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Audio Features and Crowdfunding Success: An Empirical Study Using Audio Mining

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Abstract: Crowdfunding videos have become a crucial tool for entrepreneurs seeking financial support, with audio design playing a critical role in attracting potential investors. However, research on how audio features influence crowdfunding success remains limited. This study uses audio analysis techniques to examine data from 4500 crowdfunding campaigns on the Kickstarter platform between 2013 and 2016, investigating the impact of audio features on crowdfunding success rates. Grounded in the signaling theory, we posited four hypotheses suggesting that speech rate, loudness, pitch, and emotional arousal would each exhibit an inverted U-shaped relationship with crowdfunding success rates. Through data analysis, we found that moderate levels of speech rate, loudness, pitch, and emotional arousal significantly enhanced crowdfunding success, whereas extremes in these vocal characteristics had a detrimental effect. Our findings not only extend the application of audio analysis in the crowdfunding domain, but also provide empirical evidence for the influence of audio features on crowdfunding success. This research offers practical guidance for project initiators in developing promotional strategies and for platforms in optimizing user experience.

Keywords: audio mining; audio features; crowdfunding success; signal theory

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1. Introduction

Crowdfunding is a financing model that enables individuals or groups to raise funds publicly, with supporters contributing either through donations or in exchange for rewards [1]. As a financial innovation, crowdfunding directly connects the supply and demand sides of funding, eliminating the need for financial intermediaries that typically screen and monitor projects in traditional fundraising transactions [2]. Crowdfunding is perceived as a mechanism that competes with or complements more conventional financial services, such as microcredit, because it offers entrepreneurs more accessible and expedited services [3]. Global crowdfunding markets are experiencing rapid growth, with a projected compound annual growth rate (CAGR) of 16% from 2023 to 2027 [4]. The global crowdfunding market was valued at USD 19.86 billion in 2023 and is projected to expand from USD 22.12 billion in 2024 to USD 72.88 billion by 2032 [5]. For instance, the success rate for fully funded projects on the Kickstarter platform has reached 41.15%, and some projects achieved their USD 10,000 fundraising goal within just eight minutes [6]. These statistics demonstrate the strong financing potential and market appeal of crowdfunding in practice.

The burgeoning field of fintech has enhanced inclusivity and convenience in fundraising for individuals and small businesses [7]. Within the innovative financial model of crowdfunding, technological advancements have enabled project initiators to evolve from traditional text and images to richer, more engaging multimodal forms of information distribution [8]. On mainstream crowdfunding platforms, video has become a core tool for showcasing projects [9], and high-quality video content can significantly increase the

success rate of crowdfunding projects [10]. These project videos incorporate not only text and dynamic images, but also voice information, making the communication of information more vivid and intuitive [8,11]. The combination of visuals and sound effectively captures the attention of investors in a short period [12]. Sound, due to its inherent convenience and emotional resonance [9], exhibits unique appeal in crowdfunding videos. Through auditory stimuli, project initiators can clearly convey product features and application scenarios, demonstrating the project's strengths and uniqueness to potential investors. This multimodal interaction enhances the emotional connection between funders and projects [13,14]. Moreover, the integration of interactive marketing strategies using audio and visual elements has proven to be a powerful tool in engaging potential backers. Interactive marketing allows for a two-way communication process [15,16], where backers can provide immediate feedback and suggestions, fostering a sense of community and involvement. This approach not only boosts the visibility and appeal [17] of the crowdfunding campaign, but also helps in refining the project based on direct input from the target audience, leading to higher success rates. While the relationship between visual content and crowdfunding success has been extensively studied [18], the specific impact of sound in crowdfunding videos remains underexplored. This makes designing more engaging crowdfunding videos by leveraging audio features a pressing challenge [10].

Based on signal theory, audio signals can further alleviate information asymmetry in crowdfunding beyond visual information, influencing the cognition and decision-making of potential investors [19]. Audio features typically include dimensions such as pitch, loudness, speech rate, and tone quality [12]. By precisely designing these features, one can reinforce the core message and emotional resonance of the project at the auditory level [20]. Research shows that human brains are often more sensitive to auditory stimuli than visual stimuli [21], meaning that sound can elicit stronger emotional responses and quickly influence the attention and decision-making processes of investors [10]. For example, moderate speech rate and loudness can enhance listeners' trust, while appropriate pitch avoids eliciting feelings of rejection [12]. Despite the significant importance of these audio features in the crowdfunding context, existing research rarely delves into their specific impact on crowdfunding outcomes [19]. Moreover, compared to the high-cost design of visual content, audio design is less costly and can effectively enhance the attractiveness of crowdfunding projects through optimized sound elements [22]. Understanding the role of audio features in crowdfunding videos can help project initiators better utilize sound for interactive marketing and deepen our understanding of multimodal information in crowdfunding environments. This knowledge will assist future project initiators in more effectively employing audio features on crowdfunding platforms to improve project performance and appeal.

To address this research gap, this study analyzes the audio features of 4500 crowdfunding projects initiated on Kickstarter between 2013 and 2016, examining their impact on crowdfunding success. Kickstarter is a prestigious crowdfunding platform renowned for its authority and representativeness within the industry. It frequently garners extensive media coverage and serves as a supporter or partner for numerous creative and entrepreneurial endeavors [23]. Based on signal theory, we adopt innovative methods, combining machine learning algorithms, pre-trained deep learning models [24], and other statistical analysis techniques to evaluate the influence of audio features (limited to human voice) in crowdfunding promotional videos on crowdfunding performance. After controlling for video content and image features, we investigate the relationship between four primary audio features (speech rate, loudness, pitch, and emotional arousal) and crowdfunding success. The results indicate that videos with moderate levels of speech rate, loudness, pitch, and emotional arousal are more effective in enhancing crowdfunding performance. This study contributes significantly to the fields of sound marketing and crowdfunding research. Practically, it provides valuable insights for project initiators in designing promotional videos and offers actionable recommendations for crowdfunding platforms to improve

user interfaces and experiences, helping funders find projects that align with desired audio features more easily.

2. Literature Reviews

2.1. Crowdfunding Success

Crowdfunding is defined as a method by which entrepreneurs attract large numbers of internet users to fund projects through cultural, social, and reward mechanisms, without relying on traditional financial intermediaries [18]. A successful crowdfunding campaign typically involves key factors such as visibility, backer engagement, and post-campaign execution [25]. Among these, whether the fundraising reaches or exceeds the predetermined goal is the primary indicator of crowdfunding success [26].

Existing literature categorizes the determinants of crowdfunding success into four main categories: project-related factors, campaigner-related factors, backer-related factors, and platform-related factors [27]. Project-related factors encompass the characteristics of the project and associated soft information, with project description being a key element [28]. Project descriptions include text readability, emotional orientation, and the quality of videos and images [28,29]. Campaigner-related factors involve the past crowdfunding experience of the project leader, gender, education level, and entrepreneurial spirit [30]. Backer-related factors typically include backers' emotional reactions, motivations, previous support experiences, and geographical factors [30]. Platform-related factors cover the type of platform, years of establishment, and operating model [28]. Among these factors, project-related factors are considered most critical [30], as crowdfunding often involves scaling up creative ideas from prototypes to mass production [31]. Therefore, refining project descriptions to reduce information asymmetry and uncertainty is crucial for the success of crowdfunding projects.

In presenting project-related factors, existing studies show that video, as a crucial component of project descriptions, significantly enhances the appeal and credibility of projects by providing vivid information [8]. Studies have demonstrated that visual elements in videos, such as image clarity, diversity of shots [32], and overall visual appeal, have significant impacts on viewers [29]. Additionally, clear audio, appropriate music selection, and expressive vocal intonation are believed to contribute to higher transaction success rates [33]. However, although the impact of video content on crowdfunding success has been studied, the specific influence of audio features remains underexplored [19]. Therefore, exploring the impact of audio features on crowdfunding success is a significant direction for current research.

2.2. Signaling Theory

According to signal theory, individuals send signals to demonstrate their capabilities and qualities, thereby influencing others' decisions, with the core aim of reducing information asymmetry between transacting parties [34]. The three key components of signal theory are the signal sender, the signal itself, and the signal receiver [35]. In competitive markets, the interpretation and responses of signal receivers are primarily influenced by the characteristics of the signal sender, the signal itself, and the signal receiver [35]. As markets mature and competition stabilizes the cost-benefit ratios of products [36], the primary role of signal theory, besides addressing information asymmetry, is to guide how to transmit clearer and more appealing signals in situations of uncertainty and information overload [37].

In the context of crowdfunding, campaigners send signals to potential backers through project descriptions, video content, and personal backgrounds, assisting them in assessing the risks and return potential of projects and making investment decisions [38]. Studies show that well-structured and comprehensive project descriptions help investors better understand project goals, expected returns, and potential risks, leading to more rational decisions [30]. Furthermore, the higher the quality of crowdfunding videos and sound information, the more they can enhance backers' trust in the crowdfunding project [39].

Professionally produced project videos not only effectively showcase product advantages but also create a stronger emotional connection with backers through dual visual and auditory stimulation [40].

Existing studies indicate that audio features, as part of video signals, play a significant role that cannot be overlooked [41]. Audio features such as pitch, background music, and sound effects can subtly influence investors' cognitive and emotional responses, thereby increasing the success rate of projects [42]. For example, variations in tone can convey the narrator's confidence and emotional conviction, while background music can evoke specific emotional changes, enhancing the video's appeal and persuasiveness [12]. Therefore, this study will use signal theory as the foundational theoretical framework to explain the impact of audio features in crowdfunding videos on the effectiveness of crowdfunding projects.

2.3. Audio Analytics

Sound plays a crucial role in non-verbal communication, encompassing two primary aspects: human voice and music [43]. Interdisciplinary research consistently highlights the significant role of sound, particularly human voice, in influencing individual behavior [44]. Cognitive psychology and neuroscience studies show that the human brain is more sensitive to sound compared to other senses [45], with neural reactions rapidly activated across multiple cortical regions upon receiving auditory signals [21]. These signals undergo timely and extensive processing [46]. Compared to visual stimuli, sounds leave a deeper impression on individuals [47]. Consequently, auditory stimuli play a unique and essential role in enhancing promotional performance and content dissemination [46].

