Published citation:
Putter, K. C., Krause, A. E., & North, A. C. (2021). Popular music lyrics and the COVID-19 pandemic. *Psychology of Music,* advanced online publication. https://doi.org/10.1177/03057356211045114

Popular music lyrics and the COVID-19 pandemic

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Contributorship
KP and AK collaboratively developed the study and conducted data collection. KP conducted the data analysis, with input from AK. KP drafted initial versions of the manuscript, with AK and AN offering input. All authors collaborated to approve the final version of the manuscript.

Funding Acknowledgement
This research received no funding.

Acknowledgement
The authors wish to thank participants of the Australian Music & Psychology Society's 2020 virtual conference for their early feedback on this project.

Abstract

A limited amount of previous research suggests that deteriorating socioeconomic conditions may be associated with greater popularity of music lyrics featuring negative emotional content and references to relationships. The present research considered this in charting popular music before and during the first six months of the COVID-19 pandemic. A dataset based on the song lyrics of the top-5 charting weekly songs in the UK and USA from January 1999 to August 2020 was computer-analysed for interpersonal variables, such as satisfaction and human interest, and positive and negative emotional valence. Results indicated lower satisfaction and human interest in lyrics in the USA and UK in the first six months of the COVID-19 pandemic compared to the lyrics in charting songs in 2015-2019. The USA charting songs in 2020 also saw higher leveling and negative emotional content; and, when considering monthly data from 1999-2020, there was a positive association between economic misery and the number of negatively-valenced words. The findings broaden our understanding of the relationship between significant global events and trends in popular music.

Keywords: popular music, lyrics, charts, COVID-19, pandemic, Diction

Popular music lyrics and the COVID-19 pandemic

In 2020-21 there was a pandemic of coronavirus disease (COVID-19) that is ongoing at the time of writing. Aside from the immediate health risks to those contracting COVID-19, entire national populations experienced significant social isolation and disruption as a consequence of 'lockdown' measures intended to slow the spread of the disease which required them to remain at home. This in turn caused widespread socioeconomic damage. In even the early stages of the pandemic, it became clear that music might be playing a role in how individuals addressed these socioeconomic stressors. For instance, news reports described how Italy and Spain saw mass communal singing from home balconies, and Lehman (2020) reported significantly increased streaming of some of the songs concerned. This is unsurprising, since studies conducted pre-COVID-19 indicated that listeners receive consolation through the interpretation of lyrics as meaningful (ter Bogt et al., 2017); and that cultural products, such as song lyrics, reflect shifts in psychological traits, emotions, and goals across generations (DeWall et al., 2011). Popular song lyrics may provide insight into prevailing psychological characteristics, as well as long-term evolutionary dynamics, of culture (Brand et al., 2019; DeWall et al., 2011). The occurrence of the COVID-19 pandemic provides a means of testing this, and the present research used computerised quantitative content analyses of the lyrics of top five weekly singles in the UK and USA to examine the relationship between the COVID-19 global health pandemic and the prevalence of various lyrical themes.

While researchers have begun to examine individual listeners' responses to music during the COVID-19 pandemic (e.g., Cabedo-Mas et al., 2020; Krause et al., 2020; Vidas et al., 2021), the present study is concerned with making use of historical data at population level to examine changes in lyrical content. Previous research considering trends in popular music lyrics has focused on gender roles, misogyny, and violence (e.g., Barongan & Hall,

1995; Freudiger & Almquist, 1978; Rasmussen & Densley, 2017; Stickle & Tewksbury, 2015), interpersonal relationships (e.g., North et al., 2018), and substance use (e.g., Hardcastle et al., 2015; Herd, 2005). Lyrical themes during periods of war and changing political conditions (e.g., Van Sickel, 2005) and during differing socioeconomic conditions (e.g., Pettijohn & Sacco, 2009a) have also been considered.

In addition to these, several content analyses of popular music lyrics have tracked temporal changes in very specific topics such as love and references to drugs and alcohol. These studies have highlighted the increased prevalence over time of sexually explicit lyrics (Christenson et al., 2019; Dukes et al., 2003), references to infidelity (Alexopoulos & Taylor, 2019) and female objectification and other misogynistic themes (Adams & Fuller, 2006; Flynn et al., 2016; Ross & Coleman, 2011). Moreover, several studies have found a progressive increase in the prevalence of references to alcohol, tobacco, cannabis, and other illicit drugs within popular music (see Christenson et al., 2019; Christenson et al., 2012; Hall et al., 2013; Holody et al., 2016; Primack et al., 2008; Siegel et al., 2013).

