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Tuning in to Psychological Change: Linguistic Markers of Psychological Traits and Emotions Over Time in Popular U.S. Song Lyrics

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American culture is filled with cultural products. Yet few studies have investigated how changes in cultural products correspond to changes in psychological traits and emotions. The current research fills this gap by testing the hypothesis that one cultural product—word use in popular song lyrics—changes over time in harmony with cultural changes in individualistic traits. Linguistic analyses of the most popular songs from 1980–2007 demonstrated changes in word use that mirror psychological change. Over time, use of words related to self-focus and antisocial behavior increased, whereas words related to other-focus, social interactions, and positive emotion decreased. These findings offer novel evidence regarding the need to investigate how changes in the tangible artifacts of the sociocultural environment can provide a window into understanding cultural changes in psychological processes.

Keywords: cultural products, birth-cohort, meta-analysis, Linguistic Inquiry Word Count, song lyrics

Culture and music are powerful. They independently influence emotions (Kuppens, Realo, & Diener, 2008; Tamir & Robinson, 2007), thoughts (Krumhansl, 2002; Nisbett, Peng, Choi, & Norenzayan, 2001), and behavior (Anderson, Carnagey, & Eubanks, 2003; Yamagishi, Hashimoto, & Schug, 2008). But music and culture share a powerful relationship with each other that heretofore has been left unexplored—music serves as a cultural product that documents changes in U.S. culture across time.

The current work argues that popular song lyrics are a window into understanding U.S. cultural changes in psychological states. Research on changes in U.S. culture can focus on relatively large time periods, such as differences in social customs between modern Americans and early colonials (Calhoun, 2008). Recent research using self-report measures suggests, however, that U.S. culture has changed substantially in the past few decades, enough that individualistic traits such as extraversion, self-esteem, narcissism, and agency have risen over time (Roberts & Helson, 1997; Twenge, 1997; Twenge & Campbell, 2001, 2008; Twenge & Foster, 2010; Twenge, Konrath, Foster, Campbell, & Bushman, 2008). Studies have also found a corresponding decrease in more self-reported communal experiences, such as social connection (e.g., McPherson, Smith-Lovin, & Brashears, 2006). What these methods fail to capture, according to Morling and Lamoreaux

(2008), is how cultural products—tangible, public artifacts of the sociocultural environment—can enhance our theoretical understanding of culture (Adams & Markus, 2004; Kroeber & Kluckhohn, 1952). In addition, self-report measures on mental processes can be problematic (Nisbett & Wilson, 1977), making it desirable to explore how alternative methodologies can increase understanding of cultural change. Here, we test whether changes in U.S. culture between 1980 and 2007 influence an understudied cultural product in ways that reflect these psychological transformations: word use in popular song lyrics. We predict that popular song lyrics will serve as cultural artifacts of shifts toward self-focus, social disconnection, anger, antisocial behavior, and misery commonly found in self-report research.

Cultural Products

Cultural psychologists use a variety of methods to understand how cultures differ from each other. In a recent review of the literature, Morling and Lamoreaux (2008) argued that cultural psychologists focus primarily on measuring manifestations of culture that exist “in the head,” such as self-reports and behavioral observations. To be sure, these methods enable psychologists to understand much about how culture shapes the psyche. As noted above, these methods do not illustrate how cultural products can influence understanding of culture. Consistent with this reasoning, recent research showed that Eastern (e.g., Korea, Japan, China) and Western (e.g., U.S.) cultures produce cultural products that correspond closely to their respective collectivistic and individualist psyches (Morling & Lamoreaux, 2008). Cultural products can also inform scholars regarding within-cultural differences. Snibbe and Markus (2005), for example, demonstrated how cultural products, namely music lyric preferences, related to different models of agency among European Americans of different educational at-

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tainment levels. Cultural products can also illustrate how groups of the same people change over time. Members of the music group, the Beatles, which had a tremendous impact on U.S. culture, showed changes in their linguistic lyrical styles over time that reflected changes in the development of their musical contributions (Petrie, Pennebaker, & Silvertsen, 2008). Thus, cultural products offer theoretically meaningful information about cross-cultural, within-cultural, and within-person differences, suggesting that much can be gained from a broadened focus on both the psychological and the cultural.