In existing marketing research, studies on voice analysis often focus on audio-visual consistency [48], interactivity [49], usage frequency [50], and placement [51], using manipulative experiments to observe specific impacts. For example, incorporating rich auditory sensory cues in video advertisements can promote further processing and retention of brand names, enhancing attention and creating more memorable impressions of brand images [48]. There is also systematic mapping between different sensory modalities, with non-musical and lower-level sensory attributes such as taste and smell being conveyed through music [52]. In recent years, some studies have begun to examine the essential acoustic characteristics (such as pitch, loudness, speech rate, rhythm, and tone quality) of sound through audio analysis, exploring their impact on marketing effectiveness. For instance, video content can convey intended emotional orientations through the form, texture, and expressiveness of sound elements [53].

However, such studies remain scarce, especially in the context of crowdfunding, where research on audio features is even more limited [10]. Table 1 summarizes the relevant researches on audio analytics in the marketing field over the past five years. In crowdfunding settings, backers often do not have sufficient time to thoroughly understand project information presented in videos [8]. When faced with monotonous text and images [11], backers tend to watch videos and listen to narrations to quickly grasp key information and form initial emotional impressions of the campaigners [10]. Given the advantages of sound in traditional marketing, we hypothesize that sound plays a critical role in the signal reception and information processing process in crowdfunding videos as well.

Table 1. Recent Research on Audio Analytics.

Author	Data Resource	IV	DV	Main Finding
(Hannah H. Chang et al., 2023) [46]	Network data, experiment	Number of voices	Purchasing intention	Using more voices in advertising videos can increase product awareness and favorability, thus enhancing persuasiveness and audience purchase intent.
(Brett Christenson et al., 2023) [54]	Survey data and experiment	Speech rate	Likelihood of product use	Speech speeds that are too fast or too slow reduce the likelihood of product use, while moderate speeds tend to generate more favorable user feedback.

Table 1. *Cont.*

Author	Data Resource	IV	DV	Main Finding
(Johann Melzner et al., 2023) [55]	Experiment	Timbre of music	Perceived brand personality	Changing the timbre of music, even with the same sound source, alters the perceived brand personality.
(Vinith Johnson et al., 2021) [56]	Experiment	Duration of music	Brand impression	Audio ads under 10 s can effectively boost brand and product awareness and impression.
(Xin Wang et al., 2021) [42]	Experiment	Pitch	Persuasiveness	A low pitch, compared to a high pitch, makes the audience feel more confident in the narrator, enhancing the sense of professionalism and persuasiveness of the product.
(Kristina Klein et al., 2021) [57]	Experiment	Sound presence	Preference for visual	The presence of sound decreases preference for complex visual effects but increases preference for simple ones.
(Simmonds et al., 2020) [48]	Experiment	Audio-visual sensory cues	Recall	Audio-visual sensory cues prompt extra internal processing of the brand name, leading to active attention and better memory retention.
(Angel Hsing-Chi Hwang et al., 2020) [58]	Experiment	Interactivity of music	Purchase intention	Music interactivity boosts e-commerce experiential value for low-participation consumers and enhances cognitive value and purchase intent for high-participation consumers.
(Lei Wang et al., 2020) [59]	Experiment	Sound frequency	Perceived size of product	Adjusting sound frequency by color saturation and then arousal affects perceived product size, with low frequencies making products seem larger.
(Monika Imschloss et al., 2019) [60]	Experiment	Softness of music	Haptic perception of product softness	High music softness enhances the haptic perception of product softness, which can lead to positive product reviews and increased purchase intent.
(Sunaga, 2018) [50]	Experiment	Music frequency	Decision making	Music frequency affects perceived sound distance. Matching it to marketing messages improves consumer evaluations.
(Naomi Ziv et al., 2018) [61]	Experiment	Pleasantness of music	Preference for product	Pleasant music increases product preference. Products accompanied by pleasant music receive better user evaluations.

3. Hypotheses and Research Model

3.1. Speech Rate and Crowdfunding Success

Speech rate refers to the speed at which a person speaks, measured by the number of words presented per unit of time [43]. Within the framework of signaling theory, speech rate can be considered a signal that conveys attributes of the initiator, such as their level of confidence and professionalism. Previous research indicates that a slow speech rate may be perceived as boring and lacking energy, making it difficult to maintain high levels of attention [50]. Accelerating speech rate can significantly stimulate physiological arousal, emotional valence, and emotional arousal in viewers, leading to greater concentration [62]. Additionally, speech rate is positively correlated with the persuasiveness and credibility of content [33]. Confident individuals tend to speak faster during communication compared to those who lack confidence [63]. Faster speech rates lead viewers to perceive the speaker as more knowledgeable and skilled [62], resulting in higher levels of satisfaction and trust [64]. In the context of crowdfunding, an increased speech rate enhances backers' emotional trust in campaigners, positively affecting their willingness to share resources and communicate [65].

However, several scholars hold opposing views, suggesting that excessively fast speech rates can cause cognitive barriers and induce instinctive resistance and aversion in

listeners [66]. Christenson et al. (2023) argue that fast speech rates increase the psychological distance between speakers and listeners, inducing negative emotions [54]. Especially when browsing crowdfunding videos, excessively fast speech rates can make it difficult for backers to keep up with the pace of information, creating cognitive burdens and hindering understanding and information processing [10]. Therefore, we posit that there is a moderate effect of speech rate on backers' information processing. Investors, as signal receivers, rely on the clarity and comprehensibility of the signals for processing information. Moderate speech rates are more likely to stimulate backers' psychological and emotional states in a short period, arousing their emotions [62], leading to more positive consumer behaviors. Compared to high speech rates, moderate speech rates can maintain backers' attention while enabling them to effectively understand the information, increasing interest and participation in crowdfunding projects. Based on this, we propose the following hypothesis:

H1. *There is a curvilinear (inverted U-shaped) relationship between speech rate in crowdfunding videos and crowdfunding success, with moderate speech rates levels being more likely to achieve crowdfunding success compared to low and high speech rates levels.*

3.2. Loudness and Crowdfunding Success

Loudness, also known as volume, refers to the subjective perception of the strength of sound by the human ear, typically measured in decibels, which quantify the amplitude of sound [59]. Loudness serves as a signal that can reflect the initiator's emotional intensity and level of engagement. Existing research demonstrates that loudness is closely related to emotional responses; louder sounds can alleviate feelings of loneliness, reducing social exclusion and fostering closer relationships [67]. Compared to low levels of loudness, moderate loudness is more effective in cultivating listeners' emotional responses, allowing them to fully experience the content and impact of the narration, evoking emotional resonance and motivating participation [12]. Additionally, according to psychological studies on attraction, louder sounds attract more attention, enabling listeners to more clearly receive key information [68].

However, when the loudness is too high, neuroscientific research indicates that the bilateral orbitofrontal cortex, medial temporal lobe, and visual cortex are overstimulated, placing additional stress on regions related to decision-making and memory, forcing the brain to expend more cognitive resources [69]. Furthermore, very loud sounds are typically associated with extreme emotions such as ecstasy, anger, fear, threat, and tension [70]. When individuals are exposed to high levels of emotional stimulation over extended periods, they may experience fatigue, irritability, disgust, and aversion [53]. These stimuli can trigger daytime reactions in the brain, leading to negative physiological and psychological responses such as alertness and avoidance, which are detrimental to cognitive and emotional processing [69]. Therefore, we posit that there is a moderate effect of loudness on backers' information processing. Appropriate loudness can serve as an effective signal, conveying the initiator's enthusiasm and sincerity towards the project, thereby influencing the investor's cognitive and emotional responses. Consumers have a natural interest in ads with high loudness, and their emotional and psychological states tend to be more positively oriented [67]. In the context of crowdfunding, increasing the level of loudness ensures that information about the project is clearly communicated, maintaining backers' attention at a high level, fostering and stimulating more intimate emotional responses, and increasing the attractiveness and support for crowdfunding projects. However, when the level of loudness is too high, it can generate excessive emotions in backers, affecting their emotional judgment and making them more inclined to avoid or reject the crowdfunding project. High levels of loudness can also interfere with the backers' ability to process information, leading to inadequate understanding of the content and weakening their identification with the crowdfunding project. Based on this, we propose the following hypothesis:

H2. *There is a curvilinear (inverted U-shaped) relationship between loudness in crowdfunding videos and crowdfunding success, with moderate loudness levels being more likely to achieve crowdfunding success compared to low and high loudness levels.*

3.3. Pitch and Crowdfunding Success

Unlike loudness, which pertains to the strength of sound (amplitude of sound waves), pitch focuses on the highness or lowness of sound (frequency of the sound) [71], determined by the frequency of sound waves, with higher frequencies corresponding to higher pitches [72]. The pitch of sound in marketing can have varying effects on psychological reactions. As pitch increases, the perceived distance between the audience and the marketing message decreases, leading to increased perceptions of warmth and intimacy [50]. High-pitched sounds typically indicate that the speaker is in a highly positive emotional state, making it easier to convey positive emotions to the listener and evoke emotional resonance [73]. Beyond conveying emotions, the pitch of a voice can reveals aspects of a person's character; when speakers introduce projects and services in a high pitch, they are perceived as more communicative, energetic, and generating more positive first impressions [10]. Additionally, high pitches result in better memory performance and have longer-lasting effects on capturing the audience's attention towards products [74].

