

# Three Distinct Hearing Aid Programs for Music?

By MARSHALL CHASIN, AuD

In preparation for a book that will be (hopefully) published in the spring of 2022 called *Music and Hearing Aids* (Plural Publishing, working title), I conducted a literature review of previous research regarding the programming of hearing aids for music.

The research was from many sources, over many years, and with differing research approaches. However, in reviewing everything, it seems that going forward all hearing aids, in addition to their various speech programs, should have three distinct programs for music: 1) Listening to recorded/streamed music; 2) Listening or playing live music; and 3) Listening or playing to “instrumental only” music.

## Music Program #1: Listening to Recorded or Streamed Music

Much of the research on this came out of the work by Croghan, Arehart, and Kates<sup>1</sup> over several studies. Among other things, they looked at pre-recorded music that would serve as an input to the hearing aids. Pre-recorded has already been compression limited (CL) once during the recording process to ensure that the dynamic range of the sounds of music are faithfully reproduced, given the more limited dynamic ranges of the mp3 and similar media; then they are subjected again to compression by the hard-of-hearing listeners’ own hearing aids. This double-compression can be problematic. And indeed, these researchers found that linear or slow-acting WDRC would be the best. Their research results had a dependence on the type of music, but a “less is more” approach to hearing aid programming for streamed/recorded music seems reasonable: linear compression or slight WDRC with slow-acting time constants.

## Music Program #2: Listening or Playing Live Music

This music program has been examined by many researchers over the years, including Croghan, Arehart, and Kates,<sup>1</sup> but also researchers out of Vanderbilt (Ricketts et al<sup>2</sup>) and Cambridge University (Brian Moore, Michael Stone, and colleagues<sup>3,4</sup>). When all was said and done, this particular music program might be similar to a speech-in-quiet program, along with the disabling of frequency lowering, noise reduction, and feedback management (see the book for the full explanation).

Issues related to frequency response and frequency bandwidth are more dependent on an individual’s cochlear damage rather than the nature of the input stimulus *per se*. Similar frequency response and compression settings as a speech-in-quiet program would also be the goal of this live music program.



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## Music Program #3: Instrumental Music Program

This third music program is based on some work from about a decade ago by Francis Kuk and his colleagues,<sup>5</sup> as well as some recent work on frequency lowering—that one octave island of refuge that appeared in the December 2020 edition of *HR*.<sup>6</sup> The idea is, if the only input to the hearing aid is music and no vocals, then one can impose a linear frequency-lowering algorithm by exactly one octave. This technology was available in the hearing aid industry about a decade ago, but was recommended for bird songs, speech, and for music. However, if it is just restricted to instrumental music, the results can be excellent.

When instrumental music is frequency-lowered linearly by *exactly* one octave, then the first (and odd-numbered harmonics) line up perfectly with already existing harmonics of the music, and the second and even-numbered harmonics created perfect fifths or thirds in the music. These additional notes (fifths and thirds) were perhaps not what the composer had in mind, but they would not sound dissonant; just different, but acceptable. And like “Music Program #2: Listening or Playing Live Music,” noise reduction and feedback management should be disabled (or at least minimized).

Do we really need three distinct hearing aid programs for music? The literature suggests we do!

## References

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