The present research tests the hypothesis that cultural products can also be used to understand psychological changes *within* a culture over time, exploring whether the linguistic contents of popular song lyrics change over time in tandem with generational shifts in personality traits over the same period of time. To test this hypothesis, we used the Linguistic Inquiry Word Count program (LIWC; Pennebaker, Booth, & Francis, 2007). Popular U.S. song lyrics represent cultural products that provide useful information regarding cultural values and mental states. Popular song lyrics in China, for example, contain more themes related to collectivism than do popular song lyrics in the U.S. (Rothbaum & Xu, 1995; Rothbaum & Tsang, 1998). And, as noted above, preference for song lyrics have been used to understand within-cultural differences regarding different psychological models of agency (Snibbe & Markus, 2005). These findings suggest that popular song lyrics often reflect cultural differences, but these investigations did not examine whether word use in popular song lyrics changes over time in tandem with psychological changes across the same period of time—as we do here.

Are U.S. Song Lyrics Becoming More Self-Focused Over Time?

Pronouns offer rich information about how people relate to others because their use distinguishes between self and other. Developmental research shows that infants, who are egocentric due to their stage of neural development (Piaget, 1926), use first-person singular pronouns before they use pronouns that refer to the self in relation to others (e.g., “we”; Murray, 1972). A similar pattern emerges among adults with egocentric traits. Raskin and Shaw (1988), for example, showed that scores on the Narcissistic Personality Inventory (NPI; Raskin & Hall, 1981) correlated positively with the number of first-person singular pronouns and negatively with the number of first-person plural pronouns used during an impromptu monologue. Given prior work showing an increase in NPI scores between 1982 and 2009 (Twenge & Foster, 2010), we expected that year would correlate positively with first-person singular pronoun use and negatively with first-person plural pronoun use, as narcissism is positively correlated with agency and negatively with communalism (Campbell, Rudich, & Sedikides, 2002; Campbell et al., 2007).

Are Song Lyrics Becoming More Socially Disconnected Over Time?

People have a fundamental need for social connection (Baumeister & Leary, 1995). Yet, feelings of loneliness and social isolation in the United States rose 250% between 1985 and 2004 (McPherson et al., 2006). In addition, more people now live alone

than ever before (U.S. Bureau of the Census, 2008). Hence we predicted that popular song lyrics would reflect a similar decrease over time in words related to social connection.

Are Song Lyrics Becoming More Angry and Antisocial Over Time?

As noted above, narcissism, a personality trait that has risen steadily since the early 1980s, is related to using self-focus words (Raskin & Shaw, 1988). Social connection is also decreasing over time (e.g., McPherson et al., 2006). Narcissism and social disconnection are both linked to heightened anger and antisocial behavior (Bushman & Baumeister, 1998; Twenge & Campbell, 2003). Therefore, we predicted that popular song lyrics would contain more words related to anger and antisocial behavior over time.

Do Song Lyrics Include Less Positive Emotion Over Time?

The focus on having high levels of positive emotion has increased over the past several decades. The self-help movement and other cultural practices have devoted themselves to increasing how much positive emotion people experience in their lives. This increased attention to positive emotion has even crept into psychological science, with the advent of the positive psychology movement (Seligman & Csikszentmihalyi, 2000) and scientific journals devoted to the study of happiness (e.g., *Journal of Happiness Studies*). It is therefore possible that popular song lyrics have included more positive emotion words over time.

Yet there is reason to predict the opposite—namely, that the use of positive emotion in popular songs has dwindled over time. A growing body of evidence suggests that individual mental health has decreased substantially over time. For example, Twenge, Gentile, DeWall, Ma, Lacefield, and Schurtz (2010) showed that scores on the MMPI clinical scales increased approximately one full standard deviation between 1938 and 2007. Of particular relevance, scores on the depression (D) scale have risen 0.66 standard deviation units between 1938 and 2007. Other work has shown that more people meet diagnostic criteria for major depressive disorder in recent generations compared to their predecessors (see Klerman & Weissman, 1989, for a review). Given this prior work showing diminished mental health over time, we expected a negative correlation between the year a song was published and the number of positive emotion words used.