On the other hand, excessively high pitches are often perceived as a sign of lack of confidence and nervousness [63]. Listeners may suspect that the speaker is using a high pitch to hide or exaggerate something, which can interfere with the audience's ability to make rational judgments, amplifying risk perception and decision uncertainty [75]. Zoghaib et al. (2019) note that lower-pitched voices are more conducive to generating positive associations with corporate brands, leading to more favorable interactions and feedback [76]. Excessively high pitches can have extreme effects on the audience's emotional arousal, hindering normal information processing and cognition, which is detrimental to brand image promotion and product sales [77]. According to signaling theory, pitch can serve as an indicator of the initiator's emotional state, allowing investors to evaluate the initiator's sincerity and the authenticity of the project based on these signals. Therefore, we posit that there is a moderate effect of pitch on backers' information processing [78]. In the context of crowdfunding, moderate pitch levels are more effective in demonstrating the campaigner's confidence and sincerity, effectively sending positive signals, evoking emotional resonance among backers, and enhancing their level of engagement, thus increasing the attractiveness and support for crowdfunding projects. When pitch levels increase from moderate to high, although they initially capture backers' attention, they can lead to negative emotions, damage professional image, and distract attention, ultimately decreasing the likelihood of crowdfunding success. Based on this, we propose the following hypothesis:

H3. *There is a curvilinear (inverted U-shaped) relationship between pitch in crowdfunding videos and crowdfunding success, with moderate pitch levels being more likely to achieve crowdfunding success compared to low and high pitch levels.*

3.4. Emotional Arousal and Crowdfunding Success

Emotional arousal through auditory stimuli, such as music and speech, refers to changes in the level of arousal within an individual's emotional state [79]. Emotional arousal is a significant non-verbal signal transmitted through voice elements such as music and speech. According to signaling theory, emotional arousal can reflect the initiator's emotional state and their level of commitment to the project. Investors use these signals to assess the feasibility of the project and the credibility of the initiator. In the two-dimensional model of emotion, arousal represents the intensity or excitement of an emotional experience [80]. High arousal levels indicate a state of heightened excitement, whereas low arousal levels signify a relatively calm or relaxed state [81]. Psychological studies show that lower levels of emotional arousal weaken individuals' motivation to take action, making people more inclined to maintain the status quo rather than engage in new actions [82]. Compared to

sounds with lower emotional arousal, lively and upbeat sounds with high arousal levels are more likely to capture cognitive attention and evoke emotional responses [12]. From a consumer behavior perspective, increased emotional arousal can improve memory and favorability toward products, forming better experiential impressions [83].

However, psychological research indicates that excessively high levels of emotional arousal can negatively impact cognitive and emotional processing [77]. When the emotional arousal of sounds is too high, people may interpret them as irrational signals [84]. Being exposed to high-arousal emotional stimuli over long periods can lead to psychological and physiological fatigue, triggering intense negative emotions such as anxiety or discomfort, prompting individuals to adopt risk-averse behaviors [77]. We posit that there is a moderate effect of emotional arousal on backers' information processing. Low emotional arousal may make supporters more conservative in their project decisions, leading to a lack of interest and motivation in crowdfunding projects, or causing decision delays, thereby reducing the likelihood of crowdfunding success. Conversely, high emotional arousal may interfere with rational judgment, triggering negative emotions such as anxiety or concern, causing supporters to doubt the project and worry about the safety of their funds or the feasibility of the project. Therefore, moderate emotional arousal is most effective in crowdfunding activities, being capable of stimulating backers' interest and engagement without provoking excessive emotional responses, making them more likely to be attracted to the project and respond positively. Based on this, we propose the following hypothesis:

H4. *There is a curvilinear (inverted U-shaped) relationship between emotional arousal in crowdfunding videos and crowdfunding success, with moderate emotional arousal levels being more likely to achieve crowdfunding success compared to low and high emotional arousal levels.*

3.5. Research Model

Building upon signal theory and the preceding literature, we establish a research model to investigate the impact of sound design features in short video advertisements on crowdfunding success. In addition to the four hypotheses, the research model includes control variables to observe whether they affect the main explanatory variables' impact on business performance. These control variables include functional words, cognitive words, emotional words, social process words, and text readability ratios in each audio transcript, as well as image quality in the videos.

4. Materials and Methods

4.1. Data Selected

This study employs multimodal machine learning techniques to analyze crowdfunding promotional videos on the Kickstarter platform, aiming to explore the impact of audio features in these videos on project success. Kickstarter is a well-known global crowdfunding platform, with thousands of projects seeking funding each year [85]. On this platform, projects must reach their funding goals within a specified timeframe, or the collected funds will not be distributed [86]. Therefore, many project initiators upload carefully crafted promotional videos to attract the attention and investment of potential backers, providing a rich and reliable dataset for testing the hypotheses proposed in this study.

We obtained data from Kickstarter, including 4500 crowdfunding campaigns initiated between 2013 and 2016 that included promotional videos. In all crowdfunding videos under examination, the project initiators used the English language. Following the approach of previous research, we excluded projects where creators had than three or more projects, and projects with less than 50 words in their descriptive text to ensure sample reliability [85].

It is worth noting that while our original dataset spans from 2013 to 2016, we acknowledge the importance of including more recent data to ensure the robustness of our findings. However, due to constraints in data availability, we were unable to extend the dataset to include all available data up to 2023. Specifically, some key variables in the earlier years are missing or unreliable. Additionally, the nature of crowdfunding platforms like Kickstarter

means that the impact of audio features on consumer behavior is relatively consistent over time. The core mechanisms and psychological drivers that influence backers' decisions do not change significantly from year to year. Therefore, the data from 2013 to 2016 remains highly relevant and representative for our analysis.

The final valid sample consisted of 3263 projects. Our dataset included three parts: (a) promotional videos for each crowdfunding project; (b) basic information for each project (e.g., planned duration, overall funding goal, descriptive text on the campaign page, start date, geographic location, and category); and (c) crowdfunding outcome data, including the total amount raised by each project, the number of backers, and whether the funding goal was achieved.

4.2. Data Preprocessing

Before conducting data analysis, we performed preprocessing on the crowdfunding video data. First, we used the video processing software Freemake 4.1.12 to convert the videos into audio files and extracted textual information from the audio using natural language processing techniques.

For the audio data of interest in this study, we used the Ultimate Vocal Remover v5 [87] software to isolate the human voice from the audio. We then processed the isolated vocal signals using Praat 6.2, a widely used audio analysis software that can extract and analyze various acoustic features from audio files. We began by segmenting the voice signals using Praat's audio framing function. This process involves dividing a series of sound data points into shorter segments to obtain stable and informative data within appropriate time frames. Following common practices in audio processing, we set the frame length to 20 to 30 milliseconds, using 512 data points per frame and a frame shift of 256 data points. Each frame contained 512 data points, with 256 data points overlapping with the next frame. After the audio framing, we applied a Hanning window function to each frame of the voice signal to ensure continuity between frames. Once the audio framing and windowing were completed, we performed a short-time Fourier transform (STFT) to obtain the time-domain and frequency-domain features of the voice signals. Following these preprocessing steps, Praat generated spectrograms of the input audio and extracted fundamental features such as speech rate, pitch, and loudness. Figure 1 shows an example of feature extraction and a spectrogram generated by Praat software.

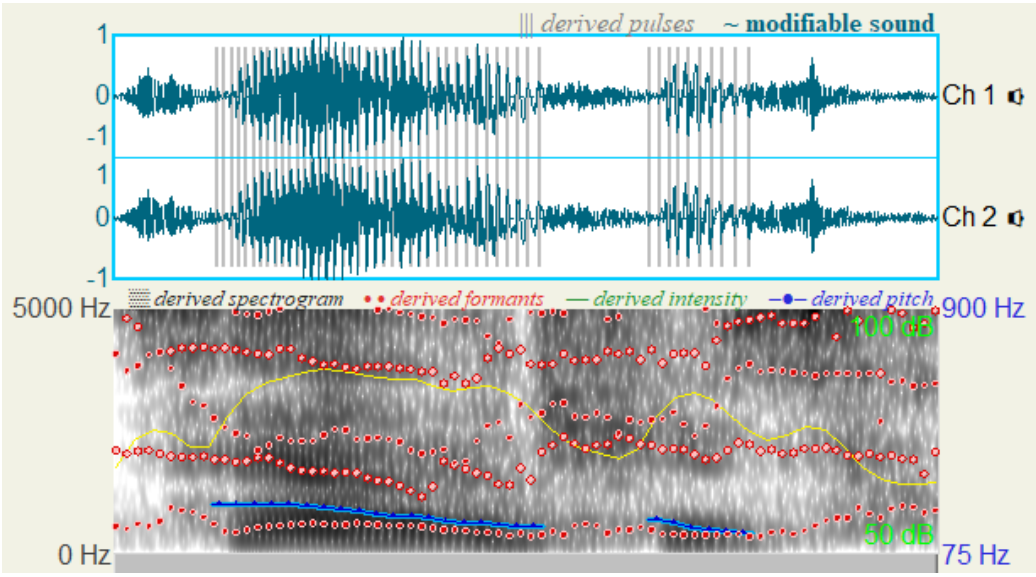


Figure 1. Sound spectrum generated by Praat software.

4.3. Variables Measures

4.3.1. Independent Variables

For speech rate, we combined speech duration data with transcribed text data, calculating the number of words per second in the audio to obtain the speech rate value for each crowdfunding project. Pitch features are determined by the fundamental frequency (F0) of the voice. We used the built-in cepstral analysis method in Praat software to estimate the fundamental frequency in each window and calculated the average fundamental frequency as the pitch feature for each crowdfunding project [88]. Loudness features are determined by the sound pressure level (SPL). Praat calculates the amplitude of the sound signal in each time window and performs a logarithmic transformation to represent the sound pressure level. We calculated the mean sound pressure level as the loudness feature for each crowdfunding project.

Additionally, we used the Beyond Verbal Emotion AI API to identify the emotional arousal in each crowdfunding project's audio. The Beyond Verbal Emotion AI API is an algorithm developed based on psychological and computer science knowledge to help quantify the valence and arousal dimensions of emotions in sound [89]. The software has an accuracy rate of up to 80% in measuring emotional valence and arousal and exhibits high retest reliability (Pearson correlation coefficient = 0.977), making it widely used in academic research [90].

4.3.2. Dependent Variable

To characterize the dependent variable of crowdfunding success, we used two measures: the amount raised and the number of investors.

4.3.3. Control Variables

To better validate our hypotheses and control for variables that might confound the results, we tested several potential influencing factors. First, the textual content of the creator's audio in the crowdfunding video may influence the crowdfunding outcomes [91]. For instance, when project initiators employ wording that conveys excitement, charm, and positivity in their crowdfunding videos, it can significantly enhance the final funding performance [92]. Therefore, we tested features related to the textual content of the crowdfunding video.

Firstly, functional words, typically encompassing elements that facilitate the construction of sentence structures such as prepositions, conjunctions, and auxiliaries, play a pivotal role [93]. Despite conveying minimal lexical information individually, functional words are indispensable for facilitating the listener's comprehension of both the syntactic organization and the logical interrelations within utterances [93]. Secondly, cognitive words, including nouns and verbs, convey the core message of the discourse directly [94]. The selection of appropriate cognitive words can render a speech more concrete and vivid, thereby aiding the audience in constructing understanding and facilitating the retention of the presented content [94]. Thirdly, emotional words refer to those terms that carry strong emotional connotations, such as "love", "fear", and "anger" [95]. The judicious use of affective vocabulary can enhance the persuasiveness and resonance of a speech; however, overutilization might come across as exaggerated or insincere [95]. Fourthly, social process words encompass lexical items that pertain to interpersonal interactions, such as pronouns like "we" and "you", along with verbs indicating requests, commands, or suggestions [96]. The utilization of these social process terms fosters a sense of community or personal connection, thereby enhancing interactivity and engagement in communication [96].

