective and emotional knowledge, with the cognitive field responsible for control, thus, it is possible to combine soul, thought and musical images. Music with its elements could be considered an extension of the sign, in short, words are not enough to represent the emotional and affective dimension of humans.

In view of the above, the question emerges: how many empirical productions focus on the study of over-excitability associated with aptitude and musical talent? What productions have been published in the last ten years? Based on the results of the surveys listed, which dimensions of over-excitability are related to aptitude and musical talent? Do individuals with aptitude and musical talent differ or not significantly in the dimensions of over-excitability when compared to other individuals with and without musical talent and talented individuals in other areas?

To answer these questions, the objective is to study the production of (inter)national literature in relation to over-excitability associated with aptitude and musical talent and to characterize, describe and analyze it.

Method

This is an integrative literature review because it allows the inclusion of (non) experimental studies by allowing to combine and discuss theoretical and empirical data in an interrelated way, as guided by Monteiro and Spiri (2016), Pereira and Gillanders (2019), Santos and Cunha (2013) and Souza *et al.* (2010).

The criteria for selecting the research sample were the following: Empirical and theoretical research published in (inter)national scope; the time frame chosen was from 2012 (January) to 2022 (August); the keyword³ were used in English and Portuguese: *overexcitability*, *overexcitability AND music*, *overexcitability AND musical aptitude*, *overexcitability AND music talent*, *over-excitability*, *over-excitability AND music*, *over-excitability AND musical aptitude* and *over-excitability and musical talent*. When defining the databases, the following were chosen: *Institute of Education Sciences* (ERIC); *Virtual Health Library* (VHL); *Directory of Open Access Journals* (DOAJ); *Elsevier's Scopus/Science Direct*; *Electronic Library Online* (Scielo); Academic Google.

Reading the titles and abstracts preceded the full reading. Afterwards, there was a separation of empirical and theoretical research from the randomized ones. Then, there was data collection in randomized surveys. The application of the meta-analysis procedure was adopted to increase the objectivity and validity of the data found. In this way, it was possible to calculate the general dimension and degree of interaction from the comparison of means and standard deviation of two groups. This is a random sample with independent variables, and because they are scalar data, descriptive analysis and the *Student T* parametric statistical test were undertaken (PEREIRA; GILLANDERS, 2019; SANTOS; CUNHA, 2013; VIEIRA, 2018).

³Based on studies by Brandau *et al.* (2005), it is noted that it will not be possible to work with descriptors since the term over-excitability is not present in the Brazilian Education Thesaurus, nor in other databases of terms. Only the terms were found: aptitude and talent.

Results

Based on the descriptive analysis, there is a low rate of research addressing overexcitability in the field of music. Chart 1 represents these overall raw results.

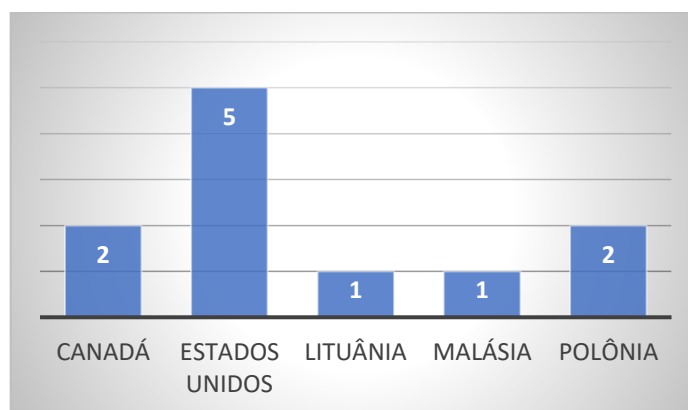
Chart 1 - Index of searches found (2012 to 2022)

Searched Database	n total	Selected researches	percentage
ERIC	33	4	12.12%
VHL	3	0	0%
DOAJ	15	0	0%
SCOPUS/SCIENCE DIRECT	80	0	0%
SCIELO	9	0	0%
ACADEMIC GOOGLE	3922	33	0.84%
Total	4062	37	12.96%

Source: Prepared by the authors

After reading the titles and abstracts, only N=11 studies remained (N=4 empirical and randomized and N=7 theoretical). No Brazilian studies were found on overexcitability correlated with aptitude and musical talent. As illustrated in Graph 1, the surveys originate from N=5 countries. It is worth mentioning that the United States is first in the *ranking* of these productions.

