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## The Effect of Rap/Hip-Hop Music on Young Adult Smoking: An Experimental Study

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### ABSTRACT

**Background:** Music may influence young people's behavior through its lyrics. Substance use references occur more frequently in rap/hip-hop than in other music genres. **Objectives:** The aim was to examine whether the exposure to rap/hip-hop lyrics referring to substance use affected cigarette smoking. **Methods:** An experiment with a 3-group between subject design was conducted among 74 daily-smoking young adults ranging in age from 17 to 25 years old. Three conditions were tested in a mobile lab (camper vehicle) from May to December 2011, i.e., regular chart pop music (N = 28), rap/hip-hop with non-frequent references to substance use (N = 24), and rap/hip-hop with frequent references to substance use (N = 22). **Results:** One-way ANOVA showed that participants listening to substance use infused rap/hip-hop songs felt significantly less pleasant, liked the songs less, and comprehended the songs less compared to participants listening to pop songs. Poisson loglinear analyses revealed that compared to the pop music condition, none of the two rap/hip-hop music conditions had a significant effect on acute smoking. Thus, contrary to expectations, the two different rap/hip-hop conditions did not have a significantly different effect on acute smoking. **Conclusions:** Listening to rap/hip-hop, even rap hip/hop with frequent referrals to substance use (primarily alcohol and drug use, and general smoking referrals), does not seem to encourage cigarette smoking among Dutch daily-smoking young adults, at least short term.

### KEYWORDS



Young adults; cigarette smoking; music; lyrics; music genres

### Introduction

Music is important in young people's lives, and they are exposed to it daily. However, there is concern that listening to certain types of music may have detrimental effects on young people's attitudes and behaviors. Rap/hip-hop, one of the most popular genres of popular music in the last three decades, has been criticized of fostering problem behavior, due to the ample referrals to violence and substance use in the lyrics (Chen, Miller, Grube, & Waiters, 2006; Gruber, Thau, Hill, Fisher, & Grube, 2005). Indeed, substance use referrals occur more frequently in rap/hip-hop music compared to other music genres, and besides, substance use is positively being portrayed in many songs (Herd, 2008; 2014; Primack, Dalton, Carroll, Agarwal, & Fine, 2008). Thus, the question arises whether substance use among young people is fostered by listening to rap/hip-hop music. In this present experimental study we will examine if this is the case for cigarette smoking. If so, this may have far-fetched implications such as informing daily-smokers to avoid listening to certain types of music.

In a study among 7,324 12 to 16 year olds, it was found that pop music was associated with less substance use while rap/hip-hop music was associated with more

smoking, particularly among girls (Mulder et al., 2009). Another study showed that listening to pop music was significantly associated with less cigarette and marijuana use while listening to rap/hip-hop music was associated with more marijuana use (Oberle & Garcia, 2015). These findings remained significant when controlling for sensation seeking. Furthermore, Miranda and Claes (2004) showed that rap music was linked to deviant behaviors. Although these studies showed positive associations between listening to rap/hip-hop music and substance use, they were all cross-sectional in nature, and therefore causality could not be determined. In order to observe a potential causal link between music listening and smoking, experimental designs are essential. A field experiment by Engels, Slettenhaar, Ter Bogt and Scholte (2011) confirmed the results of the cross-sectional studies: the exposure to alcohol-related lyrics increased the consumption of alcohol beverages among customers in a bar. In contrast, another experimental study focusing on exposure to different music genres in relation to alcohol use (but not considering alcohol-related lyrics), showed that youth exposed to 'gangsta rap' music did not drink significantly more alcohol than peers who were exposed to other music

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genres such as pop music (Engels, Poelen, Spijkerman, & Ter Bogt, 2012).