In addition to content analyses of particular subjects in lyrics, several studies in recent years have indicated that popular music lyrics have become more emotionally negative over time. For instance, studies have indicated that the lyrics of popular music since the 1960s have contained progressively lower levels of diversity, lexical complexity (Meindertsma, 2019) and positively-valenced emotional content (Brand et al., 2019; Meindertsma, 2019). Similarly, Napier and Shamir's (2018) sentiment analysis of the lyrics of popular songs on the Billboard Hot 100 between 1951 and 2016 indicated a substantial shift towards a more negative tone in lyrical content, and increasing reference to anger, fear, and sadness. Similarly, DeWall et al (2011) found that positive emotion in popular U.S. song lyrics was associated negatively with the year in which the song became well-known. Kresovich et al. (2020) analysed the lyrics of popular rap songs between 1998-2018. References to depression

and suicide increased substantially over time, and Kresovich et al. (2020) note that this corresponds to increasing rates of anxiety, depression, and suicidal ideation in the US over the same period. Work, romantic relationships and environmental conditions were among the stressors which co-occurred with mental health references in rap lyrics. Kresovich et al. (2020) suggest that through popular rap music, artists connect macro-level stressors with mental health risk.

Lyrical Themes and Socioeconomic Conditions

In addition to this trend over time towards more emotionally negative lyrics, research indicates that specific socioeconomic circumstances appear to be related to the themes found in cultural objects that become popular at the time. Drawing on print media, Iliev et al. (2016) measured war casualties among US armed forces from 1800-2010. This data was compared against a measure of linguistic positivity bias (the cross-cultural tendency for individuals to use more positive than negative words) in American English Google books (1800-2010) and *New York Times* (1851-2015) corpus data. Iliev et al. (2016) calculated the index of linguistic positivity bias by separately tallying all negative and positive words and dividing them by the total number of words in the corpus for that year, which allowed calculation of the ratio of positive to negative words. They found that the number of military casualties significantly predicted linguistic positivity bias, such that higher numbers of military casualties were associated with lower positivity bias in text corpora (Iliev et al., 2016). Moreover, Iliev et al. (2016) compared the linguistic positivity bias found in the same corpus data against Okun's Misery Index (1948-2015), which is calculated as the sum of unemployment and inflation rates. This Misery Index was a significant predictor of linguistic positivity bias, such that deteriorating economic conditions were associated with a decrease in linguistic positivity bias (Iliev et al., 2016). In summary, negative circumstances such as war and declining economic

conditions were associated with a decreased prevalence of positive emotional content in print media.

Several other studies also show that the popularity of lyrical themes may be associated with socioeconomic conditions and that these sentiments may reflect a country's societal values and collective mood. Qiu et al. (2020), for instance, analysed the emotional lyrical content of top 10 songs in Germany and the United States between 1980-2017 and found that high unemployment rates predicted higher levels of anger in the lyrics. Similarly, in several studies, Pettijohn has shown that reproductive and meaningful themes are more prevalent in songs that are popular during difficult socioeconomic periods, suggesting a concern with relationships, security, and safety needs when experiencing challenges; whereas lyrical references to fun and leisure are more prevalent during positive socioeconomic periods (Eastman & Pettijohn, 2019; Pettijohn & Sacco, 2009a). For instance, Pettijohn and Sacco (2009b) conducted a content analysis of top-charting songs in the USA from 1955 to 2003 based on listeners' ratings. They related these to the General Hard Times Measure, which was based upon the US unemployment rate and change in consumer price index, among other social and economic indicators. During threatening conditions, the songs were rated to contain more meaningful content that explored important issues (Pettijohn & Sacco, 2009b).

Similarly, Pettijohn and Sacco (2009a) conducted a thematic analysis of top-charting US song lyrics between 1955-2003. During economic hard times, lyrics had a higher prevalence of person pronouns and references to social processes (e.g., friendship, talking), suggesting a greater desire for social affiliation during threatening conditions (Pettijohn & Sacco, 2009a). Eastman and Pettijohn (2019) considered top Billboard R&B/hip-hop songs from 1946-2010, showing that songs made more reference to reproductive themes during challenging socioeconomic conditions. For example, references to lust, love, and longing in

lyrics increased as values on the General Hard Times Measure increased (Eastman & Pettijohn, 2019). In other words, during tough social and economic conditions, people tend to seek out music with lyrics concerning interpersonal relationships and support from others.