Graph 1 – Number of productions about excitability associated with Music and countries of origin (2012 to 2022).⁴



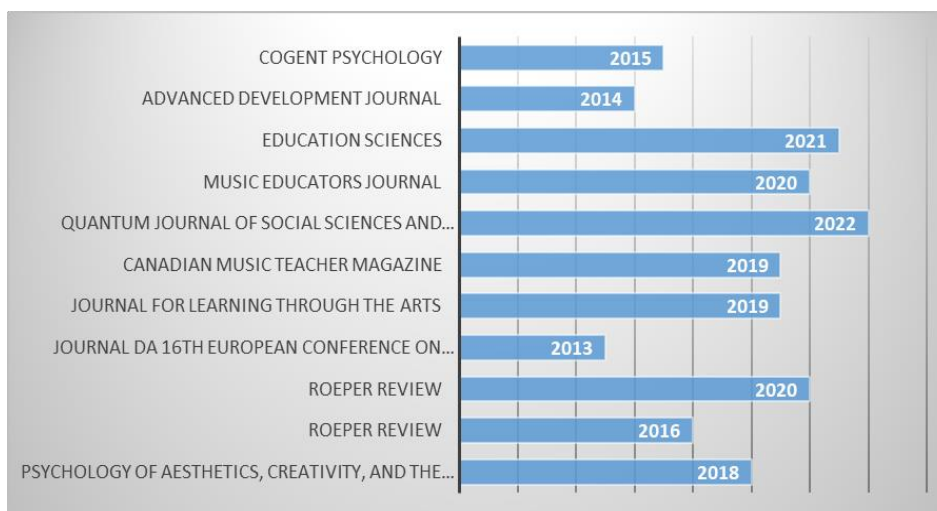
Source: Prepared by the authors

Figure 3 illustrates a retrospective of the journals and year of publication of the research found. It was observed that most of the productions are current, around the last five years. The magazines, in turn, are from the following areas: Music, Arts in general, Education, Psychology

⁴ In Portuguese, *Estados Unidos* means United States; *Polônia* means Poland; *Malásia* means Malaysia; *Lituânia* means Lithuania and *Canadá* means Canada.

and Humanities. It is important to point out that no research was found in the area of neuroscience associated with over-excitability, aptitude and musical talent, although there are qualified journals in the area.

Figure 3 – Journals and year of publication of the studies found (2012 to 2022).



Source: Prepared by the authors

With the reading and full analysis of the texts, N=02 randomized research, N=01 field and N=01 theoretical essay remained in this review. This last sieve prioritized studies that focused more specifically on over-excitability in relation to aptitude and musical talent, comparatively in experimental and control groups. When analyzing the structure, sampling, methodology and results, the following representation was reached, outlined in Chart 1:

Chart 1 - Representative outline of the studies found

Authors	Titles	Methodology	Results
Brundzaite and Gintiliene (2013)	Continues <i>Overexcitabilities of Intellectually and Artistically Gifted Children and Youth</i>	1 - Field research with a psychometric character with a sample of N=569 students. 2 - Instruments: <i>Raven's Progressive Matrices: Standard Progressive Matrices Plus</i> (SPM Plus), <i>Advanced Progressive Matrices</i> (APM) and <i>Overexcitability Questionnaire -II</i> (OEQ-II) – summer Lithuania.	Artistically gifted students scored higher on sensory and emotional overexcitability when compared to intellectually gifted and typical students.

Thomson and Jack (2016)	<i>Overexcitability: A Psychological Comparison Between Dancers, Opera Singers, and Athletes</i>	1 - Experimental research with a sample of N=195 participants. 2 - Instruments: <i>Beck Anxiety Inventory, Beck Depression Inventory-II, Internalized Shame Scale, Inventory of Childhood Memories and Imaginings and Overexcitability Questionnaire -II.</i>	Opera dancers and singers scored significantly higher on all dimensions of over-excitability. A propensity for fantasy, shame and anxiety in dancers and singers compared to the group of athletes. There were no group differences for depression. overexcitability dimensions significantly predicted shame, anxiety, and depression.
Abramo and Natalie-Abramo (2020)	<i>Reexamining "Gifted and talent" in Music Education</i>	Rehearsal theoretical	Individuals gifted in Music with over-excitability are intense to the point of irritating other people. Some characteristics are: excessive ethical sense, sensitivity to loud sounds and intense physical activities, they can be shy, their creative abilities can lead them to daydreams. They may have difficulty relating to colleagues and may have low self-esteem.
Martowska and Romanowicz (2020)	<i>Overexcitability Profile Among University Students at Music-Focused Institutions</i>	1 - Experimental research with a sample of N=106 participants. 2 - Instruments: <i>Overexcitability Questionnaire -II.</i>	It was found that the number of individuals who had high emotional levels and high sensory over-excitability was twice as high in the group of musicians than in the control group (non-musicians).

