

Immersive Cinematic Experience Through Sound Technology in Film: A Systematic Review

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ABSTRACT

Sound technology has a significant influence on audience engagement, emotional resonance, and overall storytelling impact, yet it is often underappreciated and overlooked. As cinema progresses, advances in audio technologies have become crucial to narrative development, providing a dynamic sound backdrop that complements visual storytelling. The objective of this systematic review is to investigate the importance of sound technologies in shaping the immersive film experience and to thoroughly analyze and synthesize current literature on the impact of sound technology in film, including spatial audio, surround sound, and binaural recording techniques. This research seeks to identify patterns, trends, and gaps in current knowledge. The significance of this study lies in its potential to enlighten filmmakers, sound designers, and researchers about the profound impact of sound technology on audience engagement and emotional resonance. This study contributes to the broader discussion on the intersection of technology and storytelling, offering insights that can help shape the future of audiovisual experiences. The findings of this systematic review can inspire future innovations in sound technology, not only in the realm of film but also in industries beyond entertainment, such as virtual reality and augmented reality, by fostering a deeper appreciation for the auditory dimension in the cinematic realm. Lastly, this analysis paves the way for a more holistic understanding of cinematic art, emphasizing the symbiotic relationship between technology and storytelling in the audiovisual landscape.

1. Introduction

Continuous technological developments have marked the growth of filmmaking, each adding to the enhancement of the cinematic experience. In today's digital era, a film production company's ability to use technology to achieve its goals and remain competitive is crucial[1]. Sound technology

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has emerged as a revolutionary force, substantially altering audience participation and the emotional impact of films. The interactive cinematic sound design not only improves the audience's emotional engagement and understanding of narrative depth but also immerses the audience in a realistic environment[2]. Several domains of immersive cinematic experiences made possible by sound technology uncover the multiple components that contribute to audiovisual synergy.

This research conducts an extensive review and synthesis of existing literature to reveal the significant impact of sound technology on the immersive cinematic experience. The researchers intend to use a systematic review to discover patterns, identify trends, and fill gaps in the current understanding of the integration of sound technology in films. This research specifically aims to address the question, "How does the incorporation of sound technologies contribute to the creation of an immersive cinematic experience and impact audiences?"

Sound technology is crucial in providing a genuinely immersive experience for audiences in today's filmmaking world[3]. As cinematic storylines grow, the incorporation of modern audio technology, such as spatial audio, surround sound, and binaural recording techniques, has become critical[4]. Spatial audio enhances realism and depth by the dynamic placement of sounds through a virtual space, while surround sound boosts emotional impact. On the other hand, binaural recording generates an exceedingly realistic playback experience by simulating human hearing. By bringing audiences right into the narrative, these technologies increase their emotional engagement with the film and elevate their level of enjoyment.

Understanding the immersive cinematic experience involves the investigation of sound technology's impact on audiences. Immersive sound is not merely an enhancement to the visual narrative; it is a medium for emotional connection and increased engagement between a film and audiences[3]. Add here about technology and society. The sound dimension contributes to a sensation of presence, making audiences feel like they are a part of the unfolding narrative[4], [5]. The interplay of visual and auditory elements enhances the immersion of the narrative and evokes strong reactions from audiences, leaving a significant effect on their perception, emotions, and fulfilment of films.

In the following parts, researchers will dive into the literature, synthesizing existing knowledge and generating conclusions that shed light on the role of sound technology in constructing the present cinematic world. By broadening the understanding of the immersive possibilities inherent in the combination of sound and visuals in films, researchers hope to contribute to the ongoing discussions regarding the convergence of sound technology and narrative.

2. Related works/Literature Review

Immersive cinematic experiences through sound technology in films involve an extensive tapestry of historical, accessible, and psychological aspects[5], [6]. Sergei Loznitsa's documentary "The Trial" is a testament to the historical dimension, as it meticulously repurposes archival footage from Iakov Posel's 1931 propaganda film "13 Days". It delves into how Loznitsa uses sound editing techniques, particularly indexical sounds, to immerse audiences in a particular historical event. By utilizing unique sound approaches, filmmakers could create an immersive and realistic experience, reflecting on the significance of sound technology in transporting audiences to a lived environment[7].

