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A Comparison of Changing Music Mediums and the Impact on Social Listening

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INTRODUCTION

Recorded music is a significant part of daily life for most people and has been for about one hundred years. In this time there have been many advancements in how the average person has access to music. Changes in physical mediums have only added to the overall experience of listening. From extremely tangible mediums, such as vinyl that cumulates into large physical collections, to streaming which arguably allows for larger collections without the limitations of physical space, music will always fundamentally be the same. That is not to say that the experience of listening to music does not change. Each physical medium is accompanied by a unique ritual of listening that enhances the experience for listeners. With each new advancement, there have been new possibilities for listening to and sharing music.

BACKGROUND

Music has existed for at least thirty five thousand years (Conard). However, recording music and being able to play recorded sound is an incredibly recent development. In 1877, Thomas Edison was able to successfully recover recorded sound from a piece of tin foil wrapped around a wax cylinder (“An Audio Timeline”). This discovery, that music and sound in general can be recorded, would start a long progression towards what is the recording technology of today. Just over ten years later, Edison introduced the first electric motor phonograph, which is the predecessor of what is now known as a record player (“An Audio Timeline”). These inventions created the backbone of the technological revolution that allowed music to become available to the average person on a daily basis.

VINYL RECORDS

Following Edison's invention of the phonograph, the record was the first widely used method of recording and playing music. Records are double-sided, rotating discs, with modulated spiral grooves that record and store sound information (What is Vinyl). Record players have what is called a tonearm that has a small needle on the end that sits into the grooves on the record's surface. The needle follows those modulated grooves and vibrates. These vibrations are then amplified to a level that can be heard. Originally, records were made of shellac, which is a hard, resin-like material (What is Vinyl). By 1948, most record manufacturing companies had switched from shellac to Polyvinyl Chloride (PVC); however, it wasn't until the early 2000s that the name "vinyl records" gained mainstream popularity (What is Vinyl). PVC is a much more durable material than shellac, which allows for a previously unobtainable longevity for records. Records can be seven, ten, or twelve inches in diameter, which directly correlates to the amount of music that can be recorded to their surfaces (What is Vinyl). Long-playing (LP) records are twelve-inch records that rotate at $33 \frac{1}{3}$ revolutions per minute (rpm), and they hold approximately 20 minutes of music per side or about 40 minutes of total music playback (What is Vinyl). In comparison, there are extended-playing (EP) records, which are ten-inch records that hold approximately seven and a half minutes of music per side and operate at 45 rpm (What is Vinyl).

Less than fifty years after the invention of the motor driven phonograph, recorded music had reached the consumer market. By 1912, the record was the popular method of music playback (What is Vinyl). During the rise and popularity of records, music went from being a

live-performance-only experience to being a staple in households around the world. Radio broadcast was another way that people had access to music during this time. The first commercial radio broadcast was in May 1921 (“An Audio Timeline”). So, people had access to music in their homes, but it was not until records that they had the ability to own the music they listened to. This ownership also provided the ability to choose specific songs and albums and when to play them rather than having listening determined by radio broadcasters. Records held their market popularity until 1991, when CDs were widely introduced as the prominent method of music storage and playback (What is Vinyl). However, in 2020, for the first time since 1987, vinyl sales have eclipsed the sale of CDs (“US Sales Database”).

CASSETTES

Cassettes were the next evolutionary step for music consumption after the development of records. Cassettes originated in 1926 as a paper tape coated in iron oxide (“An Audio Timeline”). In 1935, the first plastic-based magnetic tapes were developed (“An Audio Timeline”). Magnetic tape records sound by being exposed to magnetic fields, which are generated by electrical signals (Wenn). These electrical signals are produced by transducing soundwaves. After World War II, a large amount of reel-to-reel tape recorders were sent back to the US after being seized from military installations throughout Europe (“An Audio Timeline”). A few years later, magnetic tape had become the standard for sound recording. Magnetic tape has a much higher sound quality than disc recording, and it could be erased and recorded on again, which made it a much more attractive medium over vinyl disks (Kimizuka).