Three explanations have been proposed to understand the positive association between (frequent) exposure to rap/hip-hop music and the engagement in substance use such as cigarette smoking. The first explanation is referred to as the *socialization hypothesis*, based on the Social Learning Theory (Bandura, 1977), rap/hip-hop music artists may function as role models. They often endorse in and glorify substance use and young people may observe and imitate the positive attitudes and behaviors of these high-status role models. Furthermore, music listening with substance use content may affect the social schemas of young people due to cognitive priming. They may assimilate the values that are communicated through rap songs and adopt positive ideas and beliefs regarding substance use which may lead to engagement in substance use (Miranda & Claes, 2004).

The second possible explanation is that music listening is not the cause but rather reinforces already existing values and behaviors (Chen et al., 2006), also referred to as the *selection hypothesis*. Young people who are engaged in substance use and have favorable attitudes towards this are more likely to select and listen to music genres with high substance use content such as rap/hip-hop music.

The final possible explanation is that the link between music preferences and substance use is accounted for by shared ‘third factors’ (Chen et al., 2006; Dillman Carpentier, Knobloch, & Zillmann, 2003). Personality traits are likely candidates for such factors. For example, results from the study of Chen and colleagues (2006) showed that the students with higher levels of sensation seeking listened more to music genres infused with substance use and aggression, i.e. rap music. Furthermore, they also showed that these students engaged more in substance use and aggressive behaviors. Moreover, when controlling for sensation-seeking, the significant positive association between frequent listening to rap music and substance use and aggression decreased significantly. Another third factor may comprise of a specific social context. Tanner, Asbridge and Wortley (2008) concluded that affiliation and interaction with “deviant” peers may influence music preferences as well as substance use behavior of young people. Therefore, if we do find a significant effect of music genre on substance use in our experimental study, we can conclude that this alternative explanation is not valid because an experimental design controls for such other ‘third factors’.

The Media Practice Model (Steele, 1999; Steele & Brown, 1995) integrates the first two explanations. According to the Media Practice Model there is an interactive influence between media and individuals; young people with certain personality characteristics, within certain social contexts select media according to who they

are and where they feel they belong to socially (i.e., selection), and are also affected by their chosen media content (i.e., socialization) (Brown, Steele, & Walsh-Childers, 2002). In our experiment we focus on one leg of this theory, consistent with the socialization hypothesis, we expect that exposure to rap/hip-hop music may increase young people’s cigarette smoking compared exposure to more mainstream music such as pop music. To the best of our knowledge, this experiment is the first to examine whether exposure to specific music genres and therefore specific lyrics in music affect cigarette smoking. The aim is twofold: (1) to examine whether exposure to rap/hip-hop compared to pop music contributes to the maintenance of cigarette smoking, and subsequently, whether (2) the frequency of lyrics in rap/hip-hop referring to substance use is linked to smoking maintenance.

## Methods

### Design

We tested a pop music condition and two rap/hip-hop music conditions. For each condition, appropriate music songs and lyrics for each song were searched and selected through the Internet. The two rap/hip-hop conditions differed in the extent to which the lyrics referred to substance use. In the rap/hip-hop condition with frequent substance use references, primarily alcohol and drugs were addressed, reflecting the features of this particular music genre (Herd, 2008; 2014). This condition contained eight songs: Ice Cube – Smoke some Weed; Three 6 Mafia – Smokin on da Dro; Lil Wyte – Drinking Song; D12 – Purple Pills; Mystikal – I smell smoke; 50 Cent – High all the Time; Ludacris – Everybody drunk; Master P – Pass me da Green. In total, the songs contained approximately 119 alcohol, 213 marijuana, 78 pills and other drug text references, and 107 sound/voice effects with substance use references. Although few specific tobacco-smoking referrals were made, general smoking referrals included “smoke” and smoking sound/voice effects (inhaling, exhaling, using a lighter).