Using the film "Joker" as a case study, a researcher investigates the transformative role of sound technology in creating immersive cinematic experiences and fosters a broader understanding of the interplay between sound, narrative, and audience involvement in contemporary cinema[8], [9]. Unlike traditional superhero fiction, the film places its protagonist in a realistic setting, relying

primarily on sound design to build the narrative and express the protagonist's transition into a notorious character. It emphasizes sound's psychological impact on audiences, emphasizing its ability to stimulate emotions and enhance every aspect of the watching experience.

In connection with accessibility, the Enhanced Audio Description (EAD) concept provides a further alternative. This technique aims to reconsider conventional audio descriptions for visually impaired audiences by utilizing sound design as an aspect of accessibility[10]. Accessibility principles incorporation into filmmaking processes are advocated and focus group reports highlight EAD's potential as a universal design paradigm[11]. This all-encompassing approach appeals to visually impaired and sighted audiences, providing insight into the rapidly developing industry of accessible filmmaking. Furthermore, a researcher stated that EAD was as effective as traditional AD at transmitting information, increasing enjoyment, and ensuring audience accessibility[3]. This accomplishment underscores the possibilities of integrating traditional AD approaches with innovative methods presented, thus reaching end audiences' diverse style preferences.

Studying the sound design of Ari Aster's "Hereditary" explores the psychological aspect, exposing the subtle ways in which auditory features heighten the emotional and psychological impact. The intriguing composition by Colin Stetson takes the forefront, revealing the unusual sounds produced by reed instruments[12]. The Shepard tone, infrasound, subliminal and corporeal sounds, and the use of silence strategically are all thoroughly examined. It emphasizes the significance of sound design in films, particularly horror films, highlighting its ability to create tension, heighten dread, and elicit fear[13]. It forges a vital link between sound technology and film effectiveness, emphasizing the value of sound in creating emotional cinematic experiences[14].

In a contrasting scenario, a researcher critically acclaimed the film "A Quiet Place," which combines silence, noise, and closed captions to simulate deafness and involve the viewer in a post-apocalyptic environment, focusing on the concept of point of audition (POA) sound[15]. The interrelation of technology, audio-viewer involvement, and the politics of malfunctioning cochlear implants underscore the film's desire for immersion, raising accessibility concerns owing to uncaptioned silences[16]. The study of the film's soundscapes emphasizes the associated studies of sound, deafness, and disability.

Additionally, in the films *Riot in Cell Block 11* (1954) and *Caged!* (1950), prisoners' characters employ sound methods and technology for protest, opposition, or escape by analysing the interaction between sound and the rigid spatial limitations of prisons[17]. Sound plays a significant role in emphasizing the affective connection between film sound and the imprisoned character. It separates itself, however, by switching the focus from affect and experience to plot and resistance. In short, sound functions more than as a medium for audiences to experience the acoustics of the environment but also as a narrative and political tool used by actual and fictitious characters to oppose the repressive nature of confinement[18].

In the realm of audio-visual narrative, film composers employ the power of music, primarily the soundtrack, to delicately establish the emotional environment and steer audiences' visual attention[19], [20]. Despite its apparent relevance, empirical evidence for determining the precise processes by which music affects audiences is lacking. The use of music or sound resulted in faster initial fixations on film items while also delivering emotional content that increased positive sentiment toward the unfolding narrative[21]. On the other hand, music or sound had no discernible effect on the overall sentiments of audiences towards the depicted events.

Besides serving as a backdrop, the music or sound functions as an auditory cue that enhances the watching experience. This musical technique, known as 'process music', reflects the progression of events in the film[22], [23]. Furthermore, music or sound helps to create immersion by bridging the gap between the visual and auditory components of the visual on screen. The film creates an

immersive connection by synchronizing the major soundtrack cues with related visual occurrences. This synergy is most seen in the narrative's treatment of broad medical, artificial, and mechanical themes[13], [24].