Method

To explore changes in word use in popular songs over time, we obtained song lyrics for the 10 most popular U.S. songs (according to the Billboard Hot 100 year-end chart) for each year between 1980 through 2007. We chose this time period because prior work has shown significant cultural changes over time in motivation, personality, and emotion (e.g., Twenge, 1997; Twenge & Campbell, 2001, 2008; Twenge & Foster, 2010). The top 10 songs were chosen because of the preponderance of Top 10 lists that identify popular cultural products (e.g., foods, presents), including songs.

The Billboard Hot 100 is the music industry standard for tracking the weekly popularity of singles. Billboard rankings account for both album sales and radio airplay, using the Nielsen Sound-

scan and Broadcast Data Systems (BDS: The Nielsen Company, 2010). Nielsen BDS is the world's leading provider of media information. In addition to album sales and radio airplay, Billboard rankings have accounted for purchases of digital downloads since 2005 and streaming media since 2007.

We performed linguistic analyses using the LIWC program (Pennebaker et al., 2007), a widely used and well-validated program that counts the percentage of words in a body of text that correspond to various categories. The program uses an internal default dictionary comprised of several word categories according to how much a group of words relate to a particular topic. The LIWC word categories have adequate psychometric properties (Pennebaker et al., 2007). We analyzed our data using categories that correspond to previously documented psychological changes over time: first-person singular pronouns (e.g., I, me, mine), first-person plural pronouns (e.g., we, us, our), social interactions (e.g., mate, talk, child), anger and antisocial behavior (e.g., hate, kill, damn), and positive emotion (e.g., love, nice, sweet). All songs were spell-checked prior to submission to the LIWC. The song lyrics contained 88,621 total words.

Results

Analysis Strategy

The principal aim of this study was to determine whether lyrics in popular U.S. songs changed over time in a manner that mirrored documented psychological changes across the same time period (e.g., Twenge, 1997; Twenge & Campbell, 2001, 2008; Twenge & Foster, 2010). To provide a conservative test of our hypothesis, multiple regression analyses were conducted for each dependent variable, predicting word use from song year. Dummy variables for genre type (i.e., country, hip hop/r&b, pop, and rock) and changes in methodology (i.e., changes in ranking formula to account for digital downloads and streamed media) were entered as covariates. We present descriptive statistics for songs in each year in Tables 1–5. We present correlations among music genre types and the dependent variables in Table 6.

Are U.S. Song Lyrics Becoming More Self-Focused Over Time?

To test whether popular music has become more self-focused over time, we regressed use of first-person singular (e.g., I, me) and first-person plural (e.g., we, our) pronouns onto year. As expected, year was positively associated with first-person singular pronoun use, $\beta = .20$, $t(272) = 2.74$, $p = .007$, and was negatively associated with first-person plural pronoun use, $\beta = -.18$, $t(272) = -2.42$, $p = .016$ (Figures 1 and 2).

To assess the difference between pronouns related to agency (i.e., first-person singular) and communion (i.e., first-person plural) over time, we computed a difference score by subtracting first person plural pronoun use from first person singular pronoun use (see Campbell, 1999, for a similar scoring procedure). Higher scores reflected greater self-focus relative to other-focus. Year was positively associated with self-focus relative to other-focus pronoun use, $\beta = .23$, $t(272) = 3.16$, $p = .002$. Thus, changes in popular music lyrics mirror increases in narcissism over the past

Table 1

Descriptive Statistics for 1st Person Singular Pronoun Usage as a Function of Song Year