Using natural language processing techniques, we converted the audio into text data and employed Linguistic Inquiry and Word Count (LIWC) 2022 software to calculate various textual content features of the crowdfunding videos, such as the ratio of functional words, cognitive words, emotional words, and social process words [97]. Additionally, we measured the readability of the textual content of the crowdfunding videos. Specifically,

we calculated the percentage of easy-to-read words in each short video advertisement's text as the readability score for the corresponding video advertisement [98].

We also used the Google Colab Notebook developed by Schwenzow et al. (2021) to identify and control the image features of each crowdfunding video [99]. In Google Colab, images are processed by loading them into memory, preprocessing (e.g., resizing, normalization), applying image processing or ML techniques, and visualizing the results using libraries like OpenCV and Matplotlib [100]. Specifically, we measured the image quality of each short video advertisement by detecting edge focus in frames using the Laplacian filter, which is related to proper lighting and blurriness [101]. Table 2 presents the descriptive statistics for all variables used. By controlling these variables, we could more accurately assess the impact of audio features on the success of crowdfunding projects, thereby validating our hypotheses.

Table 2. Descriptive Statistics.

Variable	Mean	SD	Min.	Med.	Max.	N
Amount Raised	6358.73	46,895.84	0	6284.28	1,523,654.85	3263
Number of Investors	155.42	753.45	0	148	4265	3263
Speech Rate	3.77	1.29	0.65	4.32	8.52	3263
Pitch	328.42	21.85	215.25	351.25	448.36	3263
Loudness	49.65	8.25	25.62	45.25	91.25	3263
Emotional Arousal	28.32	5.68	6.52	21.54	52.35	3263
Functional Words Ratio	0.44	0.12	0.14	0.35	0.85	3263
Cognitive Words Ratio	0.16	0.10	0.04	0.21	0.38	3263
Emotional Words Ratio	0.12	0.06	0.05	0.14	0.37	3263
Social Process Words Ratio	0.17	0.02	0.02	0.16	0.28	3263
Readability	0.64	0.19	0.25	0.75	1.58	3263
Image Quality	93.47	10.41	67.82	87.69	178.24	3263

4.4. Results

To ensure the appropriate testing of the hypotheses, this study evaluated the statistical distribution of the dataset to select the suitable econometric method for fitting analysis. The data showed that the average amount raised per project was USD 6358.73 (standard deviation = 46,895.84), with an average of 155.42 investors (standard deviation = 753.45) contributing to each project. This suggests that the dependent variable data exhibit a right-skewed distribution. Following the approach of existing studies analyzing data with similar characteristics, we employed negative binomial regression to fit the data [102]. Specifically, the negative binomial regression model is appropriate for handling count data with overdispersion, effectively addressing the high variability in the amounts raised and the number of investors in crowdfunding projects.

Furthermore, to assess potential multicollinearity issues in the dataset, we computed and examined the Variance Inflation Factors (VIFs) (see Tables 3 and 4). In all cases, the VIF values were below 5, indicating that multicollinearity was not a concern. Through these steps, we ensured the robustness of the data analysis and the reliability of the results.

Table 3. Impact of Crowdfunding Video Audio Features on Funding Raised.

Variables	Model 1		Model 2		Model 3		Model 4	
	β	se	β	se	β	se	β	se
Speech Rate	0.132 ***	0.052						
Speech Rate^2	−0.005 ***	0.002						
Pitch			0.051 ***	0.064				

Table 3. *Cont.*

Variables	Model 1		Model 2		Model 3		Model 4	
	β	se	β	se	β	se	β	se
Pitch^2			−0.011 ***	0.002				
Loudness					0.132 ***	0.058		
Loudness^2					−0.002 ***	0.002		
Emotional Arousal							0.085 ***	0.075
Emotional Arousal^2							−0.006 ***	0.004
Functional Words Ratio	0.001	0.000	0.001	0.000	0.001	0.000	0.001	0.000
Cognitive Words Ratio	0.001	0.000	0.001	0.000	0.001	0.000	0.001	0.000
Emotional Words Ratio	0.020 ***	0.016	0.017 ***	0.015	0.016 ***	0.015	0.016 ***	0.014
Social Process Words Ratio	0.012 ***	0.008	0.015 ***	0.007	0.015 ***	0.007	0.018 ***	0.008
Readability	0.032 ***	0.014	0.029 ***	0.015	0.029 ***	0.015	0.030 ***	0.015
Image Quality	0.002	0.001	0.002	0.001	0.002	0.001	0.002	0.001
Intercept	5.28		6.52		10.85		7.68	
Max VIF	1.21		1.41		1.25		1.45	
χ^2	86.25	0.000	52.28	0.000	67.29	0.000	75.38	0.000
AIC	4347.54		4215.25		4521.42		4228.34	
N	3263		3263		3263		3263	

Note: *** $p < 0.001$.

Table 4. Impact of Crowdfunding Video Audio Features on Number of Investors.

Variables	Model 5		Model 6		Model 7		Model 8	
	β	se	β	se	β	se	β	se
Speech Rate	0.118 ***	0.022						
Speech Rate^2	−0.010 ***	0.005						
Pitch			0.165 ***	0.085				
Pitch^2			−0.028 ***	0.012				
Loudness					0.185 ***	0.062		
Loudness^2					−0.012 ***	0.008		
Emotional Arousal							0.075 ***	0.085
Emotional Arousal^2							−0.011 ***	0.006
Functional Words Ratio	0.003	0.001	0.005	0.002	0.006	0.002	0.005	0.002
Cognitive Words Ratio	0.002	0.001	0.002	0.001	0.002	0.001	0.002	0.001
Emotional Words Ratio	0.015 ***	0.006	0.012 ***	0.006	0.016 ***	0.007	0.020 ***	0.007
Social Process Words Ratio	0.017 ***	0.005	0.018 ***	0.005	0.022 ***	0.010	0.024 ***	0.012
Readability	0.014 ***	0.008	0.016 ***	0.006	0.018 ***	0.010	0.014 ***	0.007
Image Quality	0.002	0.001	0.002	0.001	0.002	0.001	0.002	0.001
Intercept	4.52		5.26		7.52		6.25	
Max VIF	1.52		1.61		1.20		1.75	
χ^2	53.25	0.000	85.25	0.000	72.62	0.000	48.28	0.000
AIC	2625.84		2751.25		2552.47		2428.25	
N	3263		3263		3263		3263	

Note: *** $p < 0.001$.

Incorporating all control variables, this study first explored the impact of each individual audio feature on the amount raised. As shown in Models 1 to 4 in Table 3, all four models exhibited good fit ($\chi^2 > 52.28$, $p < 0.001$). Hypothesis testing revealed that

speech rate had a significant positive impact on the amount raised ($\beta = 0.132$, $p < 0.001$), while the quadratic term for speech rate had a significant negative impact ($\beta = -0.005$, $p < 0.001$), indicating an inverted-U relationship between speech rate and the amount raised. For pitch, the linear term had a significant positive impact on the amount raised ($\beta = 0.051$, $p < 0.001$), and the quadratic term had a significant negative impact ($\beta = -0.011$, $p < 0.001$), suggesting an inverted-U relationship. In terms of loudness, the linear term had a significant positive impact on the amount raised ($\beta = 0.132$, $p < 0.001$), and the quadratic term had a negative coefficient ($\beta = -0.002$, $p < 0.001$), indicating a nonlinear relationship. For emotional arousal, the linear term coefficient was positive and significant ($\beta = 0.085$, $p < 0.001$), and the quadratic term coefficient was significantly negative ($\beta = -0.006$, $p < 0.001$), showing an inverted-U relationship. These conclusions support all the hypotheses proposed in this study.

Next, this study explored the impact of each individual audio feature on the number of investors. As shown in Models 5 to 8 in Table 4, all four models exhibited good fit ($\chi^2 > 53.25$, $p < 0.001$). Hypothesis testing results were as follows: speech rate had a significant positive impact on the number of investors ($\beta = 0.118$, $p < 0.001$), and its quadratic term showed a significant negative impact ($\beta = -0.010$, $p < 0.001$), indicating an inverted-U curve. For pitch, the linear term had a significant positive impact on the number of investors ($\beta = 0.165$, $p < 0.001$), and the quadratic term had a significant negative impact ($\beta = -0.028$, $p < 0.001$), also showing an inverted-U relationship. In terms of loudness, the linear term had a significant positive impact on the number of investors ($\beta = 0.185$, $p < 0.001$), and the quadratic term was significantly negative ($\beta = -0.012$, $p < 0.001$), indicating a nonlinear relationship. The results for emotional arousal were similar, with the linear term having a significant positive impact on the number of investors ($\beta = 0.075$, $p < 0.001$), and the quadratic term being significantly negative ($\beta = -0.011$, $p < 0.001$), displaying an inverted-U characteristic. These results once again support all the hypotheses proposed in this study. The relationships between the independent variables and the dependent variables are illustrated in Figure 2.