In conclusion, incorporating advanced sound technology in films provides a transformative and immersive experience that goes beyond conventional storytelling. This integration boosts emotional resonance and audiences' engagement by establishing a symbiotic connection between visual and sound[24]. As technology evolves, filmmakers are prepared to challenge the bounds of creativity, giving audiences an enthralling and sensory-rich cinematic experience into different universes[16]. Sound technology's essential role in determining the future of film emphasizes its power to take the narrative to new heights, ensuring a more profound and engaging watching experience.

3. Material and methods

3.1 Identification

The systematic review process consists of three main phases for selecting several appropriate articles for this study. The first step involves identifying keywords and searching for related terms based on thesauruses, dictionaries, encyclopedias, and previous studies. Once all the relevant keywords were identified, search strings were created for the Scopus and JSTOR databases (see Table 1). In the initial step of the systematic review process, the present research work successfully retrieved 867 papers from both databases.

The identification phase involves searching for study materials relevant to the predetermined research issue. The keywords used are film, sound, and audience. Therefore, the first step was to identify keywords and search for similar, equivalent phrases in previous research. As a result, after determining all relevant phrases, search strings for the Scopus and JSTOR databases were created (see Table 1). Thus, during the first part of the advanced searching procedure, this study effectively obtained 51 publications from the databases.

Table 1
The advanced searching

Scopus	TITLE-ABS-KEY ("Film" AND "Sound" AND "Audience") AND (LIMIT-TO (DOCTYPE , "ar")) AND (LIMIT-TO (PUBSTAGE , "final")) AND (LIMIT-TO (LANGUAGE , "English")) AND (LIMIT-TO (SRCTYPE , "j"))
JSTOR	"Film sound" AND "Audience"

3.2 Screening

Duplicated papers should be excluded during the first step of screening. The first phase omitted 816 articles, while the second phase screened 51 articles based on several inclusion and exclusion criteria developed by researchers. The first criterion was literature (research articles) because it is the primary source of practical information. This criterion also excluded publications in the form of systematic reviews, reviews, meta-analysis, meta-synthesis, book series, books, chapters, and conference proceedings. Furthermore, the review focused exclusively on papers written in English. It is essential to note that the review was limited to a four-year duration (2020–2023). In total, 51 publications were excluded based on specific parameters.

Table 2
The selection criterion is searching

Criterion	Inclusion	Exclusion
Language	English	Non-English
Timeline	2020 – 2023	< 2020
Literature type	Journal (Article)	Conference, Book, Review
Publication Stage	Final	In Press

3.3 Eligibility

For the third step, known as eligibility, a total of 51 articles were screened. All articles' titles and key content were thoroughly reviewed at this stage to ensure that the inclusion requirements were fulfilled and fit into the present study with the current research aims. Therefore, 31 reports were omitted. They were Full text excluded, Due to out of the field (n=6), Title not significantly related (n=7), Abstract not related to the objective of the study (n=7) based on empirical evidence. Finally, 31 articles are available for review (see Table 2).

3.4 Data Abstraction and Analysis

One of the assessment procedures employed in this study was integrative analysis, which was used to investigate and synthesize a variety of research designs (quantitative, qualitative, and mixed methods). The purpose of the competence study was to discover significant themes and subtopics. The stage of data collection was the first step in the theme's development. Figure 1 depicts how the writers methodically examined a collection of 867 articles for assertions or material relevant to the current study's issues. The authors next reviewed the most recent significant papers on sound in film and immersive cinematic experience. The methods employed in all investigations, as well as the research findings, are being investigated. Following that, the author worked with other co-authors to build themes based on the data in creative and film technology to determine the validity problems. The expert review phase ensures the clarity, importance, and suitability of each subtheme by establishing the domain.