Year	<i>M</i> (<i>SD</i>)	95% CI
1980	6.88 (5.95)	(2.62, 11.14)
1981	9.39 (7.26)	(4.19, 14.58)
1982	8.62 (5.19)	(4.90, 12.33)
1983	5.92 (4.33)	(2.82, 9.01)
1984	7.51 (3.35)	(5.12, 9.91)
1985	9.70 (5.85)	(5.52, 13.89)
1986	8.46 (6.54)	(3.78, 13.13)
1987	6.40 (6.75)	(1.57, 11.23)
1988	8.92 (3.82)	(6.19, 11.66)
1989	11.04 (5.18)	(7.33, 14.75)
1990	6.59 (4.98)	(3.02, 10.15)
1991	10.28 (3.34)	(7.89, 12.67)
1992	9.63 (4.93)	(6.10, 13.15)
1993	10.78 (4.40)	(7.63, 13.92)
1994	12.83 (5.19)	(9.11, 16.54)
1995	8.69 (5.11)	(5.03, 12.34)
1996	10.23 (5.97)	(5.98, 14.52)
1997	12.49 (5.09)	(8.85, 16.13)
1998	9.61 (5.52)	(5.66, 13.55)
1999	8.68 (3.92)	(5.88, 11.48)
2000	8.88 (5.87)	(4.68, 13.08)
2001	12.50 (4.50)	(9.28, 15.71)
2002	10.38 (4.61)	(7.09, 13.68)
2003	13.03 (6.04)	(8.71, 17.35)
2004	8.72 (3.04)	(6.55, 10.90)
2005	9.50 (3.51)	(6.99, 12.01)
2006	7.35 (3.55)	(4.81, 9.89)
2007	9.18 (2.11)	(7.67, 10.69)

Note. CI = confidence interval. Means correspond to mean percent of word use.

27 years, with musical lyrics becoming increasingly self-focused over time.

Are Song Lyrics Becoming More Socially Disconnected Over Time?

To test whether popular song lyrics have become more socially disconnected over time, we regressed use of words related to social interactions (e.g., talking, sharing) onto song year. As expected, year and number of words related to social interactions were negatively associated, $\beta = -.17$, $t(272) = -2.32$, $p = .02$ (see Figure 3). This finding provides additional evidence that changes in popular song lyrics over time correspond to U.S. cultural changes. Just as people report greater rates of loneliness and social isolation over time, popular song lyrics changed over time to include fewer words related to social interactions.

Are Song Lyrics Becoming More Angry and Antisocial Over Time?

Our previous findings showed that song lyrics have changed over time to resemble the speaking patterns of narcissists (Raskin & Shaw, 1988) and to include fewer words related to social interactions. Because narcissism and social disconnection are related to increased anger and antisocial behavior (Bushman & Baumeister, 1998; Twenge & Campbell, 2003), we expected that

Table 2
Descriptive Statistics for 1st Person Plural Pronoun Usage as a Function of Song Year

Year	<i>M (SD)</i>	95% CI
1980	1.11 (1.45)	(.07, 2.14)
1981	2.07 (3.70)	(-.57, 4.72)
1982	2.38 (2.53)	(.56, 4.19)
1983	.21 (.53)	(-.17, .60)
1984	.49 (.66)	(.02, .96)
1985	1.44 (1.52)	(.35, 2.53)
1986	1.56 (1.66)	(.37, 2.74)
1987	1.16 (2.16)	(-.37, 2.71)
1988	1.23 (1.21)	(.36, 2.09)
1989	.68 (.95)	(-.005, 1.36)
1990	.19 (.31)	(-.03, .41)
1991	1.65 (1.96)	(.24, 3.05)
1992	.76 (.81)	(.17, 1.34)
1993	.47 (.63)	(.02, .93)
1994	.58 (.75)	(.04, 1.18)
1995	1.43 (3.02)	(-.74, 3.59)
1996	.72 (1.19)	(-.13, 1.57)
1997	.84 (.88)	(.20, 1.47)
1998	.99 (1.55)	(-.12, 2.09)
1999	.62 (.57)	(.21, 1.03)
2000	1.05 (2.12)	(-.46, 2.57)
2001	.47 (.64)	(.01, .93)
2002	.50 (.53)	(.12, .88)
2003	.81 (1.61)	(-.34, 1.97)
2004	.74 (1.13)	(-.07, 1.54)
2005	1.08 (1.15)	(.25, 1.90)
2006	.69 (.58)	(.27, 1.10)
2007	1.30 (1.25)	(.40, 2.20)

Note. CI = confidence interval. Means correspond to mean percent of word use.

the percentage of anger and antisocial words in popular song lyrics would increase over time.