In the other rap/hip-hop condition, there were hardly any substance use references (songs with no substance use reference at all are rare in hip-hop), and songs focused on other themes. To keep the music similar to the first condition, we matched each song with a similar type of song of the same artist, taking into account the year, volume, and tempo of the song. This condition contained eight songs: Lil Wyte – Blame it on the Bay; Ludacris – My Chick Bad; D12 – How come; Mystikal – Shake it Fast; Three 6 Mafia – Baby Mama; Master P – I miss my homies; Ice Cube – It was a good day; and 50 Cent – Candy Shop. In total, these songs contained approximately 9 alcohol, 9 marijuana, 1 pill and other drug text

references, and 4 sound/voice effects for substance use references.

The pop music condition (with no references to substance use) included eight songs: Doritos Night – Who’s that chick; Katy Perry – Hot and cold; Melee – Built to last; Alphabeat – Fascination; Alexis Jordan – Happiness; Ginger Ninja – Sunshine; Bruno Mars – Just the way you are; Metro Station – Shake it. These songs were typical chart pop songs, catchy, up-tempo, cheerful, ‘feel good’ music.

### Procedure and participants

This study received approval from our internal faculty board at Utrecht University. Students were approached on campus to participate in a study on music taste and preference. We asked students to complete an initial screening questionnaire. Only daily smokers aged 16 to 25 years of age were invited to participate. Students were allocated at random to one of the two rap/hip-hop conditions by drawing lots. The data was collected from May to November 2011. The pop music condition data was collected in November and December 2011.

We used a mobile lab in a camper vehicle (Harakeh & Vollebergh, 2012). One participant participated in each session. Participants were told they could eat food and take drinks that were made available, and that they were allowed to smoke in the camper vehicle (an ashtray was present on the table). The 30-minute music task consisted of listening to eight music songs and responding to five questions for each song. Each song was played for three minutes, with a 30-second break in-between. At the end of the session, the participant completed a brief questionnaire, taking approximately 15 minutes. Each participant received ten Euros for his/her participation. After the completion of this experiment, all participants were debriefed.

Of the 103 participants, twenty participants were excluded because they did not have cigarettes with them or were no longer daily smokers, two participants did not complete the final questionnaire, one lighted up a cigarette before the music task started, one was too old to be included, two participants experienced technological failure when playing the music, one mentioned she suffered from heavy depression, and two participants played constantly with their mobile phone, leaving 74 participants in the analyses. Four of these 74 participants suspected the actual aim of the study and three participants thought the study had perhaps something to do with smoking or with the effect of music on other behavior. The seven participants were included in the analyses, but results with and without the inclusion of this group did not differ. Participants were 17–25 years old ( $M = 20.37$ ;  $SD = 1.92$ ), 47.9% were male, and 46.6% were College students.

## Measures

### Participants’ smoking behavior during the session

The experimenter coded the total number of cigarettes smoked during the music task.

*Descriptive Characteristics Living on their own* was assessed by asking whether they lived at home with their parents or caretakers or whether they lived on their own.

*Age* was measured by asking how old they were.

*Gender* was coded as 0 = female and 1 = male.

*Current smoking behavior* was coded as (a) I do not smoke, (b) less than one cigarette/day, (c) 1–5 cigarettes/day, (d) 6–10 cigarettes/day, (e) 11–20 cigarettes/day, (f) 21–30 cigarettes/day, and (g)  $\geq 31$  cigarettes or more/day.

*Music preference* was assessed by rating each musical genre (e.g., pop music and rap/hip-hop music) on a 5-point scale ranging from ‘dislike strongly’ to ‘like very much’ (Ter Bogt, Raaijmakers, Vollebergh, Van Wel, & Sikkema, 2003).

### Mood

We measured how pleasant and anxious the participants felt during the music task. We assessed “feeling pleasant” and “feeling anxious” using the self-assessment Manikin scale asking participants to, “Indicate which figure represents the best how pleasant/calm you feel at this moment.” (Lang, 1980). The response categories for “feeling pleasant” included faces (i.e., smiles) of 9 figures scored from very unpleasant = 1 to very pleasant = 9. The response categories for “feeling anxious” included faces of 9 figures (i.e., with in the center of the figure a dot/explosion) scored from very calm = 1 to very anxious = 9. We assessed the scores at the pre- and post-test. The first score was obtained just before they started with the music task and the second score was obtained immediately following the music task.

