Original Research Article

A Meta-Analysis of Studies Examining the Effect of Music on Beliefs

Communication Research
1–28

DOI: 10.1177/00936502231163633
journals.sagepub.com/home/crx
SAGE

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Abstract

Much research documented the influence of music on various behaviors, including substance use and delinquency. Yet, less is known about its influences on dimensions that are crucial for behavioral outcomes, namely beliefs and attitudes. In this study, we reviewed and meta-analyzed the literature about music effects on beliefs ($n = 82$, published 1972–2021) by mapping the theoretical and methodological features of this literature, focusing on the effect size of various characteristics (e.g., age, design) and on open scientific practices. Results indicate a relationship between exposure to music and music-consistent beliefs, with heterogeneity related to the type of beliefs, modality of exposure, designs, and sample characteristics. We conclude by evaluating this literature and reflecting upon future opportunities in this area of research.

Keywords

meta-analysis, media effects, music, beliefs

Introduction

Music has long been recognized as a crucial source for socialization, especially in relation to antisocial behaviors (Binder, 1993). In this view, studies have documented an association between music messages and behavioral outcomes, such as substance use (Franken et al., 2017), street gang involvement (Miranda & Claes, 2004), delinquency (Mulder et al., 2007), and aggression (Coyne & Padilla-Walker, 2015). This literature suggests that music messages can be internalized and mimicked in real-life behaviors (Miranda, 2013).

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While the literature about the effects of music on behaviors is well-developed, less is known about its effect on the cognitive antecedents of behaviors, such as beliefs and attitudes (Pieschl & Fegers, 2016). In particular, attitudes and beliefs are often considered interchangeable concepts (in the remainder of this article, we will refer to *beliefs* for conciseness purposes) and can be described as evaluative propositions that guide and justify behaviors (Petty et al., 2007). Various studies have shown that future behaviors can be predicted by the salience of current beliefs, hinting at the importance of studying beliefs to explain behaviors (Glasman & Albarracín, 2006). This literature suggests that, in order to better understand the socializing role of music, the influence of music on behaviors should be complemented with the analysis of its influences on beliefs.

Building upon these insights, a review and meta-analysis about the effects of music has indeed demonstrated that exposure to music brings listeners to hold and enact message-consistent beliefs and behaviors (Timmerman et al., 2008). The study of Timmerman et al. was the first effort to systematically assess the state of this literature at the time of its publication. However, the study focused on beliefs *and* behaviors, bringing together effects with potentially different origins, theorized mechanisms, and magnitudes. Moreover, since its publication, the music scene has dramatically changed, especially due to the advent of music streaming platforms, the large diffusion of digital devices such as smartphones, and new modalities of music sharing, such as through social media (Webster, 2020).

Currently, a specific focus on beliefs is lacking and the accumulated evidence since Timmerman et al. (2008) article requires a renewed effort to systematize and meta-analyze existing research. Such a review can help identify gaps in this quantitative literature, including methodological and theoretical issues (Page et al., 2021). More precisely, the main goal of this review is to describe the existing research from a theoretical and methodological point of view and to evaluate this literature in terms of mean effect sizes and power. Specifically, we aim to map the main theoretical frameworks used to link music consumption with beliefs, the types of beliefs studied, and the different music sensory modalities that have been addressed in research (e.g., lyrics, videos). Moreover, we investigate the research design (e.g., experimental, longitudinal) and sample characteristics (e.g., age). Finally, we aim to meta-analyze the effects of studies using different sensory modalities, designs, and samples and to evaluate the extent to which existing research is underpowered and follows open science principles.

A Connectionist Definition of Beliefs

Music is a form of entertainment that has been omnipresent throughout human history, not only for its hedonic (i.e., enjoyable, thought-free, and pleasurable), but also for its eudaimonic (i.e., based on appreciation and meaning-making) potentials, as a source of identity and a carrier of ideological messages (Frith, 1981; Savage, 2019). Among the many socializing roles of music, studies have focused on its effects on beliefs as core components of one's identity (Stets & Burke, 2000). Beliefs have been defined in

multiple ways, often based on the idea that they are subjective linguistic expressions about something or someone (Connors & Halligan, 2015). To say that individuals believe in something means that they are capable of verbally articulating their stance toward the object of the belief. Indeed, beliefs have often been considered as linguistic representations of personal truths, especially in media effect research (Long & Eveland, 2021). In other words, beliefs are often considered as linguistic utterances used to communicate and express someone's position on a topic. This definition allows to consider under the umbrella term of "belief" other concepts, including explicit verbal articulations (e.g., attitudes, opinion) and their (often implicit) antecedents (e.g., schemas, cognitions, script). Priming these antecedents means activating the relevant connections that will be eventually used when verbally articulating the belief itself. The inclusion of explicit and implicit forms of beliefs stems from the consideration that these concepts derive from the same underlying cognitive structure. Such reasoning departs from a connectionist perspective of human cognition, which considers beliefs as articulations of an underlying system of information—often referred to as cultural or cognitive schema—whose connections depend on the frequency and intensity of their co-occurrences (Lakoff, 2012). This framework is widely accepted in contemporary cognitive science (Conrey & Smith, 2007), often used in communication (Price & Tewksbury, 1997) and also in music research (Bharucha, 1987). Accordingly, implicit and explicit definitions of belief both tap upon the same information. What changes is the route through which this information is processed (i.e., automatic for implicit, controlled for explicit, Gawronski & Bodenhausen, 2006). Despite of their analytically different roles, these concepts are often used interchangeably to capture what individuals think about a certain topic and to study media effects on individuals' beliefs (Song & Ewoldsen, 2015). For this reason, in this article we refer to beliefs for conciseness purposes but include in such a definition a broad variety of concepts.