There were a few different physical formats of tape that were used for recording and distribution. There were reel-to-reel tapes, cassette tapes, and eight-track tapes. Reel-to-reel systems used various tape sizes from $\frac{1}{4}$ inch to 2 inches and have rotation speeds that include $3\frac{3}{4}$, 15, or 30 inches per second (Wallace). Cassette tapes, however, were a one-size-only tape. They were 0.15 inches wide and operated at a speed of $1\frac{7}{8}$ inches per second and both reels were contained in a singular cartridge (Wallace). Both reel-to-reel and cassettes had two tape reels that would feed back and forth through the play head of a tape player. Eight-track tapes were similar to cassette tapes in that they had an enclosed cartridge style, but they were different because they were a singular, continuous loop of tape that always moves in the same direction (“Definition of 8-track tape”).

Tape had a market presence in the early 1960s, however, each format had a slightly different timeline within the overall popularity of tape. In 1964, cassettes were introduced into the American markets, mainly as a toy for children and teens to record themselves on since blank cassette tapes were cheap (Payne). In 1965, eight-track tapes hit the market, with no real attraction other than the 1966 model year Ford cars all having an eight-track tape player (Penfield and Lavine). Eight-track tape became the standard for vehicles, and cars for several years between 1966 and 1969 were made to feature these tape players. Eight-track tape never became the dominant music format but it did hold a large market share until 1979 (“US Sales Database”). The same year that saw the introduction of eight-track players in cars, 1966, Philips introduced the Boombox. Boomboxes were portable all-in-one speaker systems that, in the early editions, had a cassette deck for listening and recording (“Definition of boombox”). These boomboxes made recorded music more portable than it had ever been before. Then, in 1979, Sony introduced the Walkman, a portable cassette player that, yet again, revolutionized the

average listening experience (“Definition of Walkman”). The Walkman made music small, turning what had to be played in a large tape player, car, or boombox into something that a single person could carry in their pocket. In 1984, cassettes surpassed vinyl sales for the first time (“US Sales Database”). They held a majority of the market until 1991, when, like vinyl, sales of cassette tapes were eclipsed by sales of CDs (“US Sales Database”). The last notable year for cassette sales was 2001, when cassettes made up just 4% of the total market sales as compared to 1988 when they made up approximately 62% of the total sales.

CDS

After the rise and popularity of cassettes, companies were eager to continue the relatively rapid trend of advancement for music storage and playback devices. So, in 1976, Philips and Sony developed the compact disk (CD) (Norman). CDs operate by focusing a laser into a single track of the disc, and as it rotates, the laser measures the differences in the light reflected back into the laser source (Sullivan). This is very similar to how a record player needle follows the grooves in a record to create vibrations that are then amplified into audible sounds. The CD was designed for audio storage and playback and could hold approximately 80 minutes of uncompressed audio (Norman). In 1978, they demonstrated a digital optical disk, similar to the CD, that had a 150-minute playback capacity, 44,056 Hz sample rate, and a 16-bit linear solution (Norman). However, this demonstrated version would not become the industry standard for compact disks. Instead, it was the first version, with 80 minutes of playback and a 44.1 kHz sample rate, that became the standard for compact disks on the market (Norman).

Once CDs were invented, it was only a matter of time before they became popular on the consumer market. On October 1st, 1982, Sony released the first CD player along with Billy Joel's *52nd Street* as the first album to be released on CD (Norman). This release happened in Japan, and it was not until March 2, 1983 that CDs and CD players were released in the US (Norman). CDs rapidly became popular in the US consumer market and by 1993, CD sales had surpassed all other music formats ("US Sales Database"). They reached their peak in 1999, but they still held the majority of the consumer markets until 2005 when digital downloads became the most popular form of music media ("US Sales Database"). However, CDs held the highest revenue value until 2010 when they dropped to 48% of the market revenue in the US ("US Sales Database"). The reason why CDs began to decline after nearly twenty years of popularity is largely due to advancing technology. CDs began to decline as digital downloads became more popular, which happened soon after the release of the Apple iPod and the launch of iTunes (Norman). With this shift to buying music online, CDs became a less convenient way to get music.

DIGITAL MUSIC

Digital music downloads began the largest transitions for music playback since the shift from vinyl to tape. While CDs are a physical digital media format, digital downloads are recorded music that is stored in a fully digital format ("Definition of digital music"). These downloads are frequently in MP3 format, which are digitally compressed audio files. These files are created through a process that was developed by the Moving Picture Experts Group ("MP3 - Audio File Format"). In February 1999, SubPop distributed music in the MP3 file format and was the first

recording company to do so (“MP3 - Audio File Format”). Digital downloads are purchased songs and albums that are owned in the same way that vinyl albums, cassettes, and CDs are owned. This also included a small part of the market of digital downloads that is specifically phone ringtones. With the rise of cell phones, short clips of songs would be sold to be used as ringtones for phone calls and are sold in a different section of digital music stores.