To test this hypothesis, we regressed the number of words related to anger and antisocial behavior (e.g., kill, hate, annoyed, damn, fuck) onto song year. The use of swear words corresponds to accepted definitions of antisocial behavior in that their use is not in agreement with standards for appropriate behavior (Anderson & Bushman, 2002). As predicted, the use of angry and antisocial song lyrics increased over time, $\beta = .15$, $t(272) = 2.08$, $p = .04$, (see Figure 4). Thus, popular song lyrics have become increasingly angry and antisocial over time.

Do Song Lyrics Include Less Positive Emotion Over Time?

We next tested our hypothesis that song lyrics would include a lower percentage of positive emotion words over time, which would be consistent with rises in psychopathology over time (Twenge, 1997; Twenge et al., 2010). Consistent with this prediction, year and the number of positive emotion words used were negatively associated, $\beta = -.17$, $t(272) = -2.24$, $p = .03$ (see Figure 5). These findings offer additional evidence that changes in popular song lyrics mirror psychological changes in U.S. culture regarding decreases in positive emotion.

Additional Considerations

Although we use first-person plural pronouns as our measure of other-focus, it is possible that third-person pronouns are also used to focus attention on others. By ignoring changes in the use of these words, we might be overlooking an important pattern of decreasing self-focus. We chose first-person plural pronouns instead of third-person terms for two reasons. First, using first-person plural pronouns, compared to third-person terms, involves people relating themselves to other people instead of describing another person's thoughts, feelings, or actions. We wanted to assess how much the song lyrics not only mentioned other people, but also how much the song lyrics mentioned other people in a communal way. Second, there is an extensive history of using first-person plural pronouns to assess how much people include others in their self-concept. For example, Slatcher, Vazire, and Pennebaker (2008) showed that use of first-person plural pronouns related to higher levels of satisfaction within romantic relationships, which is consistent with evidence showing a positive relationship between communality and relationship satisfaction (Clark, Lemay, Graham, Pataki, & Finkel, 2010). Thus, we based our choice not to use third-person terms on prior theory and evidence. Nonetheless, we examined the changes in third-person pronoun use over time. Neither third-person singular pronouns ($\beta = -.05$) nor third-person plural pronouns ($\beta = -.11$) changed over time (both $ps > .16$).

Table 3
Descriptive Statistics for Social Indicators as a Function of Song Year

Year	<i>M (SD)</i>	95% CI
1980	15.17 (4.66)	(11.84, 18.50)
1981	19.57 (5.48)	(15.65, 23.49)
1982	14.64 (5.60)	(10.64, 18.64)
1983	17.03 (6.46)	(12.41, 21.65)
1984	15.70 (5.31)	(11.90, 19.50)
1985	12.81 (3.44)	(10.35, 15.27)
1986	14.94 (8.24)	(9.05, 20.84)
1987	14.38 (5.54)	(10.42, 18.34)
1988	14.08 (4.56)	(10.82, 17.34)
1989	18.46 (6.37)	(13.89, 23.00)
1990	13.92 (4.95)	(10.38, 17.47)
1991	18.01 (3.96)	(15.17, 20.84)
1992	14.81 (3.74)	(12.14, 17.49)
1993	16.68 (4.40)	(13.53, 19.83)
1994	12.83 (5.35)	(9.00, 16.66)
1995	16.20 (4.49)	(12.98, 19.41)
1996	17.82 (5.30)	(14.03, 21.61)
1997	12.11 (4.58)	(8.83, 15.39)
1998	15.16 (6.20)	(10.73, 19.60)
1999	13.70 (4.79)	(10.28, 17.13)
2000	15.82 (4.92)	(12.29, 19.34)
2001	12.52 (5.32)	(8.72, 16.33)
2002	14.09 (6.30)	(9.58, 18.60)
2003	13.13 (4.19)	(10.13, 16.13)
2004	14.02 (4.20)	(11.01, 17.03)
2005	14.69 (7.74)	(9.15, 20.23)
2006	14.20 (3.18)	(11.93, 16.47)
2007	13.76 (3.46)	(11.28, 16.23)

Note. CI = confidence interval. Means correspond to mean percent of word use.