Music Genres, Messages, and Sensory Modalities

The messages studied in music are thought to directly reflect the beliefs that users internalize after music consumption. Individuals are thus expected to form message-consistent beliefs after having listened to or watched songs with certain messages. In this context, a wide variety of beliefs has been studied, including beliefs about sexuality (C. L. Wright & Rubin, 2017), violence (Pieschl & Fegers, 2016), and ethnicity (Sousa et al., 2005). Currently, a comprehensive overview about which types of beliefs and thus messages are the most or least frequently covered is lacking. Such a gap does not allow to take stock of previous research in specific areas, evaluating the maturity of research on certain beliefs (e.g., violence), and concentrating the focus on understudied beliefs (e.g., ethnicity). In order to provide such an overview, RQ1a asked *what are the types of beliefs studied and how frequently has each belief been covered?* (RQ1a). Moreover, to understand whether different beliefs have different effect sizes, RQ2a asked *what is the mean effect size for each type of belief?* (RQ2a).[1]

To identify with their favorite music, listeners tend to use genres for guidance. Genres can be broadly defined as (rather) stable sets of representations, techniques, and themes that aggregate artists and audiences together (Lena & Peterson, 2008). Because of their heuristic function, genres have been one of the main ways scholars studied the role of music in everyday life (Brisson & Bianchi, 2020). This genre-focused literature has especially studied the role of so-called deviant genres, such as heavy metal and rap, especially in relation to antisocial behaviors and beliefs (e.g., Epps & Dixon, 2017). Genres help to orient audiences, but there is much variation within each genre which likely constitutes very different representations (van Venrooij & Schmutz, 2018). For example, rap is generally associated with antisocial behaviors (e.g., drug use, gun violence) but the meanings associated with these behaviors can vary between subgenres (e.g., violence as a display of power in drill music, Stuart (2020), or as a denounce of police violence in conscious rap, Alridge and Stewart (2005)). Moreover, boundaries between genres are often fluid and open to contestation, such that their definition can vary between listeners (van Venrooij, 2009). Overall, these critiques point at the limitation of using genres as a heuristic marker and suggest that they might collapse the variation of music effects among songs from the same genre, yet with different messages (Vlegels & Lievens, 2017).

To address the problems related to genres, researchers have turned to a more specific operationalization of music in which they distinguish the meanings of songs independently from their genres (Pieschl & Fegers, 2016). Such detailed focus is absent when working with genres that function as heuristics to estimate the promotion of particular messages. Moreover, this approach lacks attention to differences within genres (and even to songs within the same subgenre). Currently, it is unclear how much the evidence accrued in this area of research varies when focusing on genres or applying a more detailed approach on messages. In order to develop a comprehensive overview of this issue, RQ1b asked *how frequently have genre- or song-specific messages been studied?* (RQ1b).

This research has shifted the attention from genre-specific to song-specific messages by paying particular attention to the sensory modality in which music is consumed (Brummert Lennings & Warburton, 2011). Music sensory modality refers to the three main types of sensory information in which music is consumed, namely textual (i.e., lyrics), visual (i.e., videos), and auditory (i.e., sounds) information (Pan et al., 2019). Each modality is expected to influence beliefs differently according to how the human brain processes information (Powell et al., 2019). Textual and visual information in, respectively, lyrics and videos convey messages that can be subsequently internalized to form beliefs. While the images present in videos are processed in a fast and automatic way (Barry, 1997), the textual information present in lyrics requires more active and attentive reflection (Messaris & Abraham, 2001). Finally, auditory information constitute the emotional background in which textual and/or visual information is encoded, potentially facilitating the internalization of music messages by synchronizing listeners to the song (through musical features such as rhythm, chords, melody), creating a so-called flow state (Tan & Sin, 2021).

A focus on a single sensory modality is necessary to understand how song-specific messages can be internalized according to specific types of information. Yet, music is often a combination of multiple types of information (Herget et al., 2022). For example, a music video is not uniquely defined by images, but it also contains lyrics and/or sounds. The lyrics and video of the same song can express different or even contrasting messages. When looking at the combinations between textual and visual information, listeners can experience a congruence (or double-dose) effect when lyrics and videos express the same messages (Fikkers et al., 2013; Gerbner et al., 1980). Instead, an incongruence (or discordant) effect occurs when they express different messages (Festinger, 1957; Powell et al., 2019), for example when violent lyrics are represented in a peace-promoting video. In the background, audio information provides the emotional and rhythmic context that might strengthen or further complicate the understanding of the messages. For example, a song with negative messages in the lyrics (e.g., violence) might be accompanied by minor chords and a repetitive rhythm that introduces the listeners in a flow-state in line with the textual information. Alternatively, the same lyrics can be followed by major chords, creating a dissonance between the messages expressed in the lyrics and the song's mood (Kolchinsky et al., 2017).

Together, a focus on music messages and sensory modalities isolates the effects of different types of messages and sources. Yet, it is currently unclear how frequently each modality (alone or combined) has been studied. To have a more comprehensive overview of this issue, we additionally asked *among studies focused on song-specific messages, how frequently have various sensory modalities (i.e., lyrics, videos, sounds) alone, or any combination between them been studied?* (RQ1c).

A focus on messages is expected to bring more accuracy and larger effects compared to the broader category of genres (Allen et al., 2007). However, some authors noticed the lack of efforts to compare the effects between studies focusing on messages and genres, as well as between studies manipulating different sensory modalities (Brummert Lennings & Warburton, 2011). Considering that messages are more easily processed visually rather than textually, videos can be expected to have stronger effects compared to lyrics (C. L. Wright & Rubin, 2017). At the same time, a focus on sensory modality might overemphasize how attentive listeners are to the messages present in lyrics and videos (Marshall, 2019). Rather, some authors argued that a focus on genres might lead to larger effects because of the heuristic function they serve, providing easy-to-retrieve connections between genre-specific messages and beliefs (Redker & Gibson, 2009). In order to shed light on this controversy and to inform future studies, the next research question of this paper asked *what are the effect sizes of studies focusing on genres and song-specific messages?* (RQ2b). *Among studies focused on song-specific messages, what are the effect sizes of studies using different sensory modalities?* (RQ2c).

Theoretical Frameworks to Understand the Links Between Music and Beliefs

The variety of modalities and beliefs chosen to study music may also potentially reflect theoretical choices, as theories likely vary in their explanatory power across

different modalities, design, and beliefs. For example, some theoretical frameworks have been developed to address antisocial beliefs (e.g., general aggression model; Anderson & Bushman, 2002), while others were originally created to understand the formation of misogynistic beliefs (e.g., affective engagement theory; P. J. Wright, 2016). Similarly, while some theoretical frameworks were developed to study short-term effects, more likely captured in experiments (e.g., priming; Price & Tewksbury, 1997), other theoretical frameworks were tailored to study the development of effects over longer periods of time, best captured by survey designs (e.g., cultivation theory; Gerbner et al., 1980). Potentially, the use of theoretical frameworks in this area of research is connected to their original intents.

Heterogeneity also occurs in relation to the sensory modality of interest. Considering that images (in music videos) are easier to process than textual information (in lyrics), it could be expected that the choice of the theoretical framework is guided by considerations about stimulus-specific affordances in information processing (Geise & Baden, 2015). For example, due to their faster processing, it would be reasonable to expect studies using music videos to focus on theoretical frameworks about affect and emotions (e.g., affective engagement theory, see van Oosten et al., 2015). On the contrary, studies on lyrics might derive their strengths from theoretical frameworks that deal with attention and active processing (e.g., social learning theory, see Greitemeyer, 2011). The theorized mechanisms for which music can influence beliefs might reflect the cognitive paths used to process the specific sensory modality under consideration.