North, Krause, Kane, and Sheridan (2018) similarly found a relationship between economic turbulence and the subsequent lyrics reaching the UK's weekly top-5 singles chart. Instability in the closing price of the London Stock Exchange was associated with the popularity of lyrics expressing less comfort, certainty, and maturity, and there was also some evidence that low economic optimism was associated with the popularity of more varied lyrics that were less optimistic and certain. Conversely, Zullow (1991) found that the frequency of pessimistic rumination in popular song lyrics predicted economic downturns with a one- to two-year lead, as indicated by various measures such as consumer optimism and Gross National Product.

As Zullow's ground-breaking research indicates, a large number of studies in economics and related fields show that there is a more general relationship between economic conditions and public sentiment. More recent exemplars of this have used digital resources to investigate corpus-level or massive sets of data, such as those obtained from blogs and social media posts (e.g., Gruhl et al., 2005; Ranco et al., 2015), books (e.g., Bentley et al., 2014), and public news articles (e.g., Chan, 2003; Shapiro et al., 2020; Mo et al., 2016). For instance, Bollen et al. (2011) examined whether public mood states could predict changes in the stock market by analysing the overall valence and a range of moods expressed within a large corpus of social media posts, showing that changes in the combined calm and happiness mood dimensions were predictive of changes in the Dow Jones Industrial Average values with a three-day lead (Bollen et al., 2011).

Some of this research has considered the association between public sentiment and specifically the Misery Index. For instance, Bentley et al. (2014) investigated the relationship

between mood in literary works and economic conditions via data from the 20th century Google Books English-language corpus and averaged US/UK Misery Index data (Bentley et al., 2014). These data showed that higher literary misery (the prevalence of words pertaining to sadness) was associated with greater economic hardship, such that the emotional sentiment of words reflected past economic conditions at an approximately 10-year lag (Bentley et al., 2014).

Research Aim

Socioeconomic crises are associated with limited access to necessities and/or greater risk to health and prosperity, which in turn are associated with greater prevalence of psychological distress and psychiatric disorders (e.g., Blanco et al., 2020). We interpret COVID-19 as being a time associated with physical and psychological strain, uncertainty, concern, and social isolation (i.e., threatening conditions). Given the literature reviewed here, we might expect that the COVID-19 pandemic should be related to the lyrical content of popular music in terms of both emotional valence and the prevalence of interpersonal relationships.

To test this, two studies were conducted. Study 1 considered the prevalence of references to interpersonal relationships in the lyrics of top-5 charting songs in the UK and USA during two periods, namely the first six months of the COVID-19 pandemic from March-August 2020 and March-August 2015-2019. In the light of research indicating cross-cultural differences in music listeners' degree of concern with lyrics and responses to them (e.g., Barradas & Sakka, 2021), the UK and USA were considered separately. The study tested two hypotheses. Hypothesis 1 was that lyrics from March-August 2020 would contain more references to interpersonal relationships than the charting songs in the same months of 2015-2019. Hypothesis 2 was that lyrics from the top-5 charting songs in the UK and USA would contain more negatively-valenced words during March-August 2020 (i.e., the first six

months of the COVID-19 pandemic) than charting songs during the corresponding period in previous years (2015-2019).

Study 2 aimed to explicitly consider the association between lyrics and a range of socioeconomic events by employing data from January 1999-August 2020 (i.e., a longer time period) concerning the US Misery Index and the lyrics of weekly top-5 charting songs in the US. Hypothesis 3 was that there would be a positive association between the US Misery Index and the prevalence of interpersonal relationships in the lyrics of the USA's weekly top-5 charting songs from 1999-2020. Hypothesis 4 was that there would be a positive association between the US Misery Index and the prevalence of negatively-valenced words in the lyrics.

Study 1

Method

Lyrics Dataset

The present research used an expanded version of North and colleagues' dataset (e.g., Krause & North, 2019; North et al., 2018), which comprises all songs to have reached the top-5 positions on the UK weekly singles chart since 1960. In particular, the current dataset was expanded to include all lyrics to have reached the top-5 positions on the weekly UK singles chart between March 2015 and August 2020 (drawing on the British Broadcasting Corporation's Official Charts for the UK, www.officialcharts.com). Corresponding weekly top-5 US chart data was added to the dataset for the current study (drawing on the Billboard chart for the USA, www.Billboard.com). Thus, for the purposes of this study, our consideration of 'popular music' is in reference to top-charting songs, rather than the genre of 'pop music', given these charts commonly contain songs classified as belonging to several genres such as pop, rock and rap.