Table 4
Descriptive Statistics for Positive Affect Indicators as a Function of Song Year

Year	<i>M (SD)</i>	95% CI
1980	4.11 (3.25)	(1.78, 6.44)
1981	7.42 (3.66)	(4.80, 10.04)
1982	3.91 (2.31)	(2.26, 5.56)
1983	3.18 (1.17)	(2.34, 4.02)
1984	3.85 (1.31)	(2.91, 4.79)
1985	4.08 (1.71)	(2.86, 5.30)
1986	6.12 (4.40)	(2.97, 9.27)
1987	2.60 (1.65)	(1.42, 3.78)
1988	5.23 (3.16)	(2.97, 7.49)
1989	6.60 (3.49)	(4.10, 9.10)
1990	5.26 (3.68)	(2.63, 7.89)
1991	6.04 (5.64)	(2.00, 10.07)
1992	5.00 (3.02)	(2.84, 7.16)
1993	6.51 (4.23)	(3.48, 9.53)
1994	4.45 (2.14)	(2.92, 5.98)
1995	5.57 (3.42)	(3.12, 8.01)
1996	5.06 (3.21)	(2.77, 7.36)
1997	4.64 (2.57)	(2.81, 6.48)
1998	5.34 (3.63)	(2.74, 7.94)
1999	3.33 (2.22)	(1.74, 4.92)
2000	3.32 (2.16)	(1.77, 4.86)
2001	3.63 (2.96)	(1.51, 5.75)
2002	2.23 (1.22)	(1.36, 3.11)
2003	3.61 (2.17)	(2.06, 5.16)
2004	3.63 (2.62)	(1.76, 5.50)
2005	2.89 (1.91)	(1.52, 4.25)
2006	3.37 (3.10)	(1.15, 5.59)
2007	3.48 (2.41)	(1.75, 5.20)

Note. CI = confidence interval. Means correspond to mean percent of word use.

Another consideration involves the role of genre in influencing our findings. Indeed, one alternative explanation for our findings is that they reflect increased popularity of certain music genres (e.g., rhythm & blues, hip/hop) instead of relating to previously documented shifts in psychological traits and emotions. Our results contradict this possibility. Because our multiple regression analyses controlled for genre, any changes in genre over time did not significantly account for our effects. Together with the large body of evidence showing birth cohort changes over time on self-report measures (e.g., Twenge & Foster, 2010), our findings suggest that changes in song lyrics mirror shifts in personality traits and emotions.

Discussion

To understand cultural processes, psychologists must examine both intrapsychic characteristics and aspects of the sociocultural environment. Psychologists from a variety of subareas have focused primarily on cross-cultural and within-cultural differences in psychological processes using methods familiar to psychological scientists, such as self-report measures, behavioral observation, and laboratory experiments. Few prior investigations, however, have examined whether cultural products change over time in a manner consistent with birth cohort changes in psychological characteristics. We hasten to acknowledge that we did not examine the direct correlation between cultural products and psychological

Table 5
Descriptive Statistics for Antisocial Indicators as a Function of Song Year

Year	<i>M (SD)</i>	95% CI
1980	.27 (.50)	(-.08, .63)
1981	.25 (.56)	(-.15, .64)
1982	.18 (.58)	(-.23, .59)
1983	1.13 (2.04)	(-.33, 2.59)
1984	.40 (.94)	(-.27, 1.07)
1985	.30 (.59)	(-.12, .72)
1986	.46 (.90)	(-.18, 1.11)
1987	.10 (.22)	(-.05, .26)
1988	.07 (.22)	(-.09, .23)
1989	.45 (.60)	(.02, .88)
1990	.99 (1.81)	(-.30, 2.28)
1991	1.15 (2.97)	(-.98, 3.27)
1992	.42 (.92)	(-.24, 1.08)
1993	.58 (1.02)	(-.15, 1.31)
1994	.24 (.40)	(-.04, .53)
1995	.28 (.34)	(.04, .52)
1996	.60 (1.68)	(-.60, 1.81)
1997	.32 (.44)	(.006, .63)
1998	.57 (.81)	(-.008, 1.15)
1999	.78 (.94)	(.11, 1.45)
2000	.62 (1.40)	(-.38, 1.62)
2001	1.62 (2.20)	(.04, 3.19)
2002	.61 (.55)	(.22, 1.01)
2003	1.29 (1.88)	(-.05, 2.64)
2004	1.08 (1.89)	(-.27, 2.43)
2005	1.82 (2.70)	(-.12, 3.75)
2006	.84 (.96)	(.15, 1.52)
2007	.80 (1.12)	(.004, 1.60)

Note. CI = confidence interval. Means correspond to mean percent of word use.

states. Instead, the current research tested whether one type of cultural product—word use in popular song lyrics—changed over time similar to the increases in individualistic traits across the same time period in the U.S. (e.g., Twenge & Foster, 2010).