### Evaluation of the songs

Participants had to rate how much they liked each song and how well they comprehend the text of the eight songs on a scale from 1 to 10, and an average score was calculated for each question.

### Statistical analyses

We used the statistical software SPSS for our analyses. First, we performed descriptive analyses on the sample. Subsequently, we checked with one-way Anova’s if randomization succeeded and whether there were significant differences between the three conditions with regard

**Table 1.** Descriptive characteristics of the participants in the three music conditions.

|  | Pop music (N = 28)<br>Percentage/Mean(SD) | Rap/hip-hop music low content <sup>a</sup> (N = 24)<br>Percentage/Mean(SD) | Rap/hip-hop music high content <sup>b</sup> (N = 22)<br>Percentage/Mean(SD) |
|--|---|--|---|
| Living on their own  | 64.3%                                     | 79.2%  | 77.3%   |
| Age  | 20.43 (2.25)                              | 20.08 (1.74)   | 20.62 (1.66)  |
| Gender (female)  | 53.6%                                     | 45.8%  | 54.5%   |
| <i>Current smoking behavior:</i>                                 |   |  |   |
| 1–5 cigarettes/day   | 35.7%                                     | 20.8%  | 31.8%   |
| 6–10 cigarettes/day  | 32.1%                                     | 50%  | 27.3%   |
| 11–20 cigarettes/day   | 28.6%                                     | 29.2%  | 40.9%   |
| 21–30 cigarettes/day   | 3.6%                                      | 0%   | 0%  |
| <i>Pop music preference:</i>                                     |   |  |   |
| very bad   | 10.7%                                     | 4.3%   | 0%  |
| Bad  | 14.3%                                     | 8.7%   | 18.2%   |
| no opinion   | 3.6%                                      | 8.7%   | 31.8%   |
| Good   | 57.1%                                     | 60.9%  | 45.5%   |
| very good  | 14.3%                                     | 17.4%  | 4.5%  |
| <i>Rap/hip-hop music preference:</i>                             |   |  |   |
| very bad   | 3.7%                                      | 4.3%   | 0%  |
| Bad  | 22.2%                                     | 17.4%  | 31.8%   |
| no opinion   | 18.5%                                     | 13%  | 13.6%   |
| Good   | 37%                                       | 52.2%  | 50%   |
| very good  | 18.5%                                     | 13%  | 4.5%  |
| Felt <i>anxious</i> at the start of the music task <sup>1</sup>  | 3.18 (1.42)                               | 3.50 (1.29)  | 3.09 (1.63)   |
| Felt <i>pleasant</i> at the start of the music task <sup>2</sup> | 7.11 (0.88)                               | 7.04 (0.81)  | 6.95 (0.79)   |
| <b>During the experiment</b>                                     |   |  |   |
| Like the music task  | 3.75 (0.70)                               | 3.83 (0.72)  | 3.57 (0.93)   |
| Felt <i>calm</i> after the music task <sup>1</sup>               | 2.63 (1.31)                               | 3.13 (1.45)  | 3.09 (1.95)   |
| Felt <i>pleasant</i> after the music task <sup>2</sup>           | 7.29 (1.05)                               | 6.71 (1.57)  | 6.00 (1.51)   |
| Like the music   | 5.70 (1.03)                               | 5.26 (1.35)  | 4.60 (1.32)   |
| Comprehended the song text                                       | 7.50 (1.23)                               | 6.69 (1.40)  | 6.13 (1.94)   |
| <i>Smoking:</i>  |   |  |   |
| 0 cigarettes   | 32.1%                                     | 20.8%  | 22.7%   |
| 1 cigarettes   | 39.3%                                     | 45.8%  | 63.6%   |
| 2 cigarettes   | 28.6%                                     | 29.2%  | 13.6%   |
| 3 cigarettes   | 0%  | 4.2%   | 0%  |