As per Krause and North (2020), song lyrics were largely obtained using web-based sources (e.g., www.azlyrics.com). Where a song had both an original and a remixed version on separate country's charts, each version was treated as a separate song and both were included in the analyses. Lyrics were cleaned using the same two-step process detailed in North et al. (2018). Briefly, this reinstated redundancies which were eliminated on the web sites from which the lyrics were obtained (e.g., "Yeah x4" was replaced with "Yeah, yeah, yeah, yeah") to provide a verbatim version of the song lyrics for analysis. Thereafter, abbreviations were expanded to their full forms, and misspellings were corrected to ensure consistency of language across song lyrics.

In order to define the set of songs appearing during the start of COVID-19 in 2020, a 27-week block was chosen aligned to the first 6-months of the pandemic, with the start week corresponding to when the World Health Organization classified COVID-19 as a global pandemic (11 March 2020; WHO, 2020). The comparison set of lyrics comprised those charting between March and August in 2015-2019. In the subsequent analyses, songs were classified as appearing in 2020 (pandemic) or appearing in 2015-2019 (pre-pandemic).

Song data were entered into the analyses based on how many times each song appeared on the charts, so that each weekly appearance of a given song was counted. Chart position within the top 5 was not accounted for in analyses. On these bases, the analyses included lyrics from $N = 1620$ songs (135 songs per year per country). This included $N = 255$ unique songs. Seventy songs appeared on both countries' charts and were entered into the analyses as part of both datasets. The remaining 185 unique songs appeared on either the US ($n = 63$) or UK ($n = 122$) chart.

Coding of Lyrics

As outlined in Krause and North (2020), sentiment analysis was conducted for the lyrics of each song using Diction 7.0 content analysis software. This contains 10,000 words

classified into a total of 35 discrete variables (Hart et al., 2013). The program determines the frequency with which words loading onto each Diction variable (known as a "dictionary") are found within a set of lyrics, producing a score for each song on each variable. Each dictionary contains between 10 and 745 words and there is no overlap in words between dictionaries. Several studies have utilized Diction software in the analysis of song lyrics (Anglada-Tort et al., 2019; Cook & Krupar, 2010; Krause & North, 2019; North et al., 2018).

Seven of the Diction variables (Hart, 1997) that address interpersonal relationships were selected, namely self-reference, praise, levelling, human interest, satisfaction, rapport, and exclusion. This set of seven Diction variables was used by North et al. (2018) when analysing the coverage of interpersonal relationships in popular UK song lyrics, and they are detailed in Table 1. Since different songs contain different numbers of words, the raw scores for each song on each variable were divided by the total number of words.

Table 1

Summary of the variables used in the present research

Variable		*M* (*SD*)	
		2015-2019	2020
Diction dictionaries (Hart, 1997)			
Self-reference	Contains all first-person references	114.120 (71.164)	116.40 (77.923)
Praise	Affirmations of some person, group, or abstract entity	14.339 (17.821)	10.848 (12.698)

Levelling	Words used to ignore individual differences and to build a sense of completeness and assurance	16.502 (17.544)	14.798 (13.960)
Human interest	Includes standard personal pronouns, family members and relations, and generic terms (e.g., friend)	110.210 (81.716)	72.548 (42.994)
Satisfaction	Terms associated with positive affective states	30.128 (37.440)	18.824 (19.400)
Rapport	Words denoting attitudinal similarities among people	1.516 (3.508)	0.707 (2.932)
Exclusion	Describes the sources and effects of social isolation	2.443 (6.440)	2.202 (8.540)
General Inquirer			
Negative valence	The negative valence word list (*N* = 2291; e.g., aversion, chaos, deceitful, embarrass, turbulent)	65.910 (61.303)	60.879 (45.007)
Positive valence	The positive valence word list (*N* = 1915; e.g., abundant, companionship, loyal, opportunity, pleasure)	81.673 (60.887)	65.098 (41.835)

To consider the valence of the song lyrics, we drew on The General Inquirer's (first published by Stone et al., 1966) lists of valence words. This has been updated to include both the Harvard IV-4 dictionary (expanded in 1998) and the Lasswell value dictionary (Harvard University, 2002). The General Enquirer program system is notable for its emotional polarity detection capabilities (Yang & Lee, 2010). It contains 11,789 English words and 182 psychological features (including two broad valence categories) which have been developed for use in social science research (Khoo et al., 2017). Two of the General Inquirer's lists were selected to investigate the valence of popular song lyrics in the present study. These were the negative valence word list and the positive valence word list (Table 1).