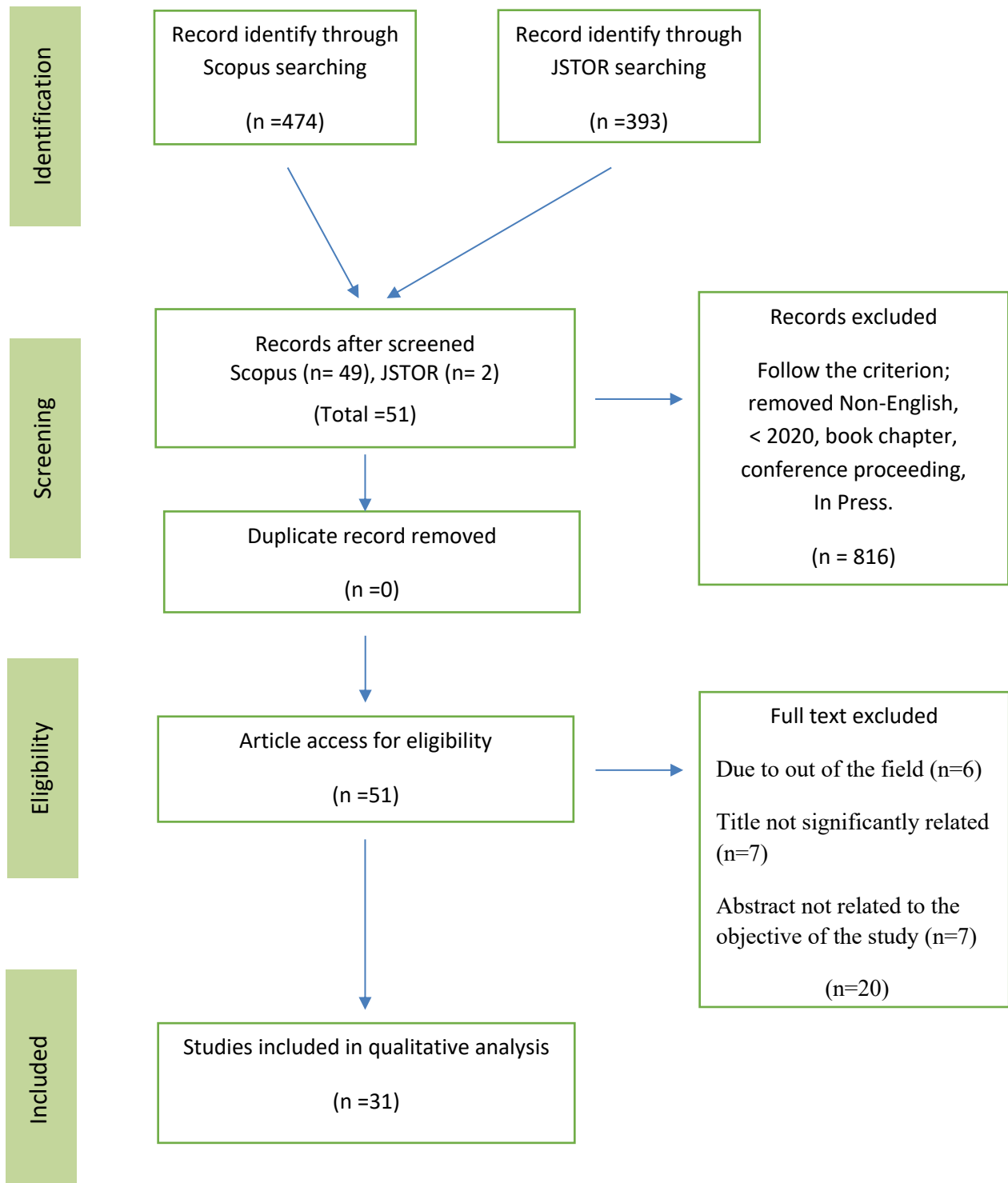


Fig. 1. Flow diagram of the proposed searching study[25]

4. Results and Finding

4.1 Technological Advancements in Sound Design

This synthesis explores the theme of "Technological Advancements in Sound Design" by analyzing relevant findings from various studies. One study focuses on Enhanced Audio Description (EAD) as an innovative technique for visually impaired audiences, highlighting sound design as a crucial tool for accessibility and proposing an integrated approach within the film industry. The result is an inclusive form of accessibility that caters to both visually impaired and sighted audiences, promoting universal cinematic experiences[1], [25]. The researcher discusses focus group conversations in which mixed audiences watched the same film with an EAD soundtrack, emphasizing the format's potential as a universal design for accessible filmmaking.