Digital downloads rose to popularity mainly due to their convenience. Websites that sold MP3 format music were popular beginning around 1998. Apple launched the iTunes store in April of 2003, making it the first big name digital music store (McCormick). However, much more popular were peer-to-peer sharing sites that allowed users to upload MP3s and download them from other users for free. The most prominent example of this was Napster, which was released in 1999 (Albright). Napster was extremely popular, especially among college students and younger music listeners, and had over 25 million users by February of 2001 and was shut down later that year following several lawsuits for copyright infringement (Albright). Because of this peer-to-peer sharing sites went out of popularity.

Digital downloads surpassed CDs in volume of sale in 2006 and still hold market supremacy for saleable music as of 2021 (“US Sales Database”). However, when it comes to market revenue, downloads only held market supremacy for four years, from 2011 to 2015 (“US Sales Database”). These four years also coincided with the lowest revenue era for the entire music industry since the early 1980s (“US Sales Database”). There are several factors that led to this rapid rise and fall in popularity for digital downloads. The largest reason is that the economy was coming out of the 2008 recession, so the population was struggling financially and buying new music was not as much of a priority. Secondly, it is extremely easy to copy digital downloads and share them to multiple devices and multiple people. So while the revenue

numbers are low for these years, it is not entirely reflective of the actual amount of music being consumed and downloaded at this time. There were websites like Napster that allowed people to share and download music for free and thus did not contribute to the revenue of the music industry for those years. Another reason could be that digital downloads are an entirely different experience than what consumers might be used to. Since the beginning of at-home consumer music, all music has had a physical experience to it. From large vinyl records and record players, to the Walkman and other devices, the physical collection that had space in people's homes; digital music has none of those qualities. This could have caused a detachment from the listening experience and made it a less attractive option for consumers.

STREAMING SERVICES

Despite the lack of popularity for digital download music, digital music only progressed into what is now known as streaming services. A streaming service is a "Web-based service that lets users stream songs to their computers or mobile devices. Such services may let users download songs for offline playback as well as allow users to upload their own music collection to the cloud, the latter known as a 'music locker'" ("Definition of music streaming service"). Music streaming is achieved through two main approaches. First, there are internet radio services such as Pandora, where listeners can choose genres, artists, or albums to base a randomized listening experience on. This is similar to listening to the radio, only more personalized. The second type of streaming service is very similar to having a library of digital downloads. These services work on what is essentially a borrowing system. Users pay a monthly fee and can then listen to tracks and albums on demand and create playlists of specific songs. The only difference from digital

downloads is that consumers do not own the music they are listening to, so if they do not pay the fee, they cannot continue to listen to music.

Music streaming is now the most popular form of music consumption. Streaming services first had a notable part of the industry revenue in 2005, and in 2017 they accounted for more than half of the industry revenue (“US Sales Database”). Streaming has only been on the rise since then and is poised to be the most prominent source of music playback for a long time to come. There are several key reasons for this trend. First, there is increased accessibility to music through streaming services. Spotify launched in 2008, and now has over 82 million songs available on their platform (“About Spotify”). This means that everyone with a Spotify account has the opportunity to listen to all 82 million tracks, which would not be possible in the era of vinyl, cassettes, and CDs. Physical formats are limited by their physicality in that as a consumer’s collection of physical media grows, their potential to acquire more diminishes; they will eventually run out of space. Another important factor in the growing popularity of streaming services is the cost efficiency for consumers. They save money by being able to access more music for a lower price. The cost per song is significantly lower than with the purchase of an album, regardless of the format. Overall, this interest in streaming has only helped the music industry revenue. In 2021, revenue for recorded music reached \$15 billion, which, adjusted for inflation, is a \$9 billion decrease from the previous all time high in 1999, but an \$8 billion increase from 2014 which was the lowest revenue year for salable music (“US Sales Database”). It is likely that there will only be an increase in the use of streaming services until the next advancement in music technology.