Note. <sup>a</sup>non-frequent substance use referrals; <sup>b</sup>frequent substance use referrals. <sup>1</sup>on a score from 1 to 9, 9 is 'very anxious'; <sup>2</sup>on a score from 1 to 9, 9 is 'very pleasant'.

to participants' baseline characteristics. Finally, we conducted a Poisson loglinear analyses to investigate the effect of music condition on participants' total number of cigarettes smoked during the session. The descriptive characteristics that showed to be significantly different between the conditions, were controlled for in the analyses.

## Results

Descriptive characteristics of the participants are depicted in Table 1. One-way Anova's showed that randomization succeeded as there were no significant differences between the three conditions with regard to participants' baseline characteristics: living on their own [ $F(2) = 0.86$ ,  $p = 0.429$ ], age [ $F(2) = 0.45$ ,  $p = 0.639$ ], gender [ $F(2) = 0.21$ ,  $p = 0.810$ ], current smoking behavior [ $F(2) = 0.10$ ,  $p = 0.910$ ], how much they like pop music [ $F(2) = 0.93$ ,  $p = 0.398$ ], how much they like rap/hip-hop music [ $F(2) = 0.31$ ,  $p = 0.733$ ], how anxious they felt before the music task [ $F(2) = 0.53$ ,  $p = 0.593$ ], how anxious they felt after the music task [ $F(2) = 0.79$ ,  $p = 0.456$ ], and how pleasant they felt before the music task [ $F(2) = 0.21$ ,  $p = 0.811$ ].

When comparing the three conditions, results of a one-way ANOVA showed that participants in the rap/hip-hop

condition with frequent substance use references felt significantly less pleasant after the music task ( $F(2) = 5.37$ ,  $p = 0.007$ ), liked the songs less ( $F(2) = 4.95$ ,  $p = 0.010$ ), and comprehended the songs less ( $F(2) = 5.13$ ,  $p = 0.008$ ) compared to the participants in the pop music condition.

First, we tested whether exposure to rap/hip-hop compared to pop music contributed to the total number of cigarettes smoked. We controlled for three covariates (feeling pleasant, liking the song, and comprehension of the song) in the analyses. When comparing smoking in the two rap/hip-hop conditions with smoking in the pop music condition (reference group), rap/hip-hop music did not emerge as a significant risk factor for the total number of cigarettes smoked (Table 2). Second, we tested whether the frequency of lyrics referring to substance use in hip-hop songs explained the total number of cigarettes smoked. The effects of the two rap/hip-hop conditions on smoking were not significantly different (IRR = 0.80, 95%CI = 0.49–1.30). Furthermore, the covariates (music task perceived as pleasant, liking the songs, and comprehension of the songs) did not have a significant effect on cigarette smoking (see table 2). Additionally, we coded smoking as a binary variable (smoked yes/no) and performed logistic regression analyses to test the same models. The results showed similar patterns (Table 2),

**Table 2.** Experiment on the effect of hip-hop music compared to pop music songs on participants' cigarette smoking.

|  | Total number of cigarettes |           |                    | Smoked Cigarettes (No/Yes) |           |                    |
|--|----------------------------|-----------|--------------------|----------------------------|-----------|--------------------|
|  | IRR                        | 95% CI    | Wald $\chi^2$ (df) | OR                         | 95% CI    | Wald $\chi^2$ (df) |
| Music (ref. = Pop music)                   | 1.00                       |           |                    |                            |           |                    |
| Rap/hip-hop with low content <sup>a</sup>  | 1.25                       | 0.77–2.03 | 0.815 (1)          | 1.71                       | 0.44–6.58 | 0.610 (1)          |
| Rap/hip-hop with high content <sup>b</sup> | 0.97                       | 0.55–1.73 | 0.008 (1)          | 1.10                       | 0.24–5.13 | 0.015 (1)          |
| Music task perceived as pleasant           | 0.99                       | 0.85–1.14 | 0.042 (1)          | 0.56*                      | 0.33–0.95 | 4.572 (1)          |
| Liked the music songs                      | 0.95                       | 0.80–1.13 | 0.290 (1)          | 0.92                       | 0.55–1.54 | 0.097 (1)          |
| Comprehension of the music songs           | 1.08                       | 0.94–1.24 | 1.123 (1)          | 1.26                       | 0.84–1.90 | 1.222 (1)          |