Source: Prepared by the authors

Among the randomized studies (N=2), those by Thomson and Jaque (2016) the means and standard deviation of the experimental group (singers) *versus* the control (dancers) were extracted, and from Martowska and Romanowicz (2020) the values of musicians *versus* non-musicians were extracted. In general, it is noted that the experimental group presents greater results in some types of over-excitability, mainly in those that correlate with the musical area (sensory, emotional, imaginative, etc.). Chart 2 presents the raw results collected in both surveys.

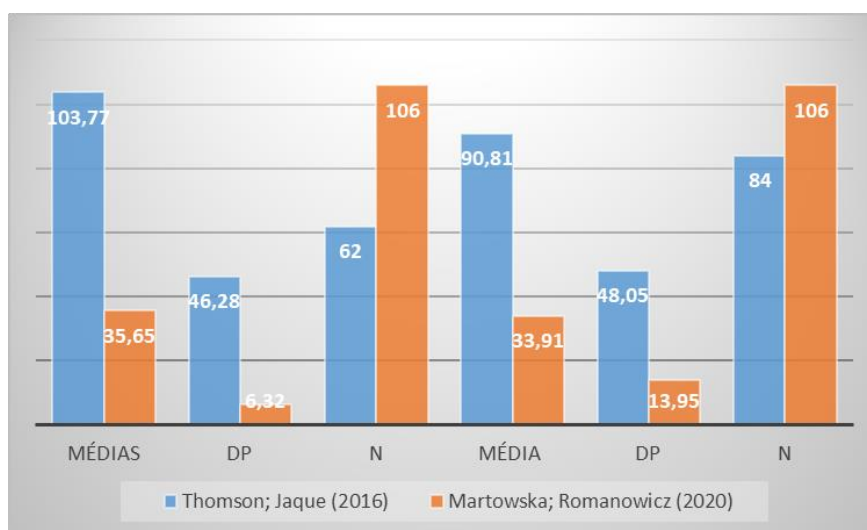
Chart 2 – Raw results of experimental and control groups.

STUDIES	TYPES OF OVEREXCITABILITY	Experimental Group			Control Group		
		Average	DP	No	Average	DP	No
Thomson; Jack (2016)	Psychomotor	3.4	0.77		3.75	0.67	
	Sensory	3.97	0.64		3.84	0.73	
	Imagination	3.08	0.77		2.64	0.85	
	Intellectual	3.75	0.68		3.58	0.78	
	Emotional	3.75	0.68	62	3.67	0.66	84
	Fantasy	27.98	8.19		24.42	8.23	
	Shame	35.97	16.49		28.34	18.97	
	Anxiety	12.53	9.8		10.82	8.93	
	Depression	9.34	8.26		9.75	8.23	
TOTAL STUDY 1		103.77	46.28	62	90.81	48.05	84
Martowska; Romanowicz (2020)	Psychomotor	6.25	1.43		6.76	1.44	
	Sensory	7.32	1.22		6.14	8.78	
	Imagination	6.95	1.29	106	6.52	1.4	106
	Intellectual	7.49	1.21		7.3	1.19	
	Emotional	7.64	1.17		7.19	1.14	
TOTAL STUDY 2		35.65	6.32	106	33.91	13.95	106

Source: Prepared by the authors

Note that Thomson and Jaques (2016) analyzed more dimensions of overexcitability than Martowska and Romanowicz (2020). Figure 4 represents this context of analysis and groups the results of the experimental and control groups of the two surveys.

Figure 4 - Sketch of the averages and standard deviation of the samples⁵



Source: Prepared by the authors

⁵ In Portuguese, *Média* means Average.

The independent t-Test, based on the results found in the study by Thomson and Jaque (2016), showed that the averages of the experimental group (singers) in relation to the control (dancers) present very similar averages, although there are some discrepancies, or that is, the difference is not statistically significant ($t(144) = 1.636$; $p > 0.05$). On the other hand, the results extracted from the research by Martowska and Romanowicz (2020) allowed us to conclude that the means of the experimental group (musicians) is different from the control (non-musicians). The difference, in this case, is statistically significant ($t(210) = 1.170$; $p < 0.05$).