The lists of positive and negative valence words were entered into Diction as two additional custom dictionaries (negative valence and positive valence respectively). Redundant words (i.e., homographs) were excluded, such that the negative valence dictionary included 2006 words and the positive valence dictionary included 1636 words. Diction 7.0 software was used to produce two valence scores for each set of song lyrics in the dataset. As per the coding of interpersonal relationships variables, raw scores were divided by the total number of words within each set of lyrics.

Results

To test Hypothesis 1, two logistic regression analyses were performed using the GENLINMIXED function in SPSS (version 27). The use of this function allowed for fitting of linear models with non-normal, correlated variable distributions. Separate models were carried out for the UK and USA data, to provide a more accurate comparison of lyrical content between 2015 and 2019 and that during 2020 (i.e., prior to and during the COVID-19 pandemic) as the USA and UK charts differed. The seven Diction variables concerning

interpersonal relationships were entered as predictor variables (self-reference, praise, levelling, human interest, satisfaction, rapport, and exclusion) and period was inputted as the binary dependent variable (2020 and 2015-2019). The overall model for the UK was statistically significant, F (7, 802) = 4.482, $p < .001$, $\eta_p^2 = 0.038$ (see Table 2). Results indicated that compared to 2015-2019, lyrics from 2020 contained significantly lower levels of words concerning human interest (personal pronouns, words pertaining to family members and relations), and satisfaction (words denoting positive affective states) (see Table 2). The overall model for the USA was also statistically significant, F (7, 802) = 9.253, $p < .001$, $\eta_p^2 = .075$ (see Table 2). In 2020, there was greater prevalence of words concerning levelling (words which ignore individual differences) compared to 2015-2019; and there was lower prevalence of words concerning human interest and satisfaction in 2020 relative to 2015-2019 (see Table 2).

Table 2

Logistical Analyses of Lyrical References to Interpersonal Relationships

Predictor variable	*F*	*p*	*Beta*	*t*	95% CI	η^2
United Kingdom (*n* = 810)						
Self-reference	2.027	0.155	0.002	1.424	[0.999, 1.004]	0.003
Praise	0.000	1.000	0.000	0.000	[0.989, 1.012]	0.000
Levelling	1.526	0.217	-0.006	-1.235	[0.985, 1.004]	0.002
Human interest	24.138	< .001	-0.008	-4.913	[0.989, 0.995]	0.029
Satisfaction	4.949	0.026	-0.008	-2.225	[0.986, 0.999]	0.006
Rapport	0.616	0.433	-0.041	-0.785	[0.865, 1.064]	0.001
Exclusion	0.634	0.426	0.011	0.796	[0.985, 1.037]	0.001
United States (*n* = 810)						
Self-reference	3.537	0.060	0.003	1.881	[1.000, 1.006]	0.004
Praise	0.433	0.511	-0.006	-0.658	[0.978, 1.011]	0.001
Levelling	19.623	< .001	0.026	4.430	[1.015, 1.039]	0.024
Human interest	25.939	< .001	-0.011	-5.093	[0.985, 0.994]	0.031
Satisfaction	14.190	< .001	-0.013	-3.767	[0.980, 0.994]	0.017
Rapport	3.539	0.060	-0.096	-1.881	[0.822, 1.004]	0.004
Exclusion	0.169	0.681	-0.013	-0.411	[0.929, 1.049]	0.000

Note. Degrees of freedom for each predictor variable = 1, 802; Period was coded as 2020 = 1, 2015-2019 = 2. CI = confidence interval.

To test Hypothesis 2, songs were classified as appearing in 2020 or appearing in 2015-2019 and, again, two logistic analyses were performed using the GENLINMIXED function to address the US and UK charts separately. In each model, the predictor variables were the two valence scores, and period was entered as the binary dependent variable (2020 and 2015-2019).