It is currently unclear whether the choice of the theoretical frameworks is in line with outcome-, design-, and modality-specific characteristics. If that was not the case, it would mean that three crucial aspects of how and why music might influence beliefs have been disregarded. Such inconsistencies might undermine the tenability of conclusions from previous studies, slowing down the cumulative process of knowledge building that is typical of a thriving field (Popper, 1959). In order to address this gap, RQ1d asks *for each type sensory modality, belief, and design what are the theoretical frameworks employed to explain the effect of music?* (RQ1d). The main goal of RQ1d is to create an overview of the frequency with which theoretical frameworks have been employed to study the effects of music in combination with various modalities, designs, and beliefs (e.g., theoretical frameworks used to study music videos in surveys).

Methodological Characteristics of Research Studying Music and Beliefs

Together with theoretical considerations, the research design of choice is crucial to explain the influence of music on beliefs. In this regard, some scholars remarked difficulties in finding a common ground between generalizability and proper test of causal mechanisms (Pieschl & Fegers, 2016). As noted by Pieschl and Fegers (2016), most of the literature is according to them focused on cross-sectional designs, and few efforts have been invested in adopting designs with high external validity and that allow to test causal mechanisms, such as longitudinal surveys (e.g., Long & Eveland,

2021; van Oosten et al., 2015). Typically, experiments have been one of the most frequently used designs in media effect research in general because of their capacity to isolate the characteristics of interest that are deemed responsible for changes in the outcome (Gervais, 2020). Yet, they have been frequently criticized for their artificial setting, not allowing to determine the reproducibility of the studied effect in real life (Green et al., 2014). More recently, the field of media effects has seen a surge of studies using designs that are better able to disentangle causal mechanisms in a realistic setting, such as longitudinal, computational (e.g., network), and experience sampling designs (e.g., van Atteveldt & Peng, 2018). At the moment, it is not clear if the same applies to the literature on music effects on beliefs. As such, RQ1e asks *how frequently has each design been used?* (RQ1e).

Related to the choice of the design, a commonly reported problem of quantitative media effect research is that self-reported measures might not be accurate and, thus, survey designs might lead to biased estimates (Parry et al., 2021). Moreover, short-term effects might be stronger compared to long-term effects, especially in relation to physiological and emotional responses (Bushman & Huesmann, 2006). As such, experiments might yield the strongest effects as they provide evidence for the short-term consequences of media exposure and do not incur recalling problems (Beaudoin et al., 2007). At the same time, changes in beliefs have been shown to take place over longer periods, and some effects of music might thus best be captured by repetitive measurements rather than short-term experiments (Thomas et al., 2021). In this perspective, studies employing designs that are able to capture within-person differences (e.g., diary and experience sampling method) might capture different effects compared to between-person designs (e.g., cross-sectional survey). In order to understand whether certain designs yielded larger effect sizes than others and to further advance the quantitative research on this topic, RQ2d asked *what are the effect sizes of studies using different designs?* (RQ2d).

Another source of methodological heterogeneity has been suggested to be related to sample composition. Understanding the sample composition allows us to understand whether the literature has mostly focused on a certain population or whether it is biased toward specific groups. A typical example of such bias regards the oversample of WEIRD (i.e., Western, educated, industrialized, rich, and democratic) populations (Henrich et al., 2010). Music is consumed worldwide and, as such, its effects should be explored among many different populations, rather than a few selected ones. In order to understand the sample composition of this literature, RQ1f asked *what is the sample composition in terms of age, gender, country, social class, and ethnic background?* (RQ1f). Following this reasoning, RQ2e asked *are the effect size of samples with WEIRD populations different compared to those with non-WEIRD populations?* (RQ2e).

Among the many background characteristics that define a sample, age has often been considered a particularly relevant characteristic in relation to music. From a lifespan perspective, beliefs are rather stable among adults and are particularly malleable during adolescence (Kiley & Vaisey, 2020). Moreover, during adolescence, music is also a crucial resource as it helps youngsters to complete developmental tasks such as

identity building (Schäfer et al., 2013). Given the unique developmental context in which music is consumed during adolescence, many studies examined the effects of music on behaviors among adolescents (e.g., Franken et al., 2017; Mulder et al., 2007). Despite the evidence that beliefs are more stable among adults than adolescents in other domains or media (e.g., Kiley & Vaisey, 2020), it is still unclear whether this is the case for music. In order to shed light on this aspect and to systematically compare the effect sizes between adolescents and adults, RQ2f asked *is the mean effect size among adolescents significantly different compared to the mean effect size among adults?* (RQ2f).

Finally, the evaluation of field-specific effect sizes can be particularly helpful to evaluate the power of a study. Even if general thresholds are available, such as for the commonly used Cohen's *d* (Cohen, 1988), they are not universal, as each field has its own peculiarities (Schäfer & Schwarz, 2019). The use of meta-analytical tools to address the previous RQs also allows to assess whether studies are underpowered in relation to standard thresholds and a field-specific mean-effect size. Such assessment is crucial to understand the reproducibility and robustness of the results in this area of research (Dienlin et al., 2021). For this reason, our final RQs asked *what is the proportion of underpowered studies according to Cohen's d standard thresholds?* (RQ3a), *as well as to a field-specific mean effect size?* (RQ3b). In addition to a power analysis, RQ3c is also interested in exploring *what proportion of studies has applied open science practices?* (RQ3c). In particular, we follow Dienlin et al. (2021) in measuring the presence or absence of the following aspects: open data, open code, open additional material, pre-registration, pre-print, registered-report, and publication bias.

Methods

Search Strategy and Sample Description

In reporting our identification, selection, and synthesis of studies, we followed the PRISMA guidelines (Page et al., 2021). Web of Science, Scopus, and the EBSCO Communication and Mass Media Complete were searched for relevant research in August 2021, and records were stored on EndNote. The search was performed in all fields (excluding full text), that is, in the article title, abstract, and keywords. Search terms included all the possible combinations between music, influence/effect, and concepts such as belief/attitude/cognition. For the full list of search terms, see Table 1 in Supplemental Appendix.[2] We selected these keywords in order to have a comprehensive overview about the concept of beliefs.

Altogether, the search consisted of 8,976 studies. After removing the duplicates, the number of entries was 5,896. Subsequently, titles and abstracts were screened for inclusion/exclusion based on the eligibility criteria discussed next, which led to 193 studies. Finally, the full texts of these studies were independently read and evaluated by the first author for inclusion/exclusion based on the inclusion criteria discussed next. This step led to 77 studies, with 122 studies removed because outside of the criteria. Inter-rater reliability was established selecting a random sample of 10% of the

193 studies ($n=20$) which full text was independently coded by the authors (Cohen's Kappa = 0.8). Finally, five studies that were not present in the search were added because deemed as relevant by the authors. The final sample of studies used for this article was 82, published between 1972 and 2021, with 326 effect sizes. Figure 1 in Supplemental Appendix shows the flow diagram followed to selected the included studies.