Additionally, a study on EAD examines how sound design, first-person narration, and binaural audio can create accessible versions of films for visually impaired audiences. It specifically looks at the reworking of the short film 'Pearl', detailing the creative process and gathering feedback from visually impaired viewers. The study finds that these methods are just as effective as traditional audio description techniques, highlighting the importance of integrating both approaches to accommodate diverse artistic preferences[26].

Another researcher delves into the intricate role of sound, particularly the point of audition (POA) sound, in the acclaimed soundscapes of the film "A Quiet Place". The study explores how POA sound shapes perceptions of deafness, technology, and the relationship between audio and visual elements through the analysis of silences, sounds, and closed captions. It focuses on the immersive potential and audist expectations of cinematic soundscapes, underscoring the complexity of examining audition sound points in the context of accessibility[15]. The study also underscores the significance of uncaptioned silences in prompting inquiries into the composition and significance of immersion and silence[2], offering insights into the interconnectedness of sound, deafness, and disability studies.

Audiovisual translation (AVT) is a crucial method for adapting multimodal discourse in films for different audiences[14]. One study focuses on the semiotic coherence in the English subtitles of the Lithuanian film "Garden of Eden" (2015). It aims to evaluate semiotic coherence, identify different types of cohesion based on their presence on screen, and analyze selected examples, highlighting the challenge and importance of maintaining cohesion between subtitles and various elements within the film's semiotic system[27].

In summary, the integration of technological advancements in sound design has revolutionized filmmaking, offering a new way to create an immersive cinematic experience. Approaches like EAD have expanded the narrative potential of films, overcoming visual limitations. These advancements extend beyond basic entertainment to facilitate inclusive storytelling, as seen in the increased audio description for visually impaired audiences. Overall, the integration of technology and narrative through sound design not only meets the needs of diverse audiences but also enhances cinematic artistry, paving the way for a more meaningful and inclusive storytelling experience in the digital age[28].

4.2 Emotional Resonance and Psychological Impact

One researcher has studied the significant influence of sound design on the emotional and psychological impact of Ari Aster's 2018 film "Hereditary". The analysis delves into the layers of the story that are enhanced by auditory methods, focusing on the film's soundtrack and score, particularly composer Colin Stetson's innovative use of reed instruments, vocalizations, and drumming elements[3]. The researcher examines specific characteristics such as the Shepard tone,

infrasound, subliminal and corporeal sounds, and strategic use of silence, demonstrating how these elements contribute to generating tension, increasing dread, and triggering terror.

Shifting the focus to the intersection of music and silent cinema, this study examines the impact of Giorgio Moroder's introduction of electronic music to silent films in the 1984 restoration of *Metropolis*. It explores the implications of modern scores on silent films and delves into the conflict between introducing young audiences to silent cinema and maintaining authenticity[29]. One research project investigates the psychological and emotional impacts of Hans Erdmann's original orchestral music and James Bernard's later composition on different editions of *Nosferatu*, using "*Nosferatu: A Symphony of Horror*" as a case study. It emphasizes the significance of audible and inaudible sound in shaping audiences' reception and creative involvement with the picture, demonstrating the delicate relationship between music, silence, and the emotional impact of cinematic experiences[9], [30].

The film "*Joker*" deviates from typical comic book norms by setting the narrative in a violent, realistic world devoid of superheroes. Research delves into the film's distinct representation of the Joker, emphasizing the significance of sound design, notably ambient noise, in creating the decaying metropolitan setting of Arthur Fleck's transformations. The sound landscape plays a major role in creating emotional impact[18], allowing audiences to emotionally engage with the path of a seemingly regular person turning into the iconic Joker and unexpected hero of Gotham's revolution. The constant use of sound becomes an influential technique, enhancing the emotional depth of the film and leaving audiences with a lasting psychological impression[4].

