

The Educational Impact of Music Video Games on Amateur Adult Musicians: A Systematic Review and Meta-Analysis

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Abstract

Many studies have investigated the educational effects of music video games on various musical skills. To identify what specific musical skills adult amateur musicians acquire through playing music video games, this study describes a systematic review and meta-analysis of music video game research. The systematic review includes a thematic analysis of selected articles, with the meta-analysis showing a possible correlation between the articles. In addition to reviewing the educational benefits of music video games, this study also examined how the validity of the different study designs affect sample size and attrition. The review was completed using online databases, academic search engines, the Made in Millersville Journal, and references found in articles that were sought for retrieval. Articles were only included if they used empirical methods, including adult amateur musician participants, and focused on music video games, with the last search occurring in January 2024. After analyzing the seven studies included in the review, it was found that long-term studies increased participant musical ability, and that there is poor standardization in experimental design between studies. Future studies on the educational impact of music video games should take place over multiple sessions to verify these findings.

Introduction

A multitude of studies have been done on the impact of playing music video games on musical abilities, using games like Rock Band, Guitar Hero, SingParty, and Beat Saber for experiments and case studies (Jenson, De Castell, Muehrer & Droumeva 2016; Sakkal & Martin 2019; Keeler 2020). Instead of focusing on educational or serious games, these studies investigate if any informal learning of various musical abilities takes place when participants play video games that are marketed for enjoyment rather

than education (Graham & Schofield 2018). Informal learning is any learning that does not take place in a classroom or with specific instruction (Hernández-Hernández & Sancho-Gil 2017), making it the process in which players may be able to increase or decrease their musical skills. These studies differ in their experimental design when experiments are the chosen methodology; these studies vary in quality, with some having no control group, multiple dependent variables, small sample size, and attrition (participants dropping out of a study) which

may be the cause of their inconsistent results (Paney 2015; Walters 2023; Keeler 2020). This systematic review aims to quantify the effects found on musical skills after playing music video games, observe attrition, and investigate a seeming lack of control group participation. It will also focus on adult non-musicians and adult amateur musicians due to the larger amount of research available to draw from on these populations.

Methods

A systematic review was completed using online databases (Academic Search Ultimate, Education Source, Music Index, Project Muse, JSTOR Journal Archive), academic search engines (EBSCO Discovery Service [Library Search], Google Scholar), an open access student journal (the Made in Millersville Journal), and references found in articles that were chosen. The review took place between December 2023 and March 2024. Experiments on music video games and adult participants were included. A meta-analysis was performed using IBM SPSS Statistics (a computer program that analyzes data), with a statistician helping the researcher in the data analysis. Also, a thematic analysis was performed by comparing coded data extracted from the studies and identifying similar ideas across the studies selected.

Findings

The search resulted in 1,219 articles. After being assessed for eligibility, seven studies were included in the review. All seven studies were included for the thematic analysis, but four of the studies were excluded in the meta-analysis because they either had no control group or did not report the sufficient data to be included in the analysis. One of the three studies included for the quantitative analysis has two control groups, so it was considered as two separate studies in the meta-analysis (see Figure 1).

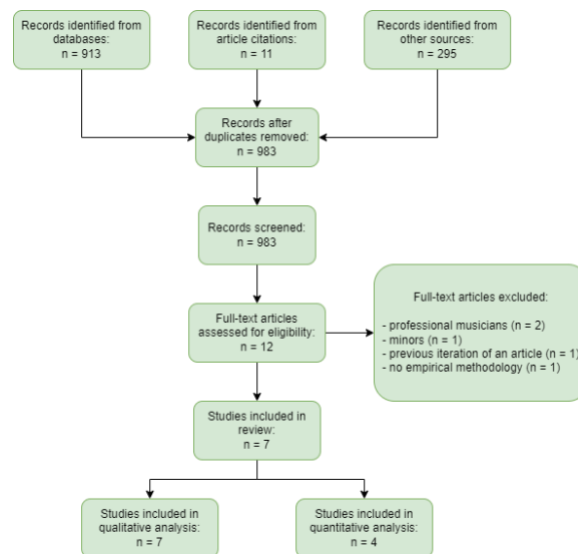


Figure 1

Studies had participants play music video games and complete some assessment to measure a selected musical ability.

One researcher completed a fixed-effect meta-analysis to find correlation between music video games and musical ability. Playing a music video game with audio resulted in worse musical abilities in participants ($g = -.697$, $p < .001$, 95% CI $-.988$ $-.407$) because Hedge's g is negative, and the p value is less than 0.05. Playing a music game over multiple sessions improved phrasing ability in participants ($g = .847$, $p = .128$, 95% CI $-.243$ 1.937) because Hedge's g is positive, but this finding is insignificant as the p value is greater than 0.05 (see graph 1). Publication bias risk was not detected. The four studies were different from each other, and study length was the reason the three studies were significantly different ($X^2(1) = 7.202$, $p = .007$). The two short-term studies were similar to each other.

For the qualitative analysis, Pasinski, Hannon & Snyder (2016) theorize that the active motor engagement music video games provide may be what stimulates the brain to

increase musical ability. This combination of motor engagement is similar to the motor engagement needed to make music. The consistent practice of musical skills that music video games provide allow amateur adult musicians the environment to learn musical skills through gaming. Furthermore, studies with multiple sessions had increased rates of participant attrition as participants that missed any of the sessions were dropped from the study. Attrition in short-term studies was due to microphone errors (Paney, 2015). Out of the four studies that had a control group, only two experienced control group attrition. Studies also showed a lack of consistency in reporting results as two studies did not have a control group, making it impossible to tell whether playing music video games affected musical ability. Studies also varied in how they tested participant musical abilities. Four main types of tests emerged: tests created for the specific musical skill tested, commentary on other's instrumental performance, in-game scores and data, and participant comments. The first two types of tests are the most reliable, with the last two giving very inaccurate and unreliable results. Also, the studies differed in interpreting the amateur musician term when selecting study participants.

Conclusion

Quantitative analysis of the literature revealed that short-term music video game studies cause a decrease in musical ability, while long-term studies may cause an increase in ability. This is further supported by the qualitative theme found across the literature that engaging with musical skills repetitively over time through music video games can increase musical ability. However, the results of these studies may be unreliable due to the poor experimental design and inconsistent reporting found in most of the studies. Because this review was completed

by only one researcher, some articles may have been missed in the searches or scanned improperly, which would have been caught by another person. Further studies should be designed using an assessment tool specifically made for the skill tested in the experiment. They should also take place over multiple sessions to verify whether the finding that long-term studies increase participant ability is valid. If this finding is validated, this could mean that playing music video games over time can truly increase an amateur adult musician's musical ability.

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