Our results provided consistent evidence in support of this hypothesis. Popular music lyrics now include more words related to a focus on the self. Just as narcissism is related to self-focused pronoun use (Raskin & Shaw, 1988), popular song lyrics showed changes toward more first-person singular pronouns and fewer first-person plural pronouns over time. Popular song lyrics include fewer words related to social interactions and positive emotions over time, which mirrors recent evidence showing increases in U.S. loneliness and psychopathology over time (McPherson et al., 2006; Twenge et al., 2010). Words related to anger and antisocial

Table 6
Correlations Between Genre Type and Linguistic Indicators

Genre	<i>r</i>				
	1st person singular	1st person plural	Social indicators	Positive affect	Antisocial indicators
Country	.049	-.017	-.009	.008	.014
Hip Hop/R&B	.067	-.008	.058	-.004	.101
Pop	-.026	-.057	.072	.071	-.049
Rock	-.077	.089	-.109	-.084	-.041

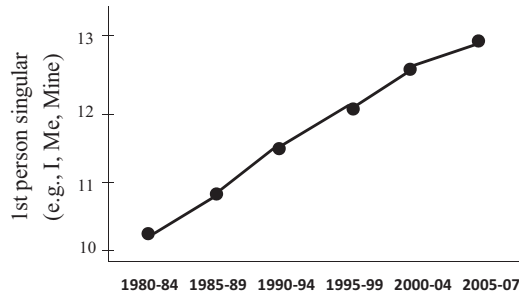


Figure 1. Association of year on first-person singular pronouns. Values on the y-axis represent the percentage of words that appeared from this word category.

behavior have also increased over time, which relates to increases in personality traits (e.g., narcissism) and social situations (e.g., social rejection) characterized by heightened anger and antisocial behavior (e.g., Bushman & Baumeister, 1998; Twenge & Campbell, 2003; DeWall, Twenge, Gitter, & Baumeister, 2009).

The broader implication from these findings is that psychological processes and cultural products mutually reinforce each other to remain in agreement with generational changes in psychological traits, goals, and emotions. Consistent with Shweder's (1991) argument that psychological processes and cultural products represent two sides of the same coin, our findings suggest that cultural products function to maintain and support shifts in psychological traits related to individualism and materialism. Therefore, understanding generational changes in psychological traits may involve making systematic comparisons of how tangible, public artifacts of the sociocultural environment have shifted over a similar time period. Within the context of the present research, simply tuning in to the most popular songs on the radio may provide people with increased understanding of their generation's current psychological characteristics—and how these characteristics may change in the future.

Limitations and Alternative Explanations

The results from the current investigation provided conclusive support for the hypothesis that cultural products change over time in tandem with generational changes in psychological characteristics. One limitation of this work is that our research focused exclusively on changes in U.S. song lyrics over time. As U.S.

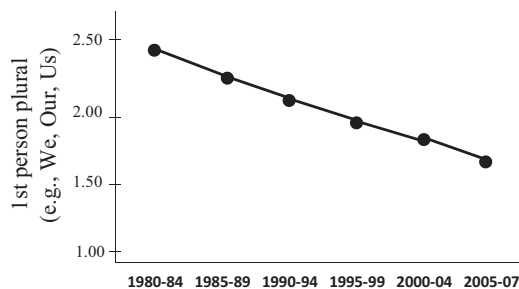


Figure 2. Association of year on first-person plural pronouns. Values on the y-axis represent the percentage of words that appeared from this word category.