Note. <sup>a</sup>non-frequent substance use referrals; <sup>b</sup>frequent substance use referrals; IRR is Incidence Rate Ratio, OR is Odds Ratio, 95% CI = 95% confidence intervals, \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ .

except that music task perceived as pleasant emerged as a protective factor. Participants that perceived the music task as pleasant were less likely to smoke compared to participant that perceived the music task as unpleasant. The effects of the two rap/hip-hop conditions on the binary variable smoking were not significantly different (OR = 0.59, 95% CI = 0.15–2.25).

## Discussion

Textual and voice referrals to substance use in rap/hip-hop songs did not seem to trigger smoking in daily-smoking young adults. Our findings indicate that textual references to other substances (alcohol and drugs) and general references to smoking did not trigger cigarette smoking. The findings of our experimental study do not confirm the socialization hypothesis, although this does not necessarily implicate that this hypothesis is not valid. There are at least four possible explanations of why we did not find any effects. The first three do not contradict the socialization hypothesis, the fourth cannot be brought in line with this hypothesis.

First, in rap/hip-hop songs alcohol and drug use referrals are most common whereas smoking is almost never the main topic of the song. Thus, our findings indicate that textual references to other substances (alcohol and drugs) may not function as cue exposure or trigger for cigarette smoking. Furthermore, listening to voice referrals may not be sufficient to affect young people's behavior, perhaps they also need to observe the behavior, as in music videos. Different types of substance use are depicted/portrayed frequently in these music videos (Gruber et al., 2005), and may have a stronger effect as a cue stimulus (Gruber et al., 2005). Future studies need to examine whether these visual cues in videos, that is combinations of voice, text and visuals, have more impact on smokers than voice and text alone.

Second, our findings show that the text lyrics of the rap/hip-hop songs are not well comprehended/understood and/or the English synonyms or metaphors for substance use may not be well-known

among the Dutch participants. This may also have contributed to the participants not liking these particular songs and feeling less pleasant when hearing these songs. This reasoning might particularly apply for non-natives in English language, and therefore, future research needs to be replicated in English-speaking countries.

Third, rap/hip-hop music may still affect smoking maintenance but indirectly, through mood. Our results showed that participants felt more pleasant when hearing pop music compared to rap/hip-hop songs with frequent substance use references, and the participants that perceived the music task as pleasant were less likely to smoke compared to participant that perceived the music task as unpleasant. Although this latter finding was not robust in our study, it may be interesting to examine mediation effects in further experimental studies. Thus, whether specific kind of music changes the mood of the participant and, in turn, increases/decreases the likelihood to smoke. There is ample empirical evidence that music affects emotions and mood (Blood, Zatorre, Bermudez, & Evans, 1999; Milliman, 1986; Saarikallio & Erkkilä, 2007; Sloboda, 1991) and the music, mood, smoking causal chain should be further explored.

Fourth, other hypotheses that were described in the Introduction (i.e., selection and 'third factors') may be more plausible than the socialization hypothesis. More importantly, possible 'third factors' such as social context and personality traits need to be studied further. The effect of music may depend on other individuals who are in the presence of the listener, on listener's location as well as on whether listening to this music is his/her own choice (Engels et al., 2011). Furthermore, certain personality traits such as rebelliousness and sensation-seeking may be related to listening to non-mainstream music (Dillman Carpentier et al., 2003). This music preference, in turn, may lead to formation of non-conventional/non-mainstream peer groups in which group members may be associated with more problem behaviors (Doornwaard, Branje, Meeus, & Ter Bogt, 2012; Ter Bogt et al., 2013). Thus, music preference may play a crucial role in (social) identity expression and development,

especially in adolescence, and needs to be examined further (Bonneville-Roussy, Rentfrow, Xu, & Potter, 2013).