Eligibility Criteria

To be included in the review, studies needed to meet the following inclusion criteria: (a) to use beliefs as dependent variable (in their implicit and explicit forms, excluded beliefs about the music itself, unless it was the main dependent variable of interest) and music as independent variable, (b) to be published in academic peer-reviewed journals written in English, (c) to be full articles and not research reports, conference proceedings, or dissertations, (d) to use a quantitative methodology, such as survey designs (including cross-sectional and panel designs, diary studies, experience sampling designs) and experimental designs (qualitative articles, mixed-method articles, other meta-analyses, and quantitative content analysis were excluded), (e) to provide sufficient statistical information to be used in a meta-analysis such that an effect size can be reconstructed in case it was not directly reported (e.g., sample size, means and standard deviations, *F*-test). No date restrictions were applied.

Data Extraction

The first author extracted the items that were needed to answer the research questions. The following data items were extracted[3]: publication year, journal's name, country of the authors' affiliation(s), country in which the study was conducted, theoretical perspective (if explicitly mentioned in the paper), focus on genre or song-specific messages, music sensory modality, study design, sample composition in terms of age, gender, ethnicity, and social class (measured in objective, such as salary or education, or subjective, such as self-position on a ladder, terms), sample size, performance of power analysis (yes/no), operationalization of music as independent variable, types of beliefs studied as dependent variable, polarity of beliefs, participants' familiarity with the music, use of implicit or explicit measures, availability of open data (yes/no), open code (yes/no), open additional material (yes/no), pre-registration (yes/no), pre-print (yes/no), and registered-report (yes/no) and effect size.

Data Analysis

Before analyzing the data, all the effects were converted into Pearson's correlation coefficients. Given the heterogeneity of effect types and the limitations in transforming certain effect sizes directly into correlation coefficients (e.g., *F*-test with multiple groups), we decided to follow the same procedure for all transformations, converting each effect first into a Cohen's *d* measure and then into a Pearson's

correlation coefficient. We chose Pearson's correlation because of its interpretability and widespread use in meta-analytical studies (e.g., Godefroidt, 2023). In particular, when mean differences and the respective standard deviations were available, they were transformed into Cohen's *d* following Lipsey and Wilson (2001, pp. 172–206) and subsequently into correlation coefficients following Ruscio (2008). When an *F*-test was available, it was first transformed into partial eta squared and then into Cohen's *d*, provided information about degrees of freedom was reported, following Cohen (1988, pp. 276, 281), and finally into correlation coefficients. Other coefficients, such as *t*-tests and *chi-squared* tests, were transformed into Cohen's *d*, provided information about sample size was reported, following Lipsey and Wilson (2001, pp. 172–206), and subsequently into correlation coefficients. When regression coefficients were available, standardized coefficients were preferred. In answering the meta-analysis questions, regression coefficients were excluded as the inclusion of different sets of covariates affects the size and standard error of the beta coefficient, which, in turn, produces biased estimates of the pooled-effect size (Peterson & Brown, 2005).

Our results section was structured along the RQs. In order to answer RQ1s and RQ3c, which were descriptive in nature and answered with descriptive analyses, we calculated the number or proportion of studies using each category of interest (e.g., theoretical frameworks or types of beliefs). RQ2s required a meta-effect approach and were studied with three-level random-effect model meta-analyses to take into account sampling and treatment effect variability within and between studies (Hedges & Vevea, 1998; Van Den Noortgate et al., 2013) and subsequently performed subgroup analysis (Borenstein & Higgins, 2013) to examine differences between categories of interest (e.g., age groups). Orthogonal polynomial contrast were used to determine whether differences between studied groups (e.g., adolescents and adults) were statistically significant (Raudenbush & Liu, 2001). Finally, to answer RQ3a,b, we performed post-hoc power analysis using common thresholds for interpreting the size of correlations (Cohen, 1988) and a field-specific effect size that was obtained from the random effect generated by the random-effect model meta-analyses (Jackson & Turner, 2017). Moderation analyses were conducted using Likelihood Ratio Test between an additive and an interaction model (Viechtbauer et al., 2015).

Results

The 82 examined studies reported a total of 22,059 participants (males = 7,842, females = 9,745), with an average of 235 (Median = 137) per study. Across the studies, the mean effect size of the association between exposure to music and expression of beliefs was positive and significant, $r = .17^{***}$,[4] $SE = 0.07$, within-study variance (v1) = 0.008, between-study variance (v2) = 0.026. Accordingly, consumption of music was associated with an increased likelihood of expressing music-consistent beliefs. This mean effect size refers to various types of music exposures, such as the recall of frequently listened music or the actual exposure to song lyrics or videos, as well as various types of beliefs, such as about gender or aggressivity. To have a more accurate

evaluation of its magnitude and variability, it is thus necessary to answer each research question, which we turn next. Table 2 in Supplemental Appendix shows descriptive information about the selected studies.

Types of Beliefs

The examined literature covered 13 types of beliefs, namely gender ($n=20$, 21%), brand/ad ($n=17$, 18%), race/ethnicity ($n=15$, 14%), sex ($n=12$, 13%), aggressive ($n=9$, 9%), prosocial ($n=6$, 6%), appearance ($n=6$, 6%), political ($n=4$, 4%), homophobic ($n=2$, 2%), substance ($n=1$, 1%), competence ($n=1$, 1%), environmental ($n=1$, 1%), physical activity ($n=1$, 1%). In addition to these categories, three studies (3%) reported beliefs that were not classified in any of these categories because about mixed categories (i.e., criminal behavior and love stories, Jevtić & Milošević, 2021), an experiment-specific narrative (i.e., a movie, Costabile & Terman, 2013), and an experiment-specific condition (i.e., water or family, Benes et al., 1990). Text 1 in Supplemental Appendix describes in detail which beliefs were captured by the categories defined above.