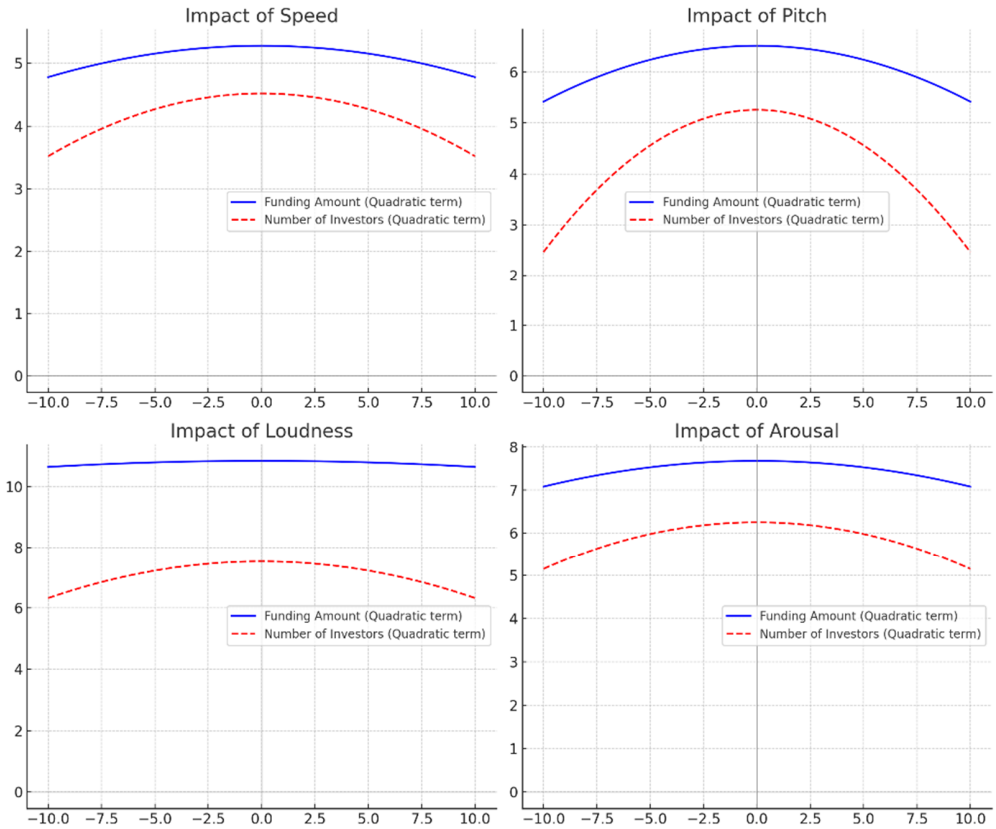


Figure 2. Diagram of the influence of each independent variable on the dependent variable.

4.5. Robustness Checks

The initial dataset comprised crowdfunding video data from the years 2013 to 2016, which may no longer fully capture current trends and patterns. To address this, we supplemented our study with an additional dataset, leveraging scraping software to collect data from 507 crowdfunding videos released between January 2023 and June 2023. Following the analysis procedures outlined in the main text, we applied identical methods to this recent data. The results paralleled our main findings, thereby providing strong support for the validity of our conclusions.

Furthermore, we recognized that the presence of projects with zero funding amounts and investor counts in our original dataset might skew the results and introduce bias. To examine the impact of these project outcomes on our analysis, we conducted additional regressions after systematically excluding these zero-outcome data points. The reevaluated models demonstrated that our original findings remain robust, as the observed relationships between audio features and crowdfunding success persisted even after the exclusion of zero-funding projects.

These robustness checks collectively enhance the reliability of our study, confirming the stability and generalizability of our findings across different datasets and addressing potential data anomalies.

5. Conclusions

5.1. Study Summary

An increasing number of crowdfunding projects are recognizing the importance of multimodal information presentation. Beyond traditional text-based modes, they attempt to enhance the interest of potential backers by releasing crowdfunding videos with different voice characteristics, thereby promoting the success of crowdfunding projects [103]. To explore the impact of voice features in crowdfunding videos on project success rates, we utilized audio mining and audio analysis technologies to investigate the theoretical relationship between four primary audio features (speech rate, loudness, pitch, and emotional arousal) and crowdfunding success in videos posted by different fundraisers on the Kickstarter platform. Our findings indicate that crowdfunding projects achieve the best performance when the four voice features in promotional videos are maintained at moderate levels.

Our findings resonate with previous research on voice features. According to existing studies, different manifestations of voice features can stimulate varied changes in information processing and emotional responses [12]. For instance, speech rate affects listeners' reception speed and depth of processing [10], as well as their emotional responses [54]. Both excessively fast and slow speech rates hinder the development of closeness and trust between the speaker and the audience [62], potentially leading to cognitive barriers [33], and instinctive resistance to the content [66]. Regarding loudness, from a psychological perspective, low loudness intensifies feelings of social exclusion, hindering emotional resonance between the speaker and the listener and making it difficult to elicit agreement and participation [67]. However, when loudness is too high, it triggers extreme emotions such as threat and tension [70], severely disrupting decision-making and memory capabilities and increasing the likelihood of avoidance behavior [69]. Concerning pitch, a moderate effect is evident. In existing consumer behavior research, rising pitch is generally associated with enhanced communication skills, vitality, and emotional positivity [10]. Listeners tend to form positive perceptions of higher-pitched voices [73], leading to more durable memory performance [74], and increased warmth and intimacy [50]. However, when pitch exceeds a moderate range, audiences perceive the content as exaggerated or concealed [63], and the initial warmth and intimacy are gradually replaced by increased risk perception and decision uncertainty, reducing trust [75]. Regarding emotional arousal, while research is limited, scholars suggest that its effects align with those of textual content: compared to low-emotional arousal sounds, lively and upbeat sounds with high arousal levels are more likely to capture cognitive attention and evoke emotional responses [12]. However, when

emotional arousal is too high, it is perceived as an irrational signal [84], activating the brain's stress response system, reducing the depth of information processing, and leading to decision bias [104].

Our study builds on these findings and extends them to the impact of voice features in crowdfunding videos on crowdfunding success. We explain our findings through signal theory [105]. Signal theory posits that a clear and comprehensive project description helps backers better understand the goals, expected returns, and potential risks of a crowdfunding project, enabling them to make more rational investment decisions [30]. Voice features, as part of the video signal [41], can further strengthen backers' understanding of the project beyond visual information [19], effectively transmitting positive signals and increasing the success rate of crowdfunding projects [42].

5.2. Theoretical Implications

This study makes several theoretical contributions. Firstly, by exploring the impact of audio features in crowdfunding videos on crowdfunding success, we broaden the research perspective on crowdfunding performance and open up new avenues for investigating antecedents of crowdfunding success. Previous literature in the crowdfunding domain has primarily focused on how to enhance the success rate of crowdfunding projects through structured information [10,106,107]. Discussions on unstructured information have typically centered around textual language and visual elements, such as language style, lens diversity, and overall visual appeal [29]. Although the promotional effects of voice features have been confirmed across multiple fields [42], such as the influence of music tempo, sound clarity, and variations in speech intonation on viewers' emotional reactions [12], research on acoustical features in the context of crowdfunding remains scarce. This study, therefore, identifies that audio features in crowdfunding videos significantly influence the success of crowdfunding projects from an acoustical perspective. Not only does this address recent calls for research on sound marketing but also expands our understanding of non-verbal communication elements.

Secondly, this study enriches the literature on signal theory. In previous research on crowdfunding, signal theory has mainly been applied to project descriptions and team capabilities, with a focus on visual cues in project descriptions [30]. Our study innovatively uses audio features as a starting point to provide new empirical evidence for signal theory, particularly in the digital crowdfunding context, where audio features serve as a non-traditional form of signal. By examining how audio features influence backers' perceptions and decision-making processes, we demonstrate that high-quality audio content can serve as a credible signal, conveying important information about the true value of the project to backers and reducing their uncertainty and skepticism. This not only broadens potential application scenarios of signal theory, but also provides valuable directions for future research. From a broader perspective, our research explores the importance of leveraging unstructured information, such as audio features, within digital environments. This provides a novel and significant viewpoint on how to transcend traditional research frameworks and investigate a wider variety of signal types and their applications across diverse scenarios. Additionally, our study integrates signaling theory with many concepts and theories related to cognitive processing in psychology, elucidating the interplay between these disciplines. This interdisciplinary application of knowledge offers a more compelling explanation of the stimuli that signaling theory can address from richer and more diverse information sources, greatly expanding its applicability.

Finally, this study fills a research gap in the analysis of voice mining as a precursor to crowdfunding success. Limitations in data and methods have constrained previous studies on the impact of voice features in promotional videos on crowdfunding performance. Our study supplements existing research findings based on surveys and experiments by using innovative machine learning metrics to measure the voice features in real crowdfunding platform promotional videos. In recent years, big data analytics methods based on diverse data structures have gained widespread attention among marketing scholars [108], yet the

application of analyses on audio data within marketing remains limited [109]. This study uses voice mining techniques to extract audio features and develops a process for analyzing voice data in crowdfunding promotional videos, extending the application of sound data and voice mining technology to the crowdfunding literature from a methodological perspective.

5.3. Practical Implications

As competition on crowdfunding platforms intensifies, project initiators are increasingly aware of the need to adopt various strategies to capture the attention of potential backers [31]. Our study provides empirical evidence supporting the use of audio features as a key component.

On one hand, the findings of this study offer concrete recommendations for crowdfunding project initiators on how to create more engaging promotional videos. With the increasing homogeneity of promotional videos on platforms and a decline in user sensitivity to video content [110], finding new ways to increase viewer interest is paramount [111]. This study provides clear guidance for initiators: by adjusting speech rate, loudness, pitch, and emotional arousal to moderate levels, they can effectively enhance the appeal of their videos and increase the success rates of their crowdfunding campaigns. These insights can help initiators save time and resources in designing audio elements for their videos before launching them on crowdfunding platforms. For those who have already released promotional videos, the findings can guide them in making reasonable adjustments to their audio elements to improve project attractiveness.

On the other hand, the results of our study provide methodological insights for crowdfunding platforms. Platforms can leverage audio analysis technologies to decode and categorize audio data in existing promotional videos [112] and match them with corresponding crowdfunding performance for analysis. This can help project initiators better identify and optimize their audio content and adjust the voice features in their videos. Moreover, platforms can use these research findings to improve user interfaces and user experiences, making it easier for backers to find projects with audio features at moderate levels, thereby enhancing backer engagement and satisfaction.

5.4. Study Limitations and Future Study Directions

While this study contributes valuable insights both theoretically and practically, there are some limitations. Firstly, given that all the data collected for this study originated from the Kickstarter platform, there are inherent limitations to the generalizability of the findings when applied to other crowdfunding platforms. Future research could collect data from a broader range of crowdfunding platforms to further expand this study. Additionally, our study conducted an overall analysis of promotional videos on crowdfunding platforms without exploring differences among different types of projects. There is a lack of investigation into how the voice features in promotional videos of different project types may differentially affect crowdfunding performance. Pagani et al. (2019) noted that there is an inherent connection between sound attributes and product types, which may have varying effects on brand building and promotion [113]. Future research could examine the moderating effects of different types of crowdfunding projects on the impact of voice features on crowdfunding performance.

Secondly, the audio loudness we measured in our empirical analysis was based on the pre-set levels in the promotional videos. However, in real life, users can adjust the volume of videos on their viewing devices, meaning that our findings regarding volume need further validation. Future studies should consider manipulating and testing the volume of short videos in a controlled experimental setting to assess their impact on business performance.