In the research by Thomson and Jaque (2016) there were two control groups with different samples (singers *versus* dancers and singers *versus* athletes). At this point, the significance values will be presented in the independent t-Test of the sample of singers *versus* that of athletes in the indicators of over-excitability. Chart 3 represents the raw results of the experimental group (singers) and the control (athletes).

Chart 3 – Raw results of the sample of singers *versus* athletes.

STUDIES	TYPES OF OVEREXCITABILITY	Experimental Group			Control Group		
		averages	DP	No	Average	DP	No
Thomson; Jack (2016)	Psychomotor	3.4	0.77		3.54	0.77	
	Sensory	3.97	0.64		3.28	0.78	
	Imagination	3.08	0.77		2.27	0.76	
	Intellectual	3.75	0.68		3.36	0.93	
	Emotional	3.75	0.68	62	3.36	0.93	49
	Fantasy	27.98	8.19		18.4	8.76	
	Shame	35.97	16.49		17.66	15.99	
	Anxiety	12.53	9.8		5.7	5.89	
	Depression	9.34	8.26		6.96	8.7	
TOTAL STUDY 1		103.77	46.28	62	64.53	43.51	49

Source: Prepared by the authors

When applying the independent t-Test, it was possible to observe that, when comparing the groups, there was a significant difference between the means. The group of singers is superior in overexcitability when compared to athletes ($t(109) = 4.554$; $p < 0.05$).

Discussions

Based on the integrative literature review with the application of meta-analysis, it was verified that in the last 10 years there were no high rates of researchers interested in the correlation of over-excitability with aptitude and musical talent, nor research correlated with neuroscience. The results found are in line with the study by Oliveira *et al.* (2015), which showed the low rate of research on over-excitability with talent in general.

When analyzing Graph 1, there is evidence of a greater concentration of research carried out by the United States, including universities with a tradition in musical training and the study of talent, such as the California State University (Northridge) and the University of Connecticut (Storrs), and in both institutions there are departments of Education and Psychology with great representation. These institutions have lines of research that study the Theory of Musical Learning (development of aptitude and musical talent) by Edwin E. Gordon, for example, or there are, in their teaching staff, theorists such as Joseph S. Renzulli, a scholar in the area of talent and enrichment (ABRAMO; NATALIE-ABRAMO, 2020; HAROUTOUNIAN, 2002, 2019).

Graph 2 shows the relevance of the topic researched, with the oldest study from 2013 and the most current from 2022. According to the scope of the journals, there were the following areas: Music, Education, Psychology and, in the case of Rooper Review, the area aptitude and talent, as well as related areas. Thus, it is explicit that this phenomenon (over-excitability) transits in an interdisciplinary way and some concepts and correlations are still being constructed, although Dabrowski (2016) has discussed over-excitability previously, as well as Teplov (1966), when addressing the phenomenon aptitude and musical talent on emotions and affectivity.

The difficulty of applying the meta-analysis is highlighted as a result of theoretical research and others with the description of data carried out without a systematization of an experimental nature, mainly because, in certain cases, the randomization of studies can contribute to a better understanding of the impact of certain phenomena in relation to the affected population. In addition, the differences or similarities between groups and individuals will not always be statistically significant, however, knowing them can be beneficial for thinking about resources and strategies that contribute to the quality of life of a given population. In addition, the very breadth of the search and criteria for carrying out this review focuses on the selection of some methodologically established parameters, since, although there

is rigor, there are limitations (MONTEIRO; SPIRI, 2016; PEREIRA; GILLANDERS, 2019; SANTOS; CUNHA, 2013; SOUZA *et al.*, 2010; VIEIRA, 2018).

The research by Brundzaite and Gintiliene (2013) carried out a field study with a psychometric character, using standardized tests, including a questionnaire focused on overexcitability. The research compared three groups of students, the intellectually gifted (1), artistically gifted (2) and the typical (3), regarding over-excitability. Results indicated that intellectually gifted students scored higher on overexcitability than typical students. Sensory, imaginative and intellectual levels were the most significant in the difference between the two groups ($p < 0.001$ and $p < 0.05$ – ANOVA); as well as among artistically gifted students. They excelled at the sensory, imaginative, intellectual and emotional levels ($p < 0.001$ – ANOVA). When they were compared to intellectually and artistically gifted students on levels of overexcitability, the results showed that artistic students scored higher on sensory and emotional levels of over-excitability ($p < 0.001$ and $p < 0.05$ – ANOVA). These data corroborate the findings of Nixon (2016), when discussing that artistic and creative individuals have greater overexcitability, and it would be more evident in the disintegration process *Unilevel* (sensitivity to social opinion) and *Multilevel* (conscious process of growth, self-knowledge and self-control).