The mean-effect sizes and SEs for each belief, presented in decreasing order, were the following (k indicates the number of effects, not articles, about each type of belief): gender ($r=.24$***, $SE=0.08$, $k=49$), prosocial ($r=.22$, $SE=0.13$, $k=9$), race/ethnicity ($r=.19$**, $SE=0.09$, $k=38$), sex ($r=.16$, $SE=0.11$, $k=16$), aggressive ($r=.13$, $SE=0.11$, $k=17$), political ($r=.12$, $SE=0.17$, $k=7$), appearance ($r=.10$, $SE=0.14$, $k=11$), brand/ad ($r=.09$, $SE=0.10$, $k=18$), homophobic ($r=-.07$, $SE=0.24$, $k=2$). Beliefs with only one reported effect were the following: physical activity ($r=.62$, $SE=0.47$, $k=1$), environmental ($r=.42$, $SE=0.27$, $k=1$), competence ($r=.23$, $SE=0.41$, $k=1$), substance ($r=.05$, $SE=0.33$, $k=1$).[5]

To better understand the distribution of positive and negative attitudes across various types of beliefs, we conducted a follow-up analysis in which we descriptively assessed the direction in which each belief has been studied (see Text 1 in Supplemental Appendix). Such analysis showed that only pro-sociality beliefs (Number of effects related to this belief studied as negative=9, 100%) were explicitly studied as positive, while aggressive ($n=17$, 100%), gender ($n=34$, 48%), homophobic ($n=17$, 100%), and race/ethnicity ($n=41$, 100%) beliefs were all studied as negative.

Exposures and Modalities

Most of the examined literature focused on song-specific messages ($n=69$). In addition, an almost equal proportion of studies focused on genres ($n=7$) and self-reported general exposure to music ($n=6$). Among studies that focused on song-specific messages, the distribution across modalities and their combinations was as follow: lyrics ($n=26$, 36.6%), video ($n=22$, 30.9%), audio ($n=17$, 23.9%), lyrics/audio ($n=4$, 5.6%), video/lyrics ($n=1$, 1.4%). One study (C. L. Wright & Rubin, 2017) also focused on messages posted by music artists on social media (e.g., Twitter and Facebook).

The mean-effect sizes and SEs for each content were the following: song-specific messages (r=.18***, SE=0.07, k=162), genres (r=.10, SE=0.12, k=46), exposure (r=.06, SE=0.34, k=1). Focusing on effects reported in studies that focused on song-specific messages, the mean-effect sizes and SEs for each modality were the following: video (r=.20**, SE=0.08, k=62), lyrics (r=.19**, SE=0.08, k=68), lyrics/audio (r=.14, SE=0.18, k=6), audio (r=.11, SE=0.10, k=24), and lyrics/video (r=.04, SE=0.26, k=2).

Theoretical Frameworks

The examined articles have used 46 different theoretical frameworks to explain the effects of music on beliefs. Table 3 in Supplemental Appendix showed that eight theoretical frameworks have been used more frequently, namely Cultivation theory, Elaboration likelihood model, General aggression model, General learning model, Priming, Social cognitive theory, Social comparison theory, and Social identity theory. The use of these theoretical frameworks across different studies hints at a correspondence between their theoretical assumptions, the type of belief, the modality, and design chosen to study these beliefs. For example, being developed to study televised contents through surveys because of its supposed long-term effects (Potter, 2014), cultivation theory has been mostly employed for music videos and using surveys. Instead, priming theory theorizes short-term effects that are best captured by experimental designs and is often used to study stereotypes (Arendt, 2013). Accordingly, the examined literature employing priming theory focused primarily on experiments and on stereotypes across various axes, such as gender and race/ethnicity. Other examples of the correspondence between these dimensions of interest are the focus of general aggression and learning theories (Anderson & Bushman, 2002) on aggressive and prosocial beliefs, the focus on audio peripheral cues of the elaboration likelihood model (Petty & Cacioppo, 1986), and the focus on beliefs about appearance among studies employing social comparison theory (Gerber et al., 2018).

To better understand which theoretical framework holds the greatest explanatory power, Table 3 in Supplemental Appendix showed that studies working with Social Cognitive Theory (r=.18***, SE=0.07, k=162), Elaboration likelihood model (r=.15, SE=0.13, k=15), and the General Aggression Model (r=.15†, SE=0.08, k=15) reported the highest effect. Yet, only the effects reported in studies using Social Cognitive Theory and Priming (r=.13**, SE=0.06, k=61) as theoretical frameworks reached statistical significance. To further grasp potential differences between mean effect sizes across the studies using these two theoretical frameworks, we conducted two follow-up moderation analyses (Table 6 in Supplemental Appendix). While the first focused on differences between research using Priming versus Social Cognitive Theory and the two beliefs most frequently studied, namely gender and race/ethnicity, the second focused on differences between research using Priming and Social Cognitive Theory together versus research using the other theoretical perspectives. None of these moderation analyses revealed significant effects.

Design

In terms of design, the examined literature mainly employed experiments ($n = 67$, 81.7%), but also cross-sectional surveys ($n = 12$, 14.6%) and longitudinal surveys ($n = 3$, 3.7%). Various measurement instruments were used in order to capture the desired effects within each type of design (n refers to the number of effects captured using each measurement instrument), namely scales (e.g., visual or Likert, $n = 287$), implicit association tests ($n = 16$), word-completion tasks ($n = 17$), and free-association tasks ($n = 6$).

The mean-effect sizes and SEs for each design were the following (no effects were present for longitudinal surveys because they were only analyzed using regression analysis): experiment ($r = .17$, $SE = 0.07$) and cross-sectional survey ($r = .09$, $SE = 0.11$). We also conducted a moderation analysis to test whether beliefs had different effects between studies using implicit and explicit measures (Table 6 in Supplemental Appendix). The results were not significant ($\chi^2 = 4.30$, $df = 2$, $p = .11$), indicating that implicit and explicit measures yielded similar effect sizes for the studied beliefs.

Sample Composition

The examined literature has been mainly conducted in Western countries, namely USA ($n = 37$), Germany ($n = 8$), England ($n = 5$), Australia ($n = 4$), Netherlands ($n = 3$), Belgium ($n = 2$), and Israel ($n = 2$). Two studies have been conducted using online samples (Herget & Albrecht, 2022; Zoghaib, 2019). Other countries that have been sampled (each in one study only) were Canada, China, Fiji, France, Korea, Portugal, Serbia, South Korea, Spain, and Taiwan. Two articles have recruited participants from two countries in the same study, namely Germany and Austria (Greitemeyer & Schwab, 2014), and USA and England (Alexopoulos & Taylor, 2021).

The samples were constituted by participants who were, on average, 21.4 years old ($SE = 0.4$), 41.4% male ($SE = 7.26$), 64.7% white ($SE = 3.35$), and 33.7% from a high social class ($SE = 2.68$). Considering the country where the study was conducted and its racial and class composition, 93% of the studies focused on WEIRD populations. The mean-effect sizes and SE's for each sample were the following: WEIRD ($r = .18^{**}$, $SE = 0.07$), non-WEIRD ($r = .08$, $SE = 0.17$). A follow-up moderation analysis revealed that, in respect to the two beliefs most frequently studied, namely gender and race/ethnicity, the mean effect size of WEIRD countries was not different than the one of non-WEIRD ones. See Table 6 in Supplemental Appendix for a more extensive overview.