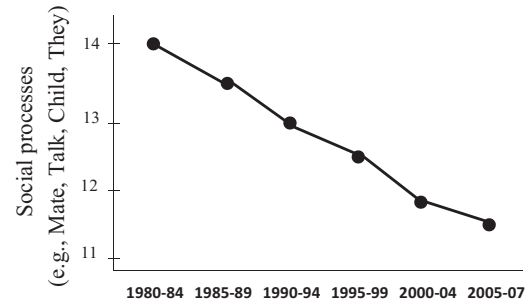


Figure 3. Association of year on social interaction words. Values on the y-axis represent the percentage of words that appeared from this word category.

citizens occupy less than 5% of the world population, the changes we identified should not be taken to apply internationally (Arnett, 2008). To be sure, our results may have differed had we investigated changes in popular song lyrics in cultures that have not seen changes in individualistic traits such as the United States. Future research may demonstrate how popular song lyrics from other cultures change to reflect recent changes in personality traits and emotions.

Another potential limitation is that although the LIWC program is a valid and reliable tool for linguistic analyses, it is not designed to analyze complex linguistic processes. It simply counts words and therefore neglects characteristics such as sarcasm, hidden meaning, and other complex communication processes inherent in many song lyrics. Despite these limitations, the current results suggest that counting the percentage of words in popular songs can offer useful information in how cultural products change over time in a manner that is similar to cultural changes in emotion, personality, and goals.

It is also possible that the company that owns Billboard has made decisions about what will be accepted by the population instead of the observed changes reflecting actual cultural change in emotion and personality. We discount this possibility for two reasons. First, there is a large body of self-report data that has consistently shown that the levels of various personality traits and emotion change over time (Twenge, 1997; Twenge & Campbell, 2001; Twenge et al., 2008). Instead, we argue that the outcomes changed over time according to changes in cultural values. Second, we believe it is unlikely that a company such as Billboard decided what culture would value. Billboard, like any other company

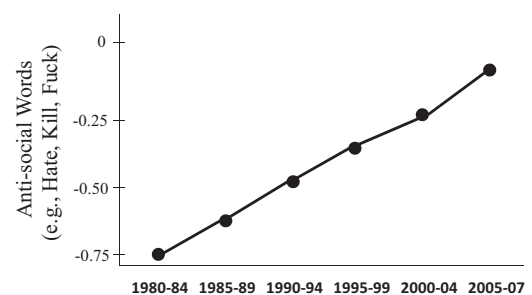


Figure 4. Association of year on antisocial words. Values on the y-axis represent the percentage of words that appeared from this word category.

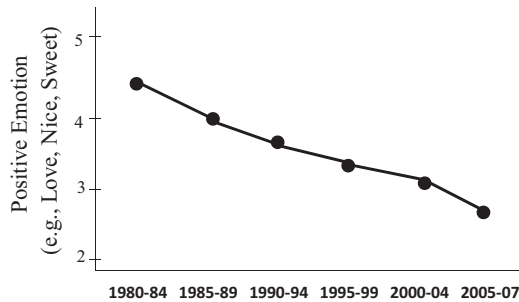


Figure 5. Association of year on positive emotion words. Values on the y-axis represent the percentage of words that appeared from this word category.

whose job is to report on popular trends in U.S. culture, depends on consumers to show it what songs are most desirable by members of culture who purchase that music. Thus, the current findings, together with prior theory and evidence, suggest that the changes over time in song lyrics reflected changes in psychological characteristics.

A final limitation is that the current results are correlational in nature and therefore should be interpreted with caution in terms of their causal basis. This problem is inherent in birth cohort studies such as ours because it is impossible to manipulate when groups of people are born. To be sure, it is not plausible that the directionality of our effects could be reversed, as changes in popular song lyrics could not cause changes in what year it is. Therefore, we attempted to rule out variables that may have accounted for the relationships between year and song lyric content, such as music genre.

Conclusion

U.S. culture is replete with cultural products. Whereas social scientists have identified a handful of examples of cultural products in nonhuman species (de Waal, 2002), humans are continuously inundated with cultural products. People listen to popular music, view billboards, and watch TV programs and movies. The current investigation provides novel evidence that changes in cultural products manifest generational changes in psychological characteristics. Given the ubiquity of cultural products, our findings begin to scratch the surface on how cultural products can expand understanding of how cultural changes over time influence personality traits, goals, and emotions.

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