Unfortunately, the study by Brundzaite and Gintiliene (2013) was not included in the meta-analysis because it is a cultural validation study of *Overexcitability Questionnaire -II* (OEQ-II) and for not detailing the statistical route used.

The study by Thomson and Jaque (2016) collaborates in understanding the influence of music in the realm of emotions, such as Teplov (1966), Haroutounian (2002, 2019) and Kirnarskaya (2018), so much so that dancers and singers stand out more in over-excitability when compared to athletes. The demands on skills required by the areas influence, for example, in the case of psychomotricity, mainly because its magnitude is observed in the group of athletes, but the sensoriality is more evident in singers. On the other hand, the emotional field, fantasy and emotion are greater in artistic individuals and psychomotricity is not as significant in athletes when compared to dancers. Apparently, the aesthetic sense, discussed by Kirnarskaya (2004), and the kinesthetic body awareness, theorized by Gardner (1993), can be variables to impact these averages.

An important discovery occurs in the context of shame, anxiety and depression, inferring concern for the psychological well-being, especially of artists. In this regard, Haroutounian (2002, 2019), Hollingworth (1928) and Kirnarskaya (2004, 2018) highlighted the importance of emotional support in an educational way, in order to teach the individual psychic

protection mechanisms and develop resilience. In this context, Thomson and Jaque (2016) conclude in their study that training psychological skills helps individuals learn to deal with suffering. Therefore, for the authors of this study, artists and athletes should undergo this type of training throughout their careers, since these are areas that require emotional and psychological self-control and there is a high exposure between success/happiness and failure/sadness.

Abramo and Natalie-Abramo (2020) draw attention, based on studies by Hollingworth (1928), to the socio-emotional needs of talented individuals in music, because they are vulnerable to misunderstandings due to over-excitability. Thus, these individuals would be intense in their personality to the point that others would be bothered by their attitudes and behaviors, in addition to being highly reactive to sounds, with low self-esteem and impulsive and antisocial characteristics, in some cases. The authors also emphasized the importance of identifying musical talent to analyze the manifestation of these indicators, such as over-excitability. For them, this knowledge contributes to teacher training, resource selection and planning, as well as guidance to the family and collaboration in the individual's self-knowledge. In this way, educational intervention procedures become more assertive and effective, bringing a better quality of life to the talented individual.

In this regard, the research by Martowska and Romanowicz (2020) demonstrates the fragility of the psycho-emotional support and intervention process, mainly in a preventive way. They point out that it is extremely important to support and develop emotional skills in artists, as over-excitability works as a mediator between the emotional and the practical life of individuals. The authors assert that the inner life of musicians seems rich, however, they experience adaptation difficulties, which may lead them to present depressive symptoms and suicidal tendencies. In this way, one wonders, how many artists, throughout history, have chosen to end their lives, even at the apex of their careers? How many have lost themselves in addictions like drugs and alcoholism?

In short, on the subject of over-excitability, the role of brain activity in musicality and *performance* processes cannot be ruled out, given the difference between singers, dancers, athletes, musicians and non-musicians, as shown by Brundzaite and Gintiliene (2013), Thomson and Jaque (2016) and Martowska and Romanowicz (2020).

Studies by Klineburger and Harrison (2015), Gordon (1997) and Levitin (2021) demonstrate the brain's autonomy in reacting to musical stimuli even if the individual is oblivious or unconscious. Still, they describe the possibilities of realization of synapses and

transformations along the cortex. Willems (2011), in this context, discussed the physiology of musicality connected with affectivity. These brain modifications may be a possibility and one of the explanations for why musicians are more over-excitable than other groups. It is worth mentioning that the statistical significance rates found in the meta-analysis prove how significant the difference between musicians *versus* non-musicians was.