Table 3

Logistical Analyses of Lyrical Valence

Predictor variable	*F*	*p*	*Beta*	*t*	95% CI	η^2
United Kingdom (*n* = 810)						
Negative valence score	2.558	0.110	-0.003	-1.599	[0.994, 1.001]	0.003
Positive valence score	2.452	0.118	-0.003	-1.566	[0.993, 1.001]	0.003
United States (*n* = 810)						
Negative valence score	4.987	0.026	0.004	2.233	[1.000, 1.008]	0.006
Positive valence score	18.423	<.001	-0.012	-4.292	[0.983, 0.994]	0.022

Note. Degrees of freedom for each predictor variable = 1, 807; Period was coded as 2020 = 1, 2015-2019 = 2. CI = confidence interval.

The overall model for the UK was non-significant, F (2, 807) = 2.722, p = .066, n_p^2 = .007 (see Table 3). The overall model for the USA was statistically significant, F (2, 807) = 9.549, p < .001, η_p^2 = .023 (see Table 3). Lyrical content in the American songs appearing in 2020 was significantly more negatively-valenced relative to song lyrics reaching the top-5 positions on the US chart between 2015-2019.

Study 2

Study 1 was able to show how lyrics differed during the initial six months of the COVID-19 pandemic relative to the same months in earlier years. However, by focusing on only lyrics, the analyses do not directly capture the socioeconomic hardship associated with the COVID-19 pandemic or other forms of societal turbulence. To address major socioeconomic events explicitly, Study 2 considered the association between the same lyrical variables as in Study 1 and the inclusion of economic hardship, operationalised as the US Misery Index, using data from 1999-2020. The study tested whether the US Misery Index was related positively to the prevalence of references to interpersonal relationships (Hypothesis 3) and negative emotional valence of the lyrics of top-5 charting songs in the USA (Hypothesis 4).

Method

The United States Misery Index, released by the Bureau of Labor Statistics, can be used as a gauge of economic malaise (Cohen et al., 2014). The index is calculated monthly by adding the inflation and unemployment rates in the United States (Cohen et al., 2014). Monthly Misery Index data for the period January 1999 to August 2020 was obtained from www.ycharts.com.

The present study employed lyrical data at the monthly level. Within each month, the mean score was calculated across all lyrics for each separate Diction variable (e.g., March 2017 had one score for self-reference, one score for praise, one score for levelling, and so on). This was done for lyrics within the USA charts from January 1999 to August 2020 (N = 260 monthly mean values, stemming from the 5,660 song entries for the period), which were otherwise identified and treated as per Study 1.

Results

To test Hypothesis 3, a Generalized Linear Mixed Model analysis examined whether the prevalence of interpersonal relationships in song lyrics was related to the US Misery Index. The results were statistically non-significant, F (7, 252) = 1.748, p = .098, η_p^2 = .046 (see Table 4).

Table 4

Generalized Linear Mixed Model Analysis Concerning Hypothesis 3 (N = 260)

Predictor variable	*F*	*p*	*Beta*	*t*	95% CI	η^2
Self-reference	1.949	.164	-0.009	-1.396	[-0.021, 0.004]	.002
Praise	0.818	.367	0.014	0.905	[-0.016, 0.044]	.001
Levelling	3.342	.069	0.031	1.828	[-0.002, 0.065]	.004
Human interest	2.916	.089	-0.011	-1.708	[-0.024, 0.002]	.004
Satisfaction	0.099	.754	0.003	0.314	[-0.018, 0.025]	.000
Rapport	0.368	.545	-0.041	-0.606	[-0.174, 0.092]	.000
Exclusion	1.366	.244	0.038	1.169	[-0.026, 0.102]	.002

Note. Degrees of freedom for each predictor variable = 1, 252. CI = confidence interval

To test Hypothesis 4, a separate analysis examined whether the prevalence of negatively-valenced words in song lyrics was associated with the US Misery Index. The overall model was statistically significant, F (2, 257) = 6.295, p = .002, n_p^2 = .047 (see Table 5). Over the period 1999-2020, there was a significant positive association between economic misery and the number of negatively-valenced words in top-5 charting songs in the USA; and there was also a significant negative association between economic misery and the number of positively-valenced words. In other words, during periods of economic hardship, US song lyrics contain a greater number of negatively-valenced words and fewer positively-valenced words.

Table 5

Generalized Linear Mixed Model Analysis Concerning Hypothesis 4 (N = 260)

Predictor variable	*F*	*P*	*Beta*	*t*	95% CI	η^2
Negative valence score	6.354	.012	.009	2.521	[.002, .016]	.008
Positive valence score	4.388	.037	-.007	-2.095	[-.014, -.000]	.005

Note. Degrees of freedom for each predictor variable = 1, 257. CI = confidence interval.