Thirdly, due to limitations in data collection, our analysis focused on the impact of various vocal features on the amount of crowdfunding received, without examining whether these features affect the overall success or failure of the campaigns. Future research could provide richer supplementation in this regard. Additionally, considering that the amount of crowdfunding is influenced by the scale of the project, this represents a

limitation of our current study. Subsequent research could further categorize and classify crowdfunding projects, conducting data analysis within more homogenous sample groups to enhance the rigor of the results. Additionally, we did not incorporate proxy variables for the strength of signals from the company, such as the company's tenure, patent filings, and revenue levels, to further test the signaling theory mechanism. Future research could address this limitation by incorporating these company-specific variables and using more comprehensive datasets to further validate and extend the conclusions of this study. Doing so would not only enhance the internal validity of the research, but also provide a deeper understanding of the role of signaling theory in interactive marketing. Furthermore, it is essential to acknowledge a limitation in the representativeness of our data sample. Our dataset is limited in scale and scope, which may affect the generalizability of our findings. Future studies should aim to use larger and more diverse samples to validate these results across different contexts and crowdfunding platforms.

Lastly, due to the limitations of current audio analysis methods, our study did not comprehensively cover known voice features such as language [114], accent, sound quality [115], gender, and aesthetics, among others. For example, listeners might assess the credibility of speakers differently based on vocal gender, which could lead to varying levels of engagement from gender-preferential audiences across different crowdfunding initiatives [116]. These multifaceted influences offer promising avenues for future research, enriching and expanding the application of existing theories in the field of marketing and providing more comprehensive and scientifically grounded guidance for the success rates of fundraising projects. Future experiments, without infringing upon data privacy, could utilize richer datasets through appropriate channels to conduct more accurate analyses and predictions of behavioral patterns and outcomes [117].

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References

1. Belleflamme, P.; Lambert, T.; Schwienbacher, A. Crowdfunding: Tapping the Right Crowd. *J. Bus. Ventur.* **2014**, *29*, 585–609. [CrossRef]
2. Chaney, D. A Principal-Agent Perspective on Consumer Co-Production: Crowdfunding and the Redefinition of Consumer Power. *Technol. Forecast. Soc. Change* **2019**, *141*, 74–84. [CrossRef]
3. Glisovic, J.; González, H.; Saltuk, Y.; de Mariz, F. Volume Growth and Valuation Contraction, Global Microfinance Equity Valuation Survey 2012. *Glob. Microfinance Equity Valuat. Surv.* **2012**. [CrossRef]
4. ReportLinker. Global Crowdfunding Market Overview 2024–2028. Available online: https://www.reportlinker.com/market-report/Online-Investing/494115/Crowdfunding?term=crowdfunding%20statistics&matchtype=b&loc_interest=&loc_physical=2702&utm_group=standard&utm_term=crowdfunding%20statistics&utm_campaign=ppc&utm_source=google_ads&utm_medium=paid_ads&utm_content=transactionnel-4&hsa_acc=7082072004&hsa_cam=15072279998&hsa_grp=136612317091&hsa_ad=568148759031&hsa_src=g&hsa_tgt=kwd-1520371132730&hsa_kw=crowdfunding%20statistics&hsa_mt=b&hsa_net=adwords&hsa_ver=3&gad_source=1&gclid=EAIaIQobChMI8OGP1PmCiAMVCqlmAh0IUwcVEAAYASAAEgI6wPD_BwE (accessed on 20 August 2024).
5. Polaris-Market-Research. Crowdfunding Market Size to Grow Usd 72.88 Billion by 2032, at a Cagr of 16.1% from 2024 to 2032. Available online: https://www.globenewswire.com/news-release/2024/08/12/2928427/0/en/Crowdfunding-Market-size-to-grow-USD-72-88-Billion-by-2032-at-a-CAGR-of-16-1-from-2024-to-2032-Polaris-Market-Research.html (accessed on 23 October 2024).
6. Statista. Percentage of Successfully Funded Kickstarter Projects as of January 2024. Available online: https://www.statista.com/statistics/235405/kickstarter-project-funding-success-rate/ (accessed on 20 August 2024).

7. de Mariz, F. Fintech for Impact: How Can Financial Innovation Advance Inclusion? De Mariz, Frederic. Fintech for Impact: How Can Financial Innovation Advance Inclusion. 2020. Available online: https://ssrn.com/abstract=3715785 (accessed on 22 October 2024).
8. Zhao, K.; Zhou, L.; Zhao, X. Multi-Modal Emotion Expression and Online Charity Crowdfunding Success. *Decis. Support Syst.* **2022**, *163*, 113842. [CrossRef]
9. Peng, Y.; Wang, Y.; Li, J.; Yang, Q. Impact of Ai-Oriented Live-Streaming E-Commerce Service Failures on Consumer Disengagement—Empirical Evidence from China. *J. Theor. Appl. Electron. Commer. Res.* **2024**, *19*, 1580–1598. [CrossRef]
10. Chen, J.; Du, M.; Yang, X. How Emotional Cues Affect the Financing Performance in Rewarded Crowdfunding? An Insight into Multimodal Data Analysis. *Electron. Commer. Res.* **2024**, 1–31. Available online: https://link.springer.com/article/10.1007/s10660-024-09841-6#citeas (accessed on 22 October 2024). [CrossRef]
11. Yang, Q.; Zhou, Y.; Jiang, Y.; Huo, J. How to Overcome Online Banner Blindness? A Study on the Effects of Creativity. *J. Res. Interact. Mark.* **2021**, *15*, 223–242. [CrossRef]
12. Barnes, S.J. Smooth Talking and Fast Music: Understanding the Importance of Voice and Music in Travel and Tourism Ads Via Acoustic Analytics. *J. Travel Res.* **2023**, *63*, 1070–1085. [CrossRef]
13. Wang, C.L. Editorial—What is an Interactive Marketing Perspective and What are Emerging Research Areas? *J. Res. Interact. Mark.* **2024**, *18*, 161–165. [CrossRef]
14. Wang, C.L. Interactive Marketing is the New Normal. In *The Palgrave Handbook of Interactive Marketing*; Springer: Berlin/Heidelberg, Germany, 2023; pp. 1–12.
15. Wang, C.L. Editorial—the Misassumptions About Contributions. *J. Res. Interact. Mark.* **2022**, *16*, 1–2. [CrossRef]
16. Huang, Z.; Zhu, Y.; Hao, A.; Deng, J. How Social Presence Influences Consumer Purchase Intention in Live Video Commerce: The Mediating Role of Immersive Experience and the Moderating Role of Positive Emotions. *J. Res. Interact. Mark.* **2023**, *17*, 493–509. [CrossRef]
17. Frau, M.; Cabiddu, F.; Frigau, L.; Tomczyk, P.; Mola, F. How Emotions Impact the Interactive Value Formation Process During Problematic Social Media Interactions. *J. Res. Interact. Mark.* **2023**, *17*, 773–793. [CrossRef]
18. Mollick, E. The Dynamics of Crowdfunding: An Exploratory Study. *J. Bus. Ventur.* **2014**, *29*, 1–16. [CrossRef]
19. Shi, J.; Yang, K.; Xu, W.; Wang, M. Leveraging Deep Learning with Audio Analytics to Predict the Success of Crowdfunding Projects. *J. Supercomput.* **2021**, *77*, 7833–7853. [CrossRef]
20. Liu, G.; Abolhasani, M.; Hang, H. Disentangling Effects of Subjective and Objective Characteristics of Advertising Music. *Eur. J. Mark.* **2022**, *56*, 1153–1183. [CrossRef]
21. Rutten, S.; Santoro, R.; Hervais-Adelman, A.; Formisano, E.; Golestani, N. Cortical Encoding of Speech Enhances Task-Relevant Acoustic Information. *Nat. Hum. Behav.* **2019**, *3*, 974–987. [CrossRef]
22. La Torre, M.; La Torre, M. Costs and Revenues of Audiovisual Products. In *The Economics of the Audiovisual Industry: Financing TV, Film and Web*; Springer: Berlin/Heidelberg, Germany, 1999; pp. 35–54.
23. Blaseg, D.; Schulze, C.; Skiera, B. Consumer Protection on Kickstarter. *Mark. Sci.* **2020**, *39*, 211–233. [CrossRef]
24. Yu, B. How Consumer Opinions are Affected by Marketers: An Empirical Examination by Deep Learning Approach. *J. Res. Interact. Mark.* **2022**, *16*, 601–614. [CrossRef]
25. Yasar, B.; Yılmaz, I.S.; Hatipoğlu, N.; Salih, A. Stretching the Success in Reward-Based Crowdfunding. *J. Bus. Res.* **2022**, *152*, 205–220. [CrossRef]
26. Ba, Z.; Zhao, Y.C.; Song, S.; Zhu, Q. Understanding the Determinants of Online Medical Crowdfunding Project Success in China. *Inf. Process. Manag.* **2021**, *58*, 102465. [CrossRef]
27. Lu, L.; Jiang, W.; Xu, J.; Wang, F. The Importance of Project Description to Charitable Crowdfunding Success: The Mediating Role of Forwarding Times. *Front. Psychol.* **2022**, *13*, 845198. [CrossRef] [PubMed]
28. Cumming, D.J.; Leboeuf, G.; Schwienbacher, A. Crowdfunding Models: Keep-It-All vs. All-Or-Nothing. *Financ. Manag.* **2020**, *49*, 331–360. [CrossRef]
29. Younkin, P.; Kuppuswamy, V. The Colorblind Crowd? Founder Race and Performance in Crowdfunding. *Manag. Sci.* **2018**, *64*, 3269–3287. [CrossRef]
30. Deng, L.; Ye, Q.; Xu, D.; Sun, W.; Jiang, G. A Literature Review and Integrated Framework for the Determinants of Crowdfunding Success. *Financ. Innov.* **2022**, *8*, 41. [CrossRef]
31. Wang, N.; Liang, H.; Xue, Y.; Ge, S. Mitigating Information Asymmetry to Achieve Crowdfunding Success: Signaling and Online Communication. *J. Assoc. Inf. Syst.* **2021**, *22*, 773–796. [CrossRef]
32. Zhu, J.; Jiang, Y.; Wang, Y.; Yang, Q.; Li, W. Richness and Dynamics: How to Improve Virtual Reality Tourism Adoption with Virtual Social Clues. *J. Res. Interact. Mark.* **2024**, *18*, 142–158. [CrossRef]
33. Wang, Y.; Yang, Y.; Wang, X.; Zheng, Q.; Peng, R. How Do Voice Characteristics Affect Tourism Interpretation Purchases? An Empirical Study Based on Voice Mining. *J. Travel Res.* **2023**, *63*, 6781386. [CrossRef]
34. Steigenberger, N.; Wilhelm, H. Extending Signaling Theory to Rhetorical Signals: Evidence from Crowdfunding. *Organ. Sci.* **2018**, *29*, 529–546. [CrossRef]
35. Heil, O.; Robertson, T.S. Toward a Theory of Competitive Market Signaling: A Research Agenda. *Strateg. Manag. J.* **1991**, *12*, 403–418. [CrossRef]
36. Drover, W.; Wood, M.S.; Zacharakis, A. Attributes of Angel and Crowdfunded Investments as Determinants of Vc Screening Decisions. *Entrep. Theory Pract.* **2017**, *41*, 323–347. [CrossRef]