PHYSICAL REVIVAL

While streaming services hold the market majority, there has been a surprising push to revive older physical listening formats. The renewed interest in physical music formats has created an excitement in younger generations of listeners. The largest area of physical medium revival is vinyl records. This growth of vinyl back into market popularity has not happened overnight. There are several theories for why this has been happening. The main one is that listening to vinyl is an experience. Listening to vinyl records allows for a slower, more meaningful listening experience (John). Scott Hagen, the CEO of Victrola, a popular record player manufacturer, says “In every store we go into we hear it [music], and we’re consuming more music than ever before, but not in the same way. The ability to stop and sit and listen to an album from beginning to end, that’s something that always has been and always will be relevant” (qtd. in John). Another reason why listeners may be returning to vinyl is that there is an increased familiarity with the technology being used in the production of new record players. Now, record players are being built with a hybrid modality, allowing bluetooth connections as well as the standard record playing capabilities (John). This allows for people to use the record player as a bluetooth speaker, and this multiple functionality may be one of the things that are attracting consumers back into listening to records and using record players. In a small survey conducted at California State University, Monterey Bay, 35% percent of respondents said they actively listen to vinyl records. The records are not their primary listening method but a quarter of those listeners were inspired to listen to vinyl because of the recent resurgence in vinyl popularity (appendix b). In 2021, during the COVID-19 pandemic, sales of records increased 67% from the previous year and made up 12% of the total sales volume of music sales in the US (“US Sales Database”).

There is also a slight increase in sales for cassette tapes. During the pandemic, there has been a doubling of cassette sales in some European markets. Small artists have been taking advantage of the cheap medium to share their music with their audiences (Taylor). Taking advantage of these older mediums can allow for artists to have a physical connection with their music that is not available with only releasing digital downloads and on streaming services.

THE SOCIAL IMPACT OF CHANGING MUSIC MEDIUMS

Music is often a social experience. It started and stayed this way until recordings brought music into the homelife of the average person. When listening to music there is a sort of ritual and practiced motion that goes into it, whether it is opening a record player and removing the record from its sleeve or pulling out headphones while walking and opening a Spotify playlist. As the advances in technology allow for music to change, these rituals adapt and the social aspect of listening to music is impacted as well.

Listening to music via vinyl records has basically the opposite possibilities as listening to streaming services. Vinyl is the ultimate non-shareable, non-portable form of physical music media. Records have to be pressed in factories, using molds and techniques that make it impossible for the average person to duplicate a record they have in their collection. Record players are also not portable. There are newer models that have a suitcase style and use battery power but largely, record players are not portable devices. Sharing vinyl means either giving someone a record to borrow or having that person in the same room as the music being played. There is also the aspect of listening to music on vinyl that involves the time it takes to switch

between new records or flip the discs to the B-side. The whole process of vinyl listening is slower because of it; not in a negative way, only a more conscious way of listening.

Along with the revolution of size and portability, tape revolutionized the ability to share music. Cassette tapes could easily be recorded at home and this allowed for a new sharing experience. Not only could blank tapes be recorded but tape is also a lot less fragile than vinyl, and its small size makes it much easier to transport. With the invention of the Walkman and Boomboxes, social listening also becomes much more accessible. Now people could bring their cassettes out with them. CDs and cassettes have a nearly identical social listening experience. There also has to be that mindful listening to be able to change a tape or flip it over but the process is not usually as slow and careful as it is with vinyl. It is with digital music and streaming where the largest change is.

Digital music, especially with peer-to-peer sharing, revolutionized the social aspect of listening to music. If vinyl is the ultimate non-portable, non-shareable music medium, digital music is the exact opposite. With digital music, people do not have to leave their homes to send a song or album to someone they want to share music with. The only limitation to sharing is computer hard drive space. Streaming services add two layers onto this. First, they remove the limitation of hard drive space and since streaming services allow people to make cultivated playlists, they can also share these playlists with other subscribers. This whole exchange happens with link sharing rather than physically sharing a record, cassette, or CD. In situations where the sharing is happening in person, several popular streaming services also now have a “listening party” option that allows multiple people to contribute to and control the music that is playing, either through a bluetooth connection with a speaker or with the main device that started the listening party (“Group Session”). Unlike the physical mediums, digital music and streaming are

usually fast processes, the only wait being internet connection speeds. Also, with link sharing being almost instantaneous, there is virtually no wait when sending and receiving songs and playlists. Without the physical albums there is also no wait time for flipping or switching the music and this creates the possibility of a seamless and continuous listening session, limited only by the music that has been added to the playlist or queue.