General Discussion

The present research investigated how socioeconomic hardship, particularly that associated with the COVID-19 pandemic, was related to the prevalence of lyrics concerning interpersonal relationships and negatively-valenced content. Study 1 addressed how the lyrics of songs that were popular during the initial six months of the COVID-19 pandemic differed from those that were popular during the same months in 2015-2019. Data from the United

Kingdom showed that the 2020 pandemic period was associated with lyrics that made less reference to personal pronouns and family members (human interest) and satisfaction. Data from the United States showed that the 2020 pandemic period was associated with lyrics that made more use of words ignoring individual differences (levelling), and less use of words concerning human interest and satisfaction.

In both countries, the 2020 COVID-19 pandemic period was associated with the popularity of music reflecting a greater degree of social isolation and lower satisfaction. One of the most striking aspects of Study 1 is the similarity of the findings from the UK and US concerning the coverage of interpersonal relationships in lyrics (although the US data showed that the 2020 COVID-19 pandemic period was also associated with greater prevalence of leveling words that was not mirrored in the UK data). However, Study 1 showed that the two countries differed in terms of the coverage of positively- and negatively-valenced words (Hypothesis 2), where only the United States gave rise to significant results. Here the 2020 pandemic period was associated with lower incidence of positive affect compared to the same months in 2015-2019. The effect size was small, but the finding is clearly intuitive. Why it was not repeated in the United Kingdom data is impossible to explain on the basis of the present data and might be attributable to a range of factors. In contrast, Study 2 employed monthly data from 1999-2020 to explicitly address the relationship between socioeconomic hardship in the USA and references in popular music lyrics to interpersonal relationships and prevalence of positively- and negatively-valenced words. Although reference to interpersonal relationships was not related to economic misery, the use of negatively-valenced words increased with greater economic misery and use of positively-valenced words decreased with greater economic misery. Again, this is clearly intuitive, suggesting that over extended periods of time, variations in socioeconomic hardship are reflected in the lyrics of the most popular music of the day. The finding also clearly mirrors earlier research showing that

socioeconomic turbulence is associated with the popularity of negatively-valenced cultural products.

Limitations and Directions for Future Research

The present study was focused on examining popular music lyrics, using the onset of the COVID-19 pandemic as a context to consider socioeconomic hardship. While Study 1 made use of six months of data, corresponding to the start of the global COVID-19 pandemic in 2020, this period does not capture the entirety of the pandemic (which is currently ongoing). Further, while we have operationalised socioeconomic hardship in terms of the COVID-19 pandemic, none of the trends described in the present research occur within a social vacuum: additional socio-cultural factors may be at play, such as the effects of the concurrent sociopolitical turmoil arising from the UK withdrawal from the European Union, and the Black Lives Matter movement in the USA. Future research may also take account of another interesting aspect of the theorising in this area, namely that very positive societal events ought to also relate to popular music lyrics (e.g., Pettijohn & Sacco, 2009b). The negative impact of the pandemic probably outweighs the positivity of any positive event that we might identify, and so represents the clearest opportunity to test the hypotheses here. Nonetheless we encourage researchers to consider 'good times' as an opportunity to further test the ideas proposed here.

Music is one of the oldest forms of cultural transmission and through lyrics, allows the communication of emotions, stories, opinions, and attitudes (Pettijohn & Sacco, 2009a) and reflects changes in psychological features within a culture across time (DeWall et al., 2011). Yet, this period does not necessarily include songs that artists recorded in response to the pandemic, nor does it include songs which explicitly reference pandemics. Future research could consider the impact of major global events on the composition process itself,

what artists produce in response to the pandemic in future years, and/or examine in-depth songs with lyrical content directly referencing the COVID-19 pandemic (although we note that this would require verifiable data on the point in time at which a given song was composed).

Similarly, data was considered at a country level and only lyrics from songs appearing on the weekly charts in the United States and United Kingdom were considered. Prior to the onset of COVID-19, the USA and UK were determined to be two of the most prepared countries for a pandemic outbreak (Fisher et al., 2020), and moreover there have been marked differences within many countries between their predicted and actual performance in reducing infection rates (Fisher et al., 2020; Milani, 2020). Future research could incorporate data from more countries for a global comparison of lyrical themes, since both the US and UK have seen significant criticism of Government handling of the pandemic: irrespective of the validity of this criticism, the possibility remains that findings reported here from the US and UK might not reflect the experience of the pandemic in other countries. Future research on a wider range of countries might attempt to include consideration of the effectiveness of pandemic control (through a moving average of weekly infection rates, for instance). In a similar vein, although the effect sizes reported here are small and recorded in the face of very significant socioeconomic threat, we are also mindful in this context that populations faced by such threats often go to great lengths to maintain their psychological resilience thus reducing the probability of finding support for the relationships identified here.