37. Papoutsi, A.; Sodhi, M.S. Does Disclosure in Sustainability Reports Indicate Actual Sustainability Performance? *J. Clean. Prod.* **2020**, *260*, 121049. [CrossRef]
38. Li, L.; Yang, L.; Zhao, M.; Liao, M.; Cao, Y. Exploring the Success Determinants of Crowdfunding for Cultural and Creative Projects: An Empirical Study Based on Signal Theory. *Technol. Soc.* **2022**, *70*, 102036. [CrossRef]
39. Ma, Z.; Palacios, S. Image-Mining: Exploring the Impact of Video Content on the Success of Crowdfunding. *J. Mark. Anal.* **2021**, *9*, 265–285. [CrossRef]
40. Yang, J.; Li, Y.; Calic, G.; Shevchenko, A. How Multimedia Shape Crowdfunding Outcomes: The Overshadowing Effect of Images and Videos on Text in Campaign Information. *J. Bus. Res.* **2020**, *117*, 6–18. [CrossRef]
41. Gold, B.; Morgan, N.; Ellis, D. *Speech and Audio Signal Processing: Processing and Perception of Speech and Music*, 2nd ed.; Wiley: Oxford, UK, 2011.
42. Wang, X.; Lu, S.; Li, X.I.; Khamitov, M.; Bendle, N. Audio Mining: The Role of Vocal Tone in Persuasion. *J. Consum. Res.* **2021**, *48*, 189–211. [CrossRef]
43. Liu, S.; Si, G.; Gao, B. Which Voice are You Satisfied with? Understanding the Physician-Patient Voice Interactions on Online Health Platforms. *Decis. Support Syst.* **2022**, *157*, 113754. [CrossRef]
44. Horowitz, S.S. *The Universal Sense: How Hearing Shapes the Mind*, 2nd ed.; Bloomsbury Publishing: New York, NY, USA, 2012.
45. Belin, P.; Fecteau, S.; Bedard, C. Thinking the Voice: Neural Correlates of Voice Perception. *Trends Cogn. Sci.* **2004**, *8*, 129–135. [CrossRef]
46. Chang, H.H.; Mukherjee, A.; Chattopadhyay, A. More Voices Persuade: The Attentional Benefits of Voice Numerosity. *J. Mark. Res.* **2023**, *60*, 687–706. [CrossRef]
47. Puligadda, S.; VanBergen, N. The Influence of Sound Logo Instruments on Brand Personality Perceptions: An Investigation of Brand Ruggedness and Sophistication. *J. Bus. Res.* **2023**, *156*, 113531. [CrossRef]
48. Simmonds, L.; Bogomolova, S.; Kennedy, R.; Nenycz-Thiel, M.; Bellman, S. A Dual-Process Model of How Incorporating Audio-Visual Sensory Cues in Video Advertising Promotes Active Attention. *Psychol. Mark.* **2020**, *37*, 1057–1067. [CrossRef]
49. Raney, A.A.; Arpan, L.M.; Pashupati, K.; Brill, D.A. At the Movies, on the Web: An Investigation of the Effects of Entertaining and Interactive Web Content on Site and Brand Evaluations. *J. Interact. Mark.* **2003**, *17*, 38–53. [CrossRef]
50. Sunaga, T. How the Sound Frequency of Background Music Influences Consumers' Perceptions and Decision Making. *Psychol. Mark.* **2018**, *35*, 253–267. [CrossRef]
51. Zhang, S.; Guo, D.; Li, X. The Rhythm of Shopping: How Background Music Placement in Live Streaming Commerce Affects Consumer Purchase Intention. *J. Retail. Consum. Serv.* **2023**, *75*, 103487. [CrossRef]
52. Knoeferle, K.M.; Woods, A.; Käppler, F.; Spence, C. That Sounds Sweet: Using Cross-Modal Correspondences to Communicate Gustatory Attributes. *Psychol. Mark.* **2015**, *32*, 107–120. [CrossRef]
53. Panda, R.; Malheiro, R.; Paiva, R.P. Audio Features for Music Emotion Recognition: A Survey. *IEEE Trans. Affect. Comput.* **2023**, *14*, 68–88. [CrossRef]
54. Christenson, B.; Ringler, C.; Sirianni, N.J. Speaking Fast and Slow: How Speech Rate of Digital Assistants Affects Likelihood to Use. *J. Bus. Res.* **2023**, *163*, 113907. [CrossRef]
55. Melzner, J.; Raghubir, P. The Sound of Music: The Effect of Timbral Sound Quality in Audio Logos on Brand Personality Perception. *J. Mark. Res.* **2023**, *60*, 932–949. [CrossRef]
56. Johnson, V.; Zhu, Z.; Anguera, R.; Bollinger, J.; Eccles, J.; Hardtke, D.; Breza, M.; Zanto, T.P. Increasing Brand Awareness: Memory for Short Audio Ads. *Psychol. Mark.* **2021**, *38*, 1960–1972. [CrossRef]
57. Klein, K.; Melnyk, V.; Völckner, F. Effects of Background Music on Evaluations of Visual Images. *Psychol. Mark.* **2021**, *38*, 2240–2246. [CrossRef]
58. Hwang, A.H.C.; Oh, J.; Scheinbaum, A.C. Interactive Music for Multisensory E-Commerce: The Moderating Role of Online Consumer Involvement in Experiential Value, Cognitive Value, and Purchase Intention. *Psychol. Mark.* **2020**, *37*, 1031–1056.
59. Wang, L.; Qian, D.; Li, O. The Cross-Modal Interaction Between Sound Frequency and Color Saturation on Consumer's Product Size Perception, Preference, and Purchase. *Psychol. Mark.* **2020**, *37*, 876–899. [CrossRef]
60. Imschloss, M.; Kuehnl, C. Feel the Music! Exploring the Cross-Modal Correspondence Between Music and Haptic Perceptions of Softness. *J. Retail.* **2019**, *95*, 158–169. [CrossRef]
61. Ziv, N. Musical Flavor: The Effect of Background Music and Presentation Order on Taste. *Eur. J. Mark.* **2018**, *52*, 1485–1504. [CrossRef]
62. Rodero, E. Do Your Ads Talk Too Fast to Your Audio Audience? How Speech Rates of Audio Commercials Influence Cognitive and Physiological Outcomes. *J. Advert. Res.* **2020**, *60*, 337–349. [CrossRef]
63. Guyer, J.J.; Fabrigar, L.R.; Vaughan-Johnston, T.I. Speech Rate, Intonation, and Pitch: Investigating the Bias and Cue Effects of Vocal Confidence on Persuasion. *Personal. Soc. Psychol. Bull.* **2019**, *45*, 389–405. [CrossRef]
64. Boughanmi, K.; Ansari, A. Dynamics of Musical Success: A Machine Learning Approach for Multimedia Data Fusion. *J. Mark. Res.* **2021**, *58*, 1034–1057. [CrossRef]
65. Yang, C.; Yang, Z.; Zhou, W. Modulating Your Speech Rate: The Effect of Speech Rate on Crowdfunding Performance. *Electron. Commer. Res. Appl.* **2022**, *56*, 101211. [CrossRef]
66. De Waele, A.; Claeys, A.S.; Cauberghe, V. The Organizational Voice: The Importance of Voice Pitch and Speech Rate in Organizational Crisis Communication. *Commun. Res.* **2019**, *46*, 1026–1049. [CrossRef]