Furthermore, research on the film "*A Quiet Place*" examines its detailed depiction of deafness, technology, and audiences' connection to the on-screen setting. It emphasizes the intentional use of sound elements, such as silence and noises, to engage audiences in an imaginative depiction of deafness and the emotional challenges associated with faulty cochlear implants[20]. Despite the study's emphasis on cinematic immersion, it uncovers accessibility concerns, encouraging consideration of the profound significance of silence. The study navigates the intricacies of audience participation, revealing a harmonic resonance between sound realms, deafness, and disability through the film's sophisticated use of sound analysis, particularly in Regan's point of audition[21].

In the context of films, the impact of sound on audiences' emotions and visual attention has been studied. One study found that sound increases early fixations on film objects, raising positive sentiments towards the narrative, but has little effect on perceptions of filmed events. Exploration of emotional resonance and psychological impact is crucial in understanding the complex relationship between sound and audiences' reactions[26]. While sound enhances the visibility of film objects and provides emotional information, it has little impact on audiences' opinions about narrative events[19]. It emphasizes the significance of creating sound for diverse visual mediums to influence content distribution methods and gain a more thorough understanding of audiences' engagement.

4.3 Narrative and Character Development

One study examines the soundtrack and score of the film *Hereditary*, illustrating how the complex soundscapes contribute to the emotional and psychological impact of the story. The focus is on the relationship between musician Colin Stetson's inventive score and the film's plot, highlighting Stetson's skill in producing unique sounds from reed instruments using unconventional techniques. The researcher delves into specific aspects of sound design that significantly affect the audience's connection with the characters and plot, all of which enhance the overall narrative experience. [17]

In addition, the study explains how the auditory elements of Hereditary effectively convey hidden narrative information, enhancing the audience's understanding of characters and their development by showing how sound functions as a shorthand language[4]. Furthermore, the study extends beyond Hereditary, arguing that the underutilized area of sound design is crucial in horror entertainment. It asserts that the discussed auditory strategies have broader applications, demonstrating their effectiveness across horror and thriller films, thus emphasizing their importance in shaping narrative and character arcs within the broader context of cinematic storytelling[12].

Through a series of intricately animated segments from *Skazka Skazok/Tale of Tales* (Yuri Norstein, 1979), the film weaves a narrative tapestry that, on the surface, seems coherent at the micro-level but leaves audiences questioning its ultimate coherence. A study presents a compelling argument focused on the significance of sound, particularly music, in shaping the film's overall narrative meaning by examining the film's history and contextual background. Instead of relying solely on visual elements, the study contends that the film's use of sound elements provides crucial clues and cues to unravel its mysteries[25]. The analysis explores how the alignment and re-alignment of music and image contribute to the film's teleological foundations, offering a fresh perspective on the film's success.

The study highlights the complex evolution of characters and narrative components by thoroughly exploring how the interplay of music, sound, and visuals contributes to the film's overall structure[10]. This synthesis emphasizes the function of soundscapes in shaping the audience's understanding of the film's overarching narrative, leading to a greater appreciation of the complex relationship between narrative and character development in *Skazka Skazok/Tale of Tales*.

Another study explores the captivating intersection of classic Hollywood prison films, sound, and counter-carceral patterns. The primary concept is that these films use sound as a narrative tool to subvert and challenge the strict confines of the prison. The research reveals inmate characters who utilize sound techniques and technologies to protest, resist, or escape from carceral regimes. In-depth case studies of the significance of films such as *Riot in Cell Block 11* (1954) and *Caged!* (1950) anchor the investigation, emphasizing how sound plays a crucial role in constructing the narrative. While previous research has emphasized the power of film sound to engage audiences in a phenomenological or affectual interaction with imprisoned characters[17], [31], this study takes a different approach, focusing on narrative and resistance.