A three-level random-effect moderation meta-analysis was used to estimate the mean-effect size between adolescents (younger than 19 years old; Davis, 2013), young adults (between 19 and 25 years old; Park et al., 2006), and adults (older than 25 years old). The mean-effect sizes and SEs for each group were the following: adolescents ($r = .34^{***}$, $SE = 0.12$), young adults ($r = .23^{**}$, $SE = 0.09$), adults ($r = .07$, $SE = 0.11$). An orthogonal polynomial contrast shows that music has, on average, stronger effects

on adolescents compared to adults ($F(1, 106) = 5.10$, $p = .02$), but not to young adults ($F(1, 106) = 1.02$, $p = .31$).

Open Scientific Practices and Power

Performing post-hoc power analyses, the proportion of underpowered (power < 0.80) effects according to Cohen's (1988) thresholds (i.e., small: $r = .10$; medium: $r = .30$; high: $r = .50$) are the following: small (86.5%), medium (15.9%), large (0.31%). When considering a field-specific effect size, calculated as the mean-effect size from a three-level meta-analysis ($r = .17$), the proportion of underpowered studies is 53.1%.

Open scientific practices were rarely followed, with 13.4% of the studies conducting an ex-ante power analysis, 1.22% reporting the open availability of data and code, 8.54% reporting the open availability of additional material, and 1.22% having preregistered the study. No study was pre-printed or submitted as a registered report. Finally, Figure 2 in Supplemental Appendix showed a somewhat symmetrical funnel plot, which symmetry is confirmed by Egger's test ($Z = 1.07$, $p = .29$), indicating no presence of publication bias (Sterne & Egger, 2001).

Discussion

The current meta-analysis showed that exposure to music was related to the holding of music-consistent beliefs in individuals. The examined literature was heterogeneous in the type of beliefs studied, with most of the studies focusing on gender, brand/ad, and race/ethnicity. Exposure to song-specific messages—rather than genres or more general exposure—was the most common type of exposure and the only type of exposure that significantly predicted the expression of music-consistent beliefs. Among studies focusing on song-specific messages, most of them focused on lyrics, videos, and audio, but few ($n = 5$) explicitly focused on the combination between these modalities. Methodologically, most of the existing literature has focused on experiments, few studies have adopted survey designs, especially longitudinal, and no study reported the use of computational designs (e.g., network). We also found that most of the studies included WEIRD populations, and that the effects reported on these population were, on average, stronger than those for non-WEIRD populations. Interestingly, music had stronger effects as the mean sample age decreased. That is, studies with younger samples had, on average, higher effect sizes than those with older samples. Finally, post-hoc power analyses showed that most of the literature was underpowered. Open scientific practices were also rarely followed. Several reflections put these and the other reported results further in perspective.

First, despite using search-terms explicitly related to a causality language (e.g., "effect"), we caution against a causal interpretation of our results. Most of the included articles used an experimental setting to study the effects of exposure to music messages. Yet, this does not exclude that selection effects can occur and that a reverse causality can be present in the link between music exposure and music-consistent beliefs. That is, individuals' beliefs can be influenced by music messages, but they can

also guide the selection of the music listened to (for reasons that vary from individual, such as identification with the artist, to structural, such as algorithmic recommendation systems; see P. J. Wright, 2016). All the studied experiments included a predefined music stimulus, not allowing respondents to choose between different songs and, consequently, to reflect about selection mechanisms. The lack of longitudinal studies further impedes the exploration of reinforcing spiral mechanisms. Given that most effects were examined in an experimental setting, we know more about short-term priming effects, but less about the long-lasting changes in beliefs due to music exposure. These caveats are relevant to contextualize the reported effects and their implications and call for more theoretical and methodological efforts in the field to disentangle selection and long-term effects of music exposure among audiences.

Second, the results need to be interpreted within a temporal perspective. More precisely, we noted an overall increase in the number of studies interested in music effects on beliefs. This increase was particularly present since 2008 (Figure 4 in Supplemental Appendix), the year in which Timmerman et al. published their meta-analysis.[6] Potentially, the latter research inspired subsequent research in this area. Interestingly, Table 7 in Supplemental Appendix showed that the mean effect size of the two beliefs most frequently studied, namely gender and race/ethnicity, was not different between studies conducted before and after 2008. This indicates that, despite substantial changes in the music landscape (e.g., emergence of music streaming platforms, of smartphones and social media), the extent to which music influences beliefs has remained the same. The time analysis further showed a fluctuation in the number of studies focusing on negative beliefs (Figure 5 in Supplemental Appendix) and, most importantly, the emergence of studies focusing on positive beliefs since the turn of the century. This is consistent with a general trend in media effects scholarship to attribute more attention to positive outcomes (e.g., Maes & Vandenbosch, 2023).

Third, the literature was heterogeneous in the type of beliefs studied, with most of the studies focusing on gender, brand/ad, and race/ethnicity. Moreover, the effects of music on gender and race/ethnicity beliefs were the only ones that reached statistical significance. A follow-up analysis showed that beliefs about race/ethnicity were exclusively negative (in terms of stereotypes), while those about gender were either negative (48%) or neutral (52%). These results can be interpreted as reflective of the long-standing public concerns about music's anti-social effects, especially on stereotypes, violence, and misogyny beliefs and behaviors, that have also been the central focus of much academic literature on music, especially in relation to rap music (e.g., Dixon & Linz, 1997; Miranda & Claes, 2004). At the same time, these concerns have also been criticized as stemming from broader stereotypes associated with genre-specific music subcultures as well as related to moral panics recurrently surfacing at the emergence of new technologies (Orben, 2020). Especially in relation to rap, Epps and Dixon (2017) noticed how previous literature about rap did not make enough efforts to search for positive messages and to venture outside of the mainstream production of rap, governed by major labels that often push widely accepted narratives for monetary gains (Arditi, 2020). Epps and Dixon (2017) further considered this academic focus on mainstream and negative messages as problematic, as it narrows the depiction of

Black individuals and culture into stereotypical representations of violence and hyper sexualization (Ross & Coleman, 2011). Such concern is indeed substantiated in our results, as most of the themes typically touched by rap have been studied in terms of negative effects. Attention to positive messages and effects in genres such as rap can help to have a more complete picture of its effects and add more nuance to scholarly insights on the positive versus negative effects of a particular genre.