67. Wang, D.; Ziano, I.; Hagger, M.S.; Chatzisarantis, N.L. Loudness Perceptions Influence Feelings of Interpersonal Closeness and Protect Against Detrimental Psychological Effects of Social Exclusion. *Personal. Soc. Psychol. Bull.* **2022**, *48*, 566–581. [CrossRef]
68. Zougkou, K.; Weinstein, N.; Paulmann, S. Erp Correlates of Motivating Voices: Quality of Motivation and Time-Course Matters. *Soc. Cogn. Affect. Neurosci.* **2017**, *12*, 1687–1700. [CrossRef]
69. Behler, O.; Uppenkamp, S. Contextual Effects on Loudness Judgments for Sounds with Continuous Changes of Intensity are Reflected in Nonauditory Areas. *Hum. Brain Mapp.* **2021**, *42*, 1742–1757. [CrossRef]
70. Bannister, S. A Vigilance Explanation of Musical Chills? Effects of Loudness and Brightness Manipulations. *Music Sci.* **2020**, *3*, 1774915155. [CrossRef]
71. Fletcher, H. Loudness, Pitch and the Timbre of Musical Tones and their Relation to the Intensity, the Frequency and the Overtone Structure. *J. Acoust. Soc. Am.* **1934**, *6*, 59–69. [CrossRef]
72. Hagtvedt, H.; Brasel, S.A. Cross-Modal Communication: Sound Frequency Influences Consumer Responses to Color Lightness. *J. Mark. Res.* **2016**, *53*, 551–562. [CrossRef]
73. Juslin, P.N.; Laukka, P. Communication of Emotions in Vocal Expression and Music Performance: Different Channels, Same Code? *Psychol. Bull.* **2003**, *129*, 770. [CrossRef] [PubMed]
74. Pourfannan, H.; Mahzoon, H.; Yoshikawa, Y.; Ishiguro, H. Towards a Simultaneously Speaking Bilingual Robot: Primary Study on the Effect of Gender and Pitch of the Robot'S Voice. *PLoS ONE* **2022**, *17*, e0278852. [CrossRef]
75. Reynolds-McIlnay, R.; Morrin, M. Increasing Shopper Trust in Retailer Technological Interfaces Via Auditory Confirmation. *J. Retail.* **2019**, *95*, 128–142. [CrossRef]
76. Zoghaib, A. Persuasion of Voices: The Effects of a Speaker'S Voice Characteristics and Gender on Consumers' Responses. *Rech. Appl. En Mark.* **2019**, *34*, 83–110. [CrossRef]
77. Buechel, E.C.; Townsend, C. Buying Beauty for the Long Run: (Mis)Predicting Liking of Product Aesthetics. *J. Consum. Res.* **2018**, *45*, 275–297. [CrossRef]
78. Dubey, M.; Farrell, J.; Ang, L. How Accent and Pitch Affect Persuasiveness in Radio Advertising. In *Advances in Advertising Research IX*; 2018; pp. 117–130. Available online: https://link.springer.com/chapter/10.1007/978-3-658-22681-7_9#citeas (accessed on 22 October 2024).
79. Cunningham, S.; Ridley, H.; Weinel, J.; Picking, R. Supervised Machine Learning for Audio Emotion Recognition. *Pers. Ubiquitous Comput.* **2021**, *25*, 637–650. [CrossRef]
80. Noteboom, J.T.; Fleshner, M.; Enoka, R.M. Activation of the Arousal Response Can Impair Performance on a Simple Motor Task. *J. Appl. Physiol.* **2001**, *91*, 821–831. [CrossRef] [PubMed]
81. Saxton, B.T.; Myhre, S.K.; Siyaguna, T.; Rokke, P.D. Do Arousal and Valence Have Separable Influences on Attention Across Time? *Psychol. Res.* **2020**, *84*, 259–275. [CrossRef] [PubMed]
82. Coker, B. Arousal Enhances Herding Tendencies When Decision Making. *J. Consum. Behav.* **2020**, *19*, 229–239. [CrossRef]
83. Hsieh, A.Y.; Lo, S.K.; Hwang, Y. Making Customers More Likely to Come Back: The Role of Background Colour in Triggering Arousal to Influence Memory, Attitude, and Patronage Intention. *Electron. Commer. Res.* **2022**, *24*, 2045–2064. [CrossRef]
84. Lang, A.; Dhillon, K.; Dong, Q. The Effects of Emotional Arousal and Valence on Television Viewers' Cognitive Capacity and Memory. *J. Broadcast. Electron. Media* **1995**, *39*, 313–327. [CrossRef]
85. Moy, N.; Chan, H.F.; Septianto, F.; Mathmann, F.; Torgler, B. Confidence is Good? Too Much, Not so Much: Exploring the Effects on Crowdfunding Success. *J. Bus. Res.* **2024**, *182*, 114711. [CrossRef]
86. Fan, T.; Gao, L.; Steinhart, Y. The Small Predicts Large Effect in Crowdfunding. *J. Consum. Res.* **2020**, *47*, 544–565. [CrossRef]
87. Takahashi, N.; Mitsufuji, Y. Multi-Scale Multi-Band Densenets for Audio Source Separation. In Proceedings of the 2017 IEEE Workshop on Applications of Signal Processing to Audio and Acoustics (WASPAA), New Paltz, NY, USA, 15–18 October 2017; pp. 21–25.
88. Styler, W. Using Praat for Linguistic Research. Available online: https://wstyler.ucsd.edu/praat/ (accessed on 15 August 2024).
89. Zhao, Y.; Cheng, B.; Huang, Y.; Wan, Z. Beyond Words: An Intelligent Human-Machine Dialogue System with Multimodal Generation and Emotional Comprehension. *Int. J. Intell. Syst.* **2023**, *2023*, 9267487. [CrossRef]
90. Rokhsaritalemi, S.; Sadeghi-Niaraki, A.; Choi, S.M. Exploring Emotion Analysis Using Artificial Intelligence, Geospatial Information Systems, and Extended Reality for Urban Services. *IEEE Access* **2023**, *11*, 1. [CrossRef]
91. Acar, O.A.; Dahl, D.W.; Fuchs, C.; Schreier, M. The Signal Value of Crowdfunded Products. *J. Mark. Res.* **2021**, *58*, 644–661. [CrossRef]
92. Anglin, A.H.; Pidduck, R.J. Choose Your Words Carefully: Harnessing the Language of Crowdfunding for Success. *Bus. Horiz.* **2022**, *65*, 43–58. [CrossRef]
93. Mahowald, K.; Fedorenko, E.; Piantadosi, S.T.; Gibson, E. Info/Information Theory: Speakers Choose Shorter Words in Predictive Contexts. *Cognition* **2013**, *126*, 313–318. [CrossRef] [PubMed]
94. Pennebaker, J.W.; Francis, M.E. Cognitive, Emotional, and Language Processes in Disclosure. *Cogn. Emot.* **1996**, *10*, 601–626. [CrossRef]
95. Landis, T. Emotional Words: What's so Different From Just Words? *Cortex* **2006**, *42*, 823–830. [CrossRef] [PubMed]
96. Kumpulainen, K. The Nature of Peer Interaction in the Social Context Created by the Use of Word Processors. *Learn. Instr.* **1996**, *6*, 243–261. [CrossRef]

97. Yang, Q.; Huo, J.; Li, H.; Xi, Y.; Liu, Y. Can Social Interaction-Oriented Content Trigger Viewers' Purchasing and Gift-Giving Behaviors? Evidence From Live-Streaming Commerce. *Internet Res.* **2023**, *33*, 46–71. [CrossRef]
98. Crossley, S.; Heintz, A.; Choi, J.S.; Batchelor, J.; Karimi, M.; Malatinszky, A. A Large-Scaled Corpus for Assessing Text Readability. *Behav. Res. Methods* **2023**, *55*, 491–507. [CrossRef]
99. Schwenzow, J.; Hartmann, J.; Schikowsky, A.; Heitmann, M. Understanding Videos at Scale: How to Extract Insights for Business Research. *J. Bus. Res.* **2021**, *123*, 367–379. [CrossRef]
100. Carneiro, T.; Da Nóbrega RV, M.; Nepomuceno, T.; Bian, G.B.; De Albuquerque VH, C.; Reboucas Filho, P.P. Performance Analysis of Google Colaboratory as a Tool for Accelerating Deep Learning Applications. *IEEE Access* **2018**, *6*, 61677–61685. [CrossRef]
101. Yakut, Ö. Diabetes Prediction Using Colab Notebook Based Machine Learning Methods. *Int. J. Comput. Exp. Sci. Eng.* **2023**, *9*, 36–41. [CrossRef]
102. Yang, Q.; Li, H.; Lin, Y.; Jiang, Y.; Huo, J. Fostering Consumer Engagement with Marketer-Generated Content: The Role of Content-Generating Devices and Content Features. *Internet Res.* **2022**, *32*, 307–329. [CrossRef]
103. Hu, A.; Ma, S. *Persuading Investors: A Video-Based Study*; National Bureau of Economic Research, Inc.: Cambridge, UK, 2021.
104. Oatley, K.; Johnson-Laird, P.N. Cognitive Approaches to Emotions. *Trends Cogn. Sci.* **2014**, *18*, 134–140. [CrossRef] [PubMed]
105. Wei, K.S. The Impact of Barrage System Fluctuation on User Interaction in Digital Video Platforms: A Perspective from Signaling Theory and Social Impact Theory. *J. Res. Interact. Mark.* **2023**, *17*, 602–619. [CrossRef]
106. Moy, N.; Chan, H.F.; Torgler, B. How Much is Too Much? The Effects of Information Quantity on Crowdfunding Performance. *PLoS ONE* **2018**, *13*, e0192012. [CrossRef] [PubMed]
107. Shneor, R.; Vik, A.A. Crowdfunding Success: A Systematic Literature Review 2010-2017. *Balt. J. Manag.* **2020**, *15*, 149–182. [CrossRef]
108. Ballouli, K.; Heere, B. Sonic Branding in Sport: A Model for Communicating Brand Identity through Musical Fit. *Sport Manag. Rev.* **2015**, *18*, 321–330. [CrossRef]
109. Ngai, E.W.; Wu, Y. Machine Learning in Marketing: A Literature Review, Conceptual Framework, and Research Agenda. *J. Bus. Res.* **2022**, *145*, 35–48. [CrossRef]
110. Wu, Y.; Huang, H. Influence of Perceived Value on Consumers' Continuous Purchase Intention in Live-Streaming E-Commerce—Mediated by Consumer Trust. *Sustainability* **2023**, *15*, 4432. [CrossRef]
111. Alalwan, A.A. Investigating the Impact of Social Media Advertising Features on Customer Purchase Intention. *Int. J. Inf. Manag.* **2018**, *42*, 65–77. [CrossRef]
112. Gretzel, U.; Fuchs, M.; Baggio, R.; Hoepken, W.; Law, R.; Neidhardt, J.; Xiang, Z. E-Tourism Beyond Covid-19: A Call for Transformative Research. *Inf. Technol. Tour.* **2020**, *22*, 187–203. [CrossRef]
113. Pagani, M.; Racat, M.; Hofacker, C.F. Adding Voice to the Omnichannel and How that Affects Brand Trust. *J. Interact. Mark.* **2019**, *48*, 89–105. [CrossRef]
114. Melitz, J.; Toubal, F. Native Language, Spoken Language, Translation and Trade. *J. Int. Econ.* **2014**, *93*, 351–363. [CrossRef]
115. Yang, Q.; Wang, Y.; Song, M.; Jiang, Y.; Li, Q. Sonic Strategies: Unveiling the Impact of Sound Features in Short Video Ads on Enterprise Market Entry Performance. *J. Bus. Bus. Mark.* **2024**, 1–22. [CrossRef]
116. Martín-Santana, J.D.; Muela-Molina, C.; Reinares-Lara, E.; Rodríguez-Guerra, M. Effectiveness of Radio Spokesperson's Gender, Vocal Pitch and Accent and the Use of Music in Radio Advertising. *BRQ Bus. Res. Q.* **2015**, *18*, 143–160. [CrossRef]
117. Zuboff, S. *The Age of Surveillance Capitalism: The Fight for a Human Future at the New Frontier of Power*; PublicAffairs: New York, NY, USA, 2018.

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