Despite the importance of sound in influencing audiences' emotions and attentiveness, there is a lack of research information outlining the underlying mechanisms. A study indicated that sound did not affect audiences' perceptions of the events depicted in the film. However, it did have a minimal influence on attitudes towards the events, significantly increasing the relevance of film objects and providing emotional cues that influenced audiences' sentiment towards the whole film experience[14]. Recognizing the physiological and behavioural effects of sound could offer valuable insights for improving content delivery tactics[12].

5. Discussion

The synthesis study aims to delve deeper into the various domains of advances in sound technology, studying its impact on emotional resonance, psychological effects, narrative creation, and character development within the cinematic world. The development of audio technology and the incorporation of surround sound has created a more captivating and complex auditory experience for audiences. The innovative incorporation of sound technology has ushered in a new era of immersive storytelling, changing how audiences engage with films. Technological

improvements in sound design emphasize the growing importance of sound technologies in enhancing the auditory aspect of cinema.

Like other industries, the film industry has been heavily influenced by the world's increasing reliance on technology, especially for creating immersive cinematic experiences. Advanced sound technology has become a vital element in reaching the constantly evolving needs of audiences[1]. Advanced sound design also has the power to bring the audience into both real and imagined worlds, fostering emotional engagement. Sound technology serves as an effective tool for creating emotional resonance and psychological impact in the minds and hearts of audiences within the context of cinematic narratives. Filmmakers can evoke a wide range of emotions through the skillful manipulation of soundscapes, from heart-pounding excitement to introspection. This allows them to transcend language and cultural boundaries and build global connections with their audience. By understanding the psychological impact of sound, filmmakers can craft more compelling and resonant stories, creating a deeper connection between audiences and the cinematic experience.

Subconsciously, sound technology has the power to influence the behaviors and opinions of society, and its impact on emotions goes beyond mere entertainment. The human body is capable of responding to certain auditory stimuli, releasing hormones that affect mood and ways of thinking. This has significant implications for empathy and audience participation in film, as the proper use of sound can enhance the attachment between audiences and the characters. Filmmakers can influence the audience's perception by manipulating the emotional rhythm of the film through sound design, subtly but significantly affecting how they perceive and comprehend challenging subjects and moral quandaries.

Narrative and character development delve into the symbiotic relationship between sound design, narrative construction, and characters. Sound serves as a narrative tool, influencing the pacing, mood, and atmosphere of a film. It also plays a significant role in influencing the audience's perception and level of emotional involvement in the plot in several ways. By providing insight into the mind, motive, and inner conflicts, it immerses audiences in a multi-dimensional sound experience, blurring the boundaries between fiction and reality, and real and unreal characters.

In conclusion, the systematic review navigates through the interconnected themes of technological advancements in sound design, emotional resonance and psychological impact, and narrative and character development. By synthesizing existing knowledge in these areas, the research article provides valuable insights into the transformative impact of sound technologies on creating an immersive cinematic experience. As filmmakers continue to push the boundaries of sound design, the potential for storytelling to reach new heights and evoke profound emotional responses becomes increasingly evident, ushering in a captivating era for the art of filmmaking.

6. Conclusion

Sound design in films plays a significant role in creating an immersive cinematic experience for the audience. A thorough analysis reveals that sound technology has a major impact on emotional resonance, psychological impact, narrative development, and character development in filmmaking. Filmmakers can enhance immersion by using advanced sound technologies that evoke strong emotional reactions from the audience. The psychological effects of sound greatly influence the audience's perceptions and responses, as well as enhance their engagement with the narrative.

Sound technology also plays a crucial role in setting the mood, building suspense, and synchronizing timing in a film. The way it conveys the details of a narrative and the characters' roles, emotions, and psychological impact makes a significant contribution to a film. This review provides a comprehensive understanding of the immersive possibilities of sound technology by synthesizing

current material and offering valuable insights for filmmakers looking to enhance storytelling and create a stronger connection between audiences and the cinematic art form.

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