Fourth, studies differed in their approaches to music exposure, designs, and modalities. More precisely, to better understand how music and beliefs were related, we first examined how individuals were exposed to music. Exposure to song-specific messages—rather than genres or more general exposure—was the most common type of exposure in the studied literature and the only type of exposure that significantly predicted the expression of music-consistent beliefs. In other words, the extant literature recommends to focus on song-specific messages (e.g., comparing the effects of songs with similar messages expressed through different words) rather than to genres in order to understand whether music influences individuals' beliefs. This is surprising considering that the literature on music has generally focused on genres as crucial agents in processes of identity formation and socialization, especially in relation to anti-social beliefs and behaviors, such as for rap and heavy metal music (e.g., Coyne & Padilla-Walker, 2015).

We believe that the null finding on genre is the result of different measurement strategies (e.g., lack of a common set and definition of genres) in this literature as well as of intrinsic problems in the study of genres as broad categories of interest. While studies that focus on song-specific messages are able to precisely measure the type of information that is used to convey certain messages (e.g., words or images) and to align them with the specific beliefs that are of interest, studies focusing on genres are, by their own nature, more general. Genres are heuristic categories with fuzzy boundaries and great within-genre message heterogeneity (van Venrooij, 2009). Methodologically, this point can further be illustrated by looking at differences in design. While exposure to song-specific messages was mostly studied in experiments (84%), exposure to genres was uniquely studied in cross-sectional surveys. As such, studies focusing on genres can be less able to detect effects because of the incapacity of surveys to exactly manipulate the variables of interest but also because of the enormous heterogeneity that exists within genres. This does not mean that the research on genres is doomed to be neglected in the study of individuals' socialization. Instead, we recommend future research to adopt more experimental designs in the study of genre-specific effects and to more specifically focus on sub-genres, rather than mainstream genres, in contextualizing the formation of beliefs within sub-genre-specific messages and sub-cultures (Lena & Peterson, 2008; Wilderom & van Venrooij, 2019). In fact, while mainstream music might account for the largest share of popularity in general (i.e., by definition, most people know about mainstream music), this does not necessarily mean that it accounts for the largest share of music preferences within each user. In other words, being aware of the existence of mainstream artists does not necessarily mean that they are the most frequently listened to by each user. In order to better understand the effects of music, it is therefore also important to focus on music genres

that are the most attended to by different audiences, including more fine-grained subgenres and local artists.

Among studies focusing on song-specific messages, most of them focused on lyrics, videos, and audio, but few ($n = 5$) explicitly focused on the combination between these modalities. The findings on modalities have several implications. A first implication is that the lack of cross-modality studies can most likely be attributed to the complexity of a design that can disentangle the effects of various combinations of music information, such as lyrical and visual, in the same study. Yet, such a gap has important consequences for the study of music effects, as it forces the study of music within modality-specific choices (e.g., in terms of designs and theoretical frameworks), obstructing a broader understanding of how various types of music information interact in influencing listeners' beliefs (Yu et al., 2019). Future studies are therefore recommended to take stock of the limited existing literature, and to further advance this literature in the direction of a cross-modality understanding of music effects.

Another implication relates to the surprising finding that exposure to messages in music videos had the same statistically significant effect than lyrics, considering that visual information is more easily processed than textual (Powell et al., 2019). Being encoded faster and more easily, the visual information present in videos can be expected to lead to a faster and easier decoding in the form of beliefs (Barsalou, 2008), but we did not see this when comparing them to lyrical effects. This finding might be explained by a problem with external validity, which is typical for experiments. It is possible that when invited in an experiment and asked to listen to a song, participants pay more attention to lyrics than in everyday life. In other words, this would mean that the similar effect between lyrics and videos is not the result of actual differences but artificially created by the use of experiments. Future studies might employ designs with a better ecological validity (e.g., experience sampling methods) and explicitly account for the role of attention in order to understand how and to what extent the exposure to music lyrics can influence individuals' beliefs.

Fifth, the existing literature has mostly focused on media effect theoretical frameworks that either privilege short-term exposure effects, such as priming (Price & Tewksbury, 1997) and the elaboration likelihood model (Petty & Cacioppo, 1986), or long-term exposure effects, such as social cognitive theory (Bandura, 2001) and cultivation theory (Gerbner et al., 1980).[7] The use of theoretical frameworks that focus on short-term effects, such as priming and the elaboration likelihood model, should be carefully considered when applied in relation to beliefs. Especially among adults, beliefs are rather stable across one's lifespan. When beliefs do change in adults, it happens rather gradually and thus over time (Kiley & Vaisey, 2020). As such, theoretical frameworks focusing on long-term effects (and related methodological designs, e.g., longitudinal research) may be more suitable when focusing on belief changes in adults due to music exposure. Preferably, future research using such theoretical frameworks can select in particular those that also capture selection and reciprocal effects. Individuals do not experience music content from a blank state; instead, their prior beliefs (and behaviors) are crucial to contextualize choice and subsequent exposure to musical experiences (Franken et al., 2017). Theoretical frameworks known for

focusing in particular on such dynamic selection and effect processes appeared to be absent in the field. As such, future (longitudinal) research is recommended to apply such frameworks (e.g., Powell et al., 2019; Slater, 2015).

Sixth, the analysis of sample composition showed attention points regarding country and age. As for country, most studies were conducted in countries from the Global North, especially in the US and Western-Europe. Looking at the demographics, most of the sampled participants were female, young adults, white, and from a middle-high social class, even though only a handful of studies reported information about class origins. We found that most of the studies included WEIRD populations, and that the effects reported among these population were, on average, stronger than those for non-WEIRD populations. Yet, only 7% ($n = 9$) of the studies included non-WEIRD populations, a result that calls for a closer focus on the experience of historically-marginalized groups (e.g., people of color, specific ethnic groups, individuals from lower social classes) and on countries from the Global South. We also acknowledge that our decision to only include English-language articles might have had an impact in the sampled populations, as many countries where studies are being published in a non-anglophone language were not considered. Our choice was motivated by the difficulty in accessing literature that used language-specific search-terms and, when eventually captured, in translating such literature. We encourage future efforts to conduct comparative analysis between two or more countries (and in particular WEIRD vs. NON-WEIRD samples) to better understand inter-cultural differences in this area.