When analyzing the work of these authors along with those of Gagné and McPherson (2016), Gordon (1997; 2015) and Teplov (1966), the phylogenetic and ontogenetic impact on the manifestation of aptitude and talent is observed. Sensory and perception, for example, directly affect the sensory cortex, increasing the excited area of the brain to the point of presenting a more significant dimension in musicians than non-musicians. However, this is another subject that has mobilized current science both to unveil other elements and nuances of musical talent, psychic work, and for the rehabilitation of patients with some kind of brain injury or damage (LEVITIN, 2021). That said, sociogenic elements affect the individual's way of acting musically in the world. There are overdetermined behaviors⁶, which are perpetuated throughout history and are encouraged and established in social relations through interpellations. Regarding this topic, Vygotsky and Lúria (1996) addressed the development of higher psychological functions and social interaction impacted by the social environment.

Therefore, aptitude and musical talent require attentive attention and listening, emotional and educational support, access to resources and rights, professional and family support, understanding and respect, seeking to remove myths, which contribute to situations of prejudice (ABRAMO; NETALIE-ABRAMO, 2020; BRUNDZAITE; GINTILIENE, 2013; RECH; NEGRINI, 2019; MARTOWSKA; ROMANOWICZ, 2020; SISK, 2021; THOMSON; JAQUE, 2016; WINNER, 1996).

For Sisk (2021), the current moment presents constant stress, impacting the way of life of talented individuals. Furthermore, their psychic life is advanced and complex, which requires experience on the part of those who work with this public: especially if they are well guided and given the possibility of self-knowledge, they will certainly make great contributions to society.

Furthermore, based on studies by Sanz (2004), the greater the manifestation of over-excitability and the number of dimensions, the more evident the individual's potential and

⁶Term conceptualized by Louis Althusser. It is about how the individual sees himself and acts in the world in the face of representation in economic, political-legal, ideological issues and the satisfaction of material and social issues and levels of access represent the meaning around the present concept (PINHEIRO, 2016).

capacity in a given area will be. In this way, this phenomenon can be considered one of the nuances of aptitude and musical talent (ABRAMO; NATALIE-ABRAMO, 2020).

Over-excitability is not restricted to studies that focus on Special Education, specifically, talent and the area of Music, according to Oliveira *et al.* (2015). From the studies by Dabrowski (2016), one can better understand the characteristics surrounding the phenomenon, which are often seen as inadequate and problematic (OLIVEIRA *et al.*, 2015). Given the above, one notes the importance of this theory in the school environment in order to break with certain stigmas and myths regarding behavioral issues of students, for example. What may seem like indiscipline in the eyes of educators can often be a manifestation of talent (HOLLINGWORTH, 1928; WINNER, 1996; DABROWSKI, 2016; ABRAMO; NATALIE-ABRAMO, 2020).

Therefore, it is important to know the present phenomenon, but also to analyze the importance of Music Education in the school curriculum. There are many ways to learn and many paths to development, but unfortunately there is precariousness and devaluation of music in school spaces, as argued by Fonterrada (2020).

It is worth emphasizing that over-excitability under harmonious conditions can contribute to the development of individuals' potential, whether in Music or other areas, such as academics, creativity, other artistic languages, psychomotricity and leadership; all of them contextualized in society (OLIVEIRA *et al.*, 2015; ABRAMO; NATALIE-ABRAMO, 2020). If Music were a reality in school curricula, it would benefit all students, especially the talented ones (GORDON, 2015; FONTEERRADA, 2020).

Final remarks

The low rate of research interested in the theme of over-excitability correlated with aptitude and musical talent is worrying, mainly in the Brazilian context, where it was not possible to find any studies. On the other hand, studies show that artistically talented individuals manifest more dimensions of over-excitability than individuals from other areas and, consequently, need support and preventive intervention so that they do not culminate in suffering, psychological damage, such as depression, and even show suicidal tendencies.

Directing this evidence to the educational dimension encourages reflection that over-excitability, incident in ordinary and talented people, who, above all, need attention so that disharmonies do not interfere negatively in the development of potentials. Therefore, studies

related to over-excitability and Education, for example, need to advance in the Brazilian context so that evidence can be analyzed. It is suggested that investigations can list and correlate the characteristics of over-excitability among typical and talented individuals in the musical area, with the objective of analyzing how much this condition can impact the individual's quality of life. After all, can it affect the general development, academic and/or professional performance and the quality of life of an individual? What interventional procedures would be useful, adequate and effective when dealing with the educational scope? What preventive interventions could be carried out in anticipation of school failure and emotional illness caused by the presence of over-excitability?

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