It is also important to note that computer text analysis software was used to analyse the lyrical content. While this allows objective analysis of a large set of lyrics, the approach is based on the use of dictionaries and characteristics such as humour and metaphors are not understood by the software (North et al., 2018). Several studies have found connections between a tally of valence words in written text (e.g., Iliev et al., 2016) and the period in

which they were popular; however, Schotanus (2020) suggested that song sentiments are not the sum of word sentiments and require complex computations or participant ratings of whole songs. Moreover, while none of the songs explicitly mentioned COVID-19 (or a pandemic in general), the current approach does not account for the idiosyncratic associations that some people may draw between a particular song and a particular social phenomenon. Thus, future research may use alternative approaches to lyrical analysis and interpretation. Researchers might also consider the inclusion of how explicitly musical variables (such as dynamic range and melodic complexity) relate to turbulent socioeconomic conditions (North et al., 2018; Simonton, 1987). Since musical features can affect how sentences are interpreted (Schotanus, 2020), consideration of both lyrical and musical variables together would further increase our understanding of this topic.

Finally, the present study focused on historical population-level data, rather than individual-level responses to the pandemic. This use of naturalistic data on song popularity means it is impossible to address individual listeners' preferences or separate out listeners' perception of the lyrics from their perception of the music. Economic and social threat has been associated with preferences for mature facial features in popular performers, and meaningful television content that addresses serious issues (see, McIntosh et al., 2000; Pettijohn & Sacco, 2009a; Pettijohn & Sacco, 2009b). Future research could operationalise versions of these variables relevant to music (e.g., facial features of the performer, meaningful and serious lyrics) and consider how these relate to the musical preferences of individuals in the light of the COVID-19 pandemic.

In offering this suggestion, however, it is also important to keep in mind that listeners vary in their listening style (Greenberg & Rentfrow, 2015), including for instance how listeners prioritise their focus on musical versus lyrical content (Frith, 1989) and how listeners may not always understand song lyrics (Condit-Schultz & Huron, 2015).

Additionally, Barradas and Sakka (2021) found that lyrics substantially influenced feelings of sadness and nostalgia for Portuguese participants, but that Swedish participants were not similarly affected. Instead, lyrics influenced feelings of surprise-astonishment for the Swedish group and researchers suggest that they are generally less concerned with lyrics (Barradas & Sakka, 2021). Thus, cross-cultural differences in listeners' degree of interest in lyrics and the types of emotions aroused by lyrics may be important factors to consider within future research.

Similarly, given listeners have different strategies for using music to cope (e.g., when they feel sad – Van den Tol & Edwards, 2014), additional research may wish to consider people's use of cultural products in response to socioeconomic hardship. Research has found, for example, that people use music as a social surrogate – in other words, personal music listening is used as a temporary replacement for social connectedness and can mitigate the listener's feelings of loneliness, increase feelings of empathy and provide mood-repair (Schäfer & Eerola, 2020; Schäfer et al., 2020; see also Krause, 2020). Moreover, music listening can promote parasocial interaction, or imagined relationships between people and media personas (Rubin & McHugh, 1987; Krause, et al., 2018). For instance, people can identify with social cues created by lyrics (Herrera, 2017): popular music lyrics often include singers 'speaking to' the listener or about themselves. Thus, listeners may form empathy by correctly interpreting lyrical messages of musicians which reflect shared experiences, attitudes, and feelings between artist and listener (Ginsburg, 1996).

In summary, the present findings broaden the understanding of how cultural products reflect changes in socioeconomic conditions through the consideration of lyrical themes and valence. The results provide further evidence supporting the assertion that cultural products, reflect social and economic turbulence (characterized by social isolation, uncertainty, and physical, psychological, and financial strain, in the case of the COVID-19 pandemic). The

present research showed that popular music lyrics are consistent with this more general trend, since turbulent times are associated with the greater prevalence of negative emotional content and references to interpersonal relationships.

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