As for age, we found that music exposure had stronger effects when the mean sample age decreased. That is, studies with younger samples had, on average, higher effect sizes than those with older samples. This finding is consistent with previous literature showing the importance of music among adolescents and young adults (Primack et al., 2009), but it is in contrast with findings from the previous meta-analysis of Timmerman et al. (2008). According to the latter study, older individuals tend to have stronger effects than younger ones. Their results included both beliefs and behaviors and may have been especially driven by the behavioral effects of music. Behavioral versus belief effects are recommended to not be mixed when comparing adolescents and adults. From a developmental perspective, adolescence is a period of intense changes and beliefs are known to be especially fluid in this period (Miranda, 2013). To better understand the role of developmental phases in music literature, future studies may benefit from using theoretical frameworks that have been specifically developed to study adolescents, such as the adolescents' media practice model (Steele & Brown, 1995) or the music marker theory (Ter Bogt et al., 2013) and to more explicitly combine the study of certain effects (e.g., behaviors, beliefs) with the characteristics of the population of interest (e.g., adults, young adults, adolescents).

Seventh, future literature is recommended to pay attention to two main aspects related to the credibility and reliability of their analyses and conclusions. First, post-hoc power analyses showed that the majority of the studies were underpowered. We came to this conclusion when using a Cohen's *d* general thresholds for small effects

(86.5%), which is typical of media effect studies, as well as using a field-specific mean-effect size (53.1%). In other words, it is possible that, for half of the articles analyzed, the effects are actually not significant, or they could have been significant with a larger sample. Uniquely speaking from a statistical point of view, the lack of a power analysis does not permit to clearly evaluate whether the effects found in the sample are actually true effects in the (again, unknown) case in which the true effects in the population were different.

Second, the adoption of open scientific practices was rare, with very few studies following any of the open scientific requirements, such as making the data and syntax available or pre-registering the study. These results do not seem to be driven by the exclusive publication of significant results as we did not find evidence of publication bias.

Finally, our findings should to be contextualized within the changes in the contemporary media landscape that are crucial for how people consume music and, subsequently, how they are influenced by such consumption. The advent of music streaming platforms and of social media such as Instagram and TikTok has occurred at the expenses of traditional media, such as the radio (Bonini & Gandini, 2019), but also of specific channels where music was previously consumed, such as on MTV (Edmond, 2014). Accessing music on streaming platforms, such as Spotify, and sharing it on social media means that music lyrics have become more central in listeners' everyday life compared to music videos. This does not mean that listeners pay more attention to the lyrics than before, but simply that lyrics have acquired a more central position while music videos have become less central. As such, the effects of music videos versus lyrics should be contextualized within this landscape, where lyrics and audio, rather than videos, seem to guide the music experiences of contemporary audiences. Future research is therefore recommended to better understand the role of music streaming platforms in boosting the exposure to music lyrics and their potential effects on audiences' beliefs.

We envision two potential ways—one theoretical and one methodological—in which the role of music streaming platforms can be taken into account. Articles using various media theories to study music effects have often considered music listeners as passive agents that receive music messages and are expected to internalize them dependently on the length and modality of exposure (e.g., Greitemeyer, 2011). Yet, few efforts have so far been invested to contextualize such effects within the existing and fast-changing music industry, in which listeners have endless opportunities to consume music and recommendation algorithms recommend users relevant music according to their listening profiles. Such changes generate questions about choice, self-selection, and reciprocal effects between selected contents and beliefs. Theoretical frameworks that directly deal with reciprocal selection effects (e.g., self-reinforcing spiral model, Slater, 2015) might better tackle questions that come with the advent of new platforms and streaming services than the current used theoretical frameworks in the field (e.g., ELM model). Individuals might be influenced by music because of the constant reinforcement of previously existing beliefs that are present in songs or represented by artists who are continuously selected by users and are recommended to them by

algorithms. Taking this selection process into account would shift the focus from the length and modality of music exposure, which considers users as passive, to a contextualization of audiences and platforms as active agents in the selection, consumption, and interpretation of music contents. This also means that the (yet) unexplored relationships between algorithmic recommendation systems, self-selection, and music effects can open up new opportunities for theoretical developments of music effect models that integrate different media theories within the particular context of music.

Methodologically, most of the existing literature has focused on experiments, few studies have adopted survey designs, especially longitudinal, and no study reported the use of computational designs (e.g., network). The overarching majority of experiments increases the confidence in the results presented in this study, as they are more robust than survey designs in manipulating and detecting media effects (Barabas & Jerit, 2010). The use of cross-sectional surveys is not, per se, problematic. Yet, it should be noticed that measuring *effects* requires designs that are capable of tackling questions about causality. Future research should therefore strive for a wider variety of causal designs (e.g., network, experience sampling methods, conjoint experiments) that are better able to incorporate the fleeting nature of music experiences going beyond single measurements, not only in surveys but also in experiments (Knudsen & Johannesson, 2019).

Taken together, the results of this meta-analysis indicate a variegated and effervescent area of research, with many potentials for new developments. Exposure to music is related to audiences holding message-consistent beliefs, which vary according to the type of belief studied, music modality, design choices, and sample characteristics. Interdisciplinary efforts are thus required to systematically address the various axes along which music is expected to socialize and influence audiences. Importantly, these quantitative efforts should take advantage of the availability of free technologies (e.g., open repositories such as OSF, free statistical software such as R or Python) to preregister, share, and promote collaborations in order to take stock and further advance the research on this topic.

Acknowledgments

We wish to thank Kathrin Karsay, Paul Wright, and Bobby Tokunaga for their helpful comments on earlier drafts of this article. We also thank the three anonymous reviewers for their comments that helped to greatly improve this work.

Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The authors disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This research was funded by the European Research Council (ERC) under the European Union's Horizon 2020 research and innovation programme (number 852317).

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Supplemental Material

Supplemental material for this article is available online.

Notes

1. In this article, we distinguish three types of RQ. RQ1 refers to descriptive information, RQ2 to meta-analytical effects, and RQ3 to the robustness of the results (i.e., statistical power and open scientific practices).
2. The data, syntax, pre-registration, and Appendix can be found on OSF at this link: https://osf.io/v8dx3/?view_only=b7123afbd1664141935f108b67cf8e07
3. We refer to Text 1 in Supplemental Appendix for a more detailed explanation of the extracted categories.
4. Throughout the article, we refer to the following notation for significance level: .001 "***" .01 "**" .05 "*" .1 "†" 1 " "
5. We conducted robustness checks with familiarity with the music as a control variable (Table 6 in Supplemental Appendix). None of the results changed. We also conducted a moderation analysis to test whether beliefs have different effects between WEIRD and non-WEIRD countries (Table 6 in Supplemental Appendix). The difference was not significant.
6. We conducted moderation analysis to test whether beliefs have different effects before and after 2008 (Table 6 in Supplemental Appendix). The difference was not significant.
7. We conducted moderation analyses to test whether beliefs have different effects between (1) studies using priming and social cognitive theory and (2) studies using either priming or social cognitive theory and all the rest (Table 6 in Supplemental Appendix). Neither of these comparisons was significant.

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