CONCLUSION

The evolution of technology impacts every aspect of daily life and music consumption is no different. From no recording technology to 1877 when the first recording was made to 2008 when Spotify was launched, music listening has been in constant change for the last 100 years.

As the available technology for playing music evolved, from non-existent to the high-tech streaming services and bluetooth connections of today, the experience of the average music listener has evolved along with it. Slow listening experiences gave way to fast paced streaming and streaming will likely give way to something new and different in the future; and with it there will be more opportunities for people to share their favorite songs with the people around them.

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APPENDIX A: TURNTABLE REPAIR

In order to gain insight into the process that a consumer would go through in order to maintain their habit of listening to music via a record player and vinyl records, I acquired a record player with the hopes of it being broken so that I could attempt to repair it. The one that I was able to get was not broken, however I still used the opportunity to take it apart and clean it so that I could have a better understanding of the internal mechanisms of a standard record player.

Despite my record player being in working order, some common problems that need to be repaired on record players are broken drive belts, tonearm issues, and power source issues (“The Costs Of Repairing A Record Player”).

The record player I got was a Jensen, 3-speed, suitcase-style record player. It has an AC power adapter, or it takes 4 D-size batteries. In order to take it apart there were a few specific things that I had to do. The first thing to take off in order to start getting to the inside of the record player is the platter. The platter is the big flat area where the records sit while they are being played. In order to take the platter off, there is a C-clip that must be removed from the spindle. C-clips are small C-shaped pieces of metal that can be placed around a post (or in this case, a spindle) in order to hold something down around it. They can be easily removed by being pried away with a small flat head screwdriver. Once the C-clip was removed, I could lift the platter off of the main body of the record player. At this point, I also had to move slowly so that I could observe how the motor was attached to the platter so that I didn't break the mechanism and so that I could place the platter back into the motor's influence when reassembling the record player later. In this case, there was a long, thin drive belt that was wrapped around the base of the platter and then placed onto the motor arm. Once I had fully removed the platter, I unscrewed the

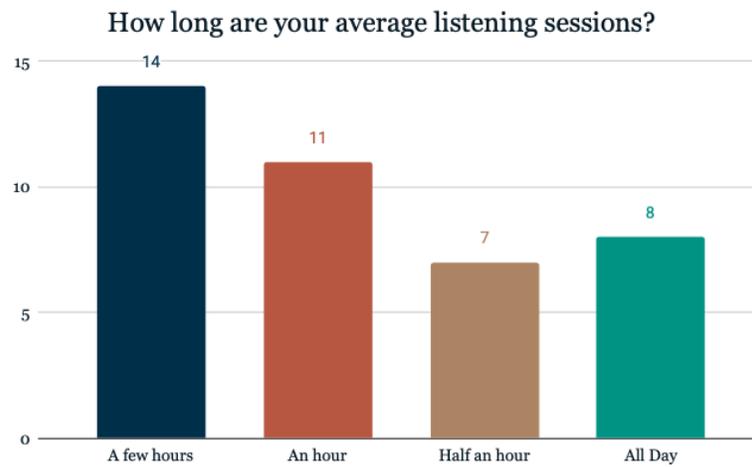
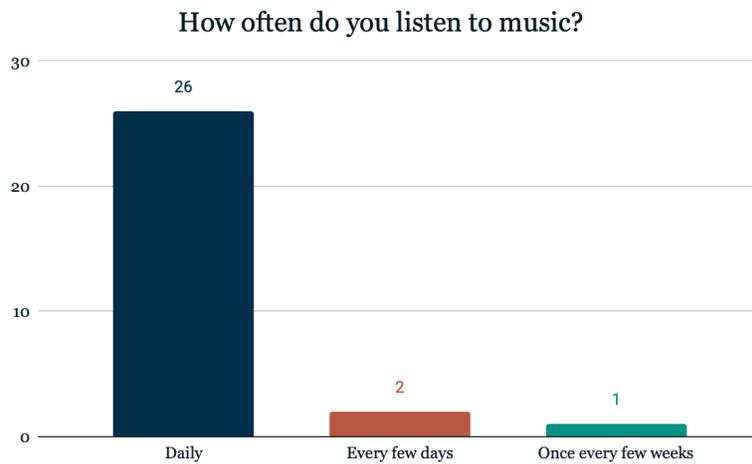
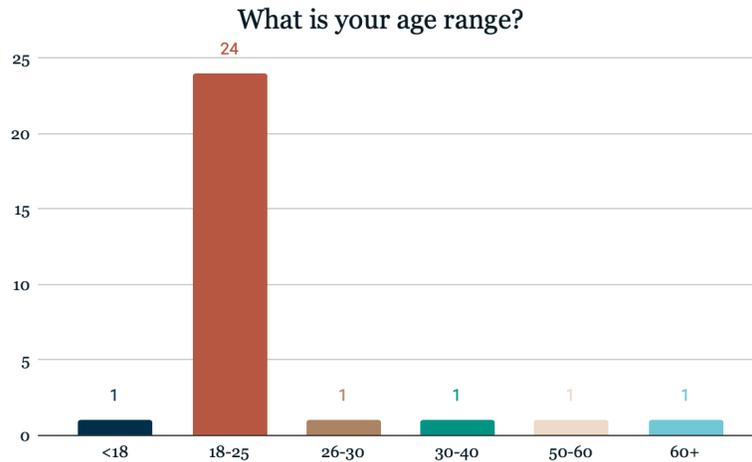
faceplate of the record player and took the whole thing out. Most of the other mechanisms of the record player were attached to the underside of the faceplate and did not need to be removed for me to access them. This includes the needle arm and motor, the motor control switch, and the power/volume control knob.

There was nothing broken on the inside of the turntable so I just cleaned all the parts and examined the connections on the inside. The cleaning process was basic, I used cotton swabs for the small areas and cotton balls for big parts with small amounts of rubbing alcohol so that it wasn't wet, but also not quite dry, just enough to get the layer of dust off everything. The wiring was direct and simple, so someone with a basic knowledge of repairing wiring would be able to fix a simple turntable like this one, since all of the connections were direct from power to switch. After I cleaned everything, I put the record player back together. Rescrewing the faceplate was simple. However, it was tricky to get the platter belt back onto the spoke of the motor and around the bottom of the platter because they have to sit so close together and the belt would not sit properly because of how far away I was holding the platter. I ended up getting it on, with a few adjustments to how high I was holding the platter as I put the belt on. Then, I just had to put the C-clip back onto the spindle.

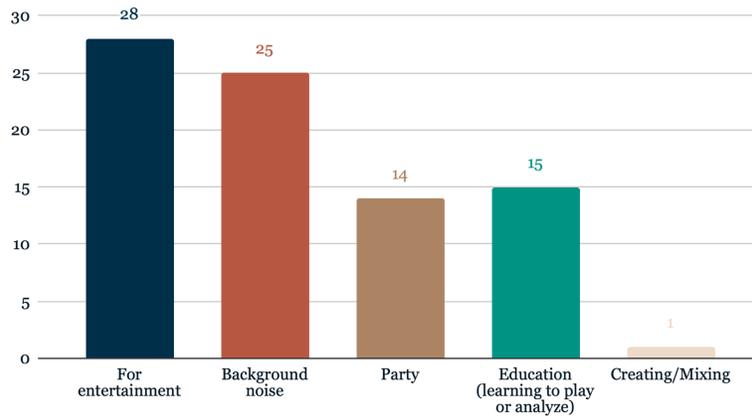
In this process I figured out that for a simple turntable like the one I got, repairing it would not be difficult. It is cheap enough that if it required a larger repair, buying a new record player would be more cost effective (not environmentally friendly, but more cost effective). More expensive record players that have higher quality parts and more functions that would likely need a more experienced person to repair it.

APPENDIX B: SURVEY DATA

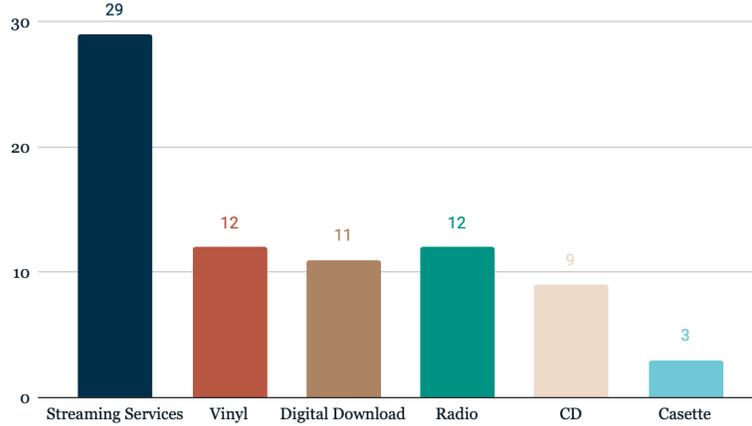
Survey conducted by Amanda Liberotti at California State University, Monterey Bay Spring 2022.



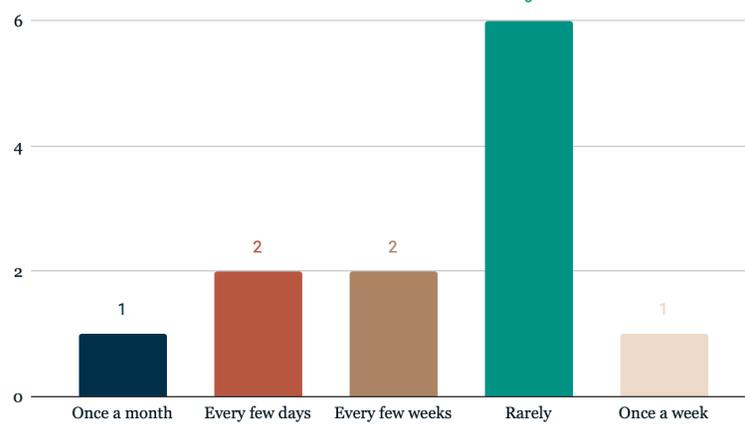
In what context do you listen to music?



What format do you listen to your music on?

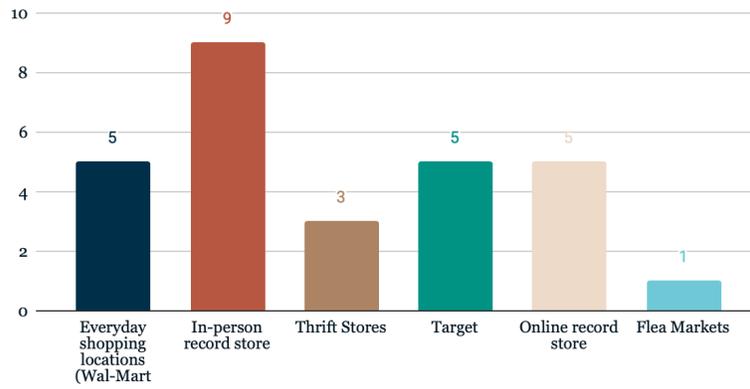


If you listen to vinyl, how often do you listen?

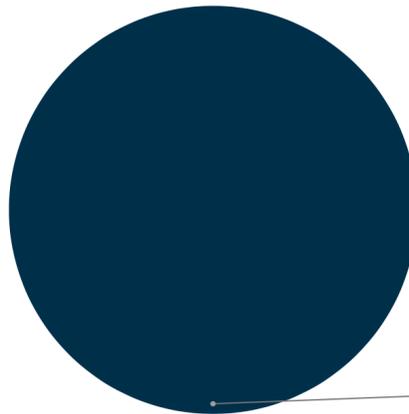


Where do you buy records?

Choose all that apply

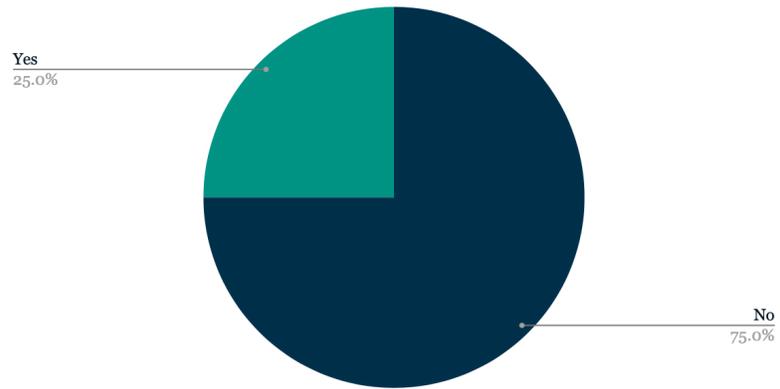


Is vinyl your main method of listening to music?



No
100.0%

Is your vinyl listening inspired by the recent resurgence of vinyl?



Do you view your vinyl as a collection you cultivated?