### Limitations

First, the external validity may be limited because of the limited range of music genres, the number of songs, and the specific sample (daily-smoking young adults). Second, our study was designed to test strong effects but may have had insufficient power to test small effects. Third, the pop music condition research was conducted later in time (from November to December) than the two other conditions (from May to November). This may have biased the results, although the procedure and protocol were similar in each of the three conditions. Fourth, other covariates may have been important to control for but were not assessed: e.g., familiarity with the songs, aspects of mood other than calmness and pleasantness, such as depression, anger, vigor, fatigue. Future research may consider these possible covariates, but may also examine them as possible moderators or mediators.

### Conclusion

Our findings imply that rap/hip-hop music per se is not a significant factor inducing smoking among daily-smoking young adults. There is no need to acutely discourage daily-smokers to listen to certain types of music. However textual references to substance use in combination with visuals should be further explored. We furthermore need to address personality traits or social context factors which drive an alternative explanation of the association between listening to specific kinds of music and cigarette smoking. Future, more sophisticated experimental studies are necessary to replicate or reject our findings in different cultural contexts and larger samples.

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### Declaration of interest

Both authors declare they have no conflicts of interest.

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### References

- Bandura, A. (1977). *Social learning theory*. Oxford, England: Prentice Hall.
- Blood, A. J., Zatorre, R. J., Bermudez, P., & Evans, A. C. (1999). Emotional responses to pleasant and unpleasant music correlate with activity in paralimbic brain regions. *Nature Neuroscience*, 4, 382–387.
- Bonneville-Roussy, A., Rentfrow, P. J., Xu, M. K., & Potter, J. (2013). Music through the ages: Trends in musical engagement and preferences from adolescence through middle adulthood. *Journal of Personality and Social Psychology*, 105, 703–717.
- Brown, J. D., Steele, J. R., & Walsh-Childers, K. (2002). Introduction and overview. In Brown, J. D., Steele, J. R., & Walsh-Childers, K. (Eds.), *Sexual teens, sexual media: Investigating media's influence on adolescent sexuality* (pp. 1–24). Mahwah, NJ: Erlbaum.
- Chen, M. J., Miller, B. A., Grube, J. W., & Waiters, E. D. (2006). Music, substance use, and aggression. *Journal of Studies on Alcohol*, 6, 373–381.
- Dillman Carpentier, F., Knobloch, S., & Zillmann, D. (2003). Rock, rap, and rebellion: comparisons of traits predicting selective exposure to defiant music. *Personality and Individual Differences*, 35, 1643–1655.
- Doornwaard, S. M., Branje, S., Meeus, W. H. J., & Ter Bogt, T. F. M. (2012). Development of adolescents' peer crowd identification in relation to changes in problem behaviors. *Developmental Psychology*, 48, 1366–1380.
- Engels, R. C. M. E., Poelen, E. A. P., Spijkerman, R., & Ter Bogt, T. F. M. (2012). The effects of music genre on young people's alcohol consumption: An experimental observational study. *Substance Use & Misuse*, 47, 180–188.
- Engels, R. C. M. E., Slettenhaar, G., Ter Bogt, T. F. M., & Scholte, R. H. J. (2011). Effects of alcohol references in music on alcohol consumption in public drinking places. *American Journal on Addictions*, 20, 530–534.
- Gruber, E. L., Thau, H. M., Hill, D. L., Fisher, D. A., & Grube, J. W. (2005). Alcohol, tobacco, and illicit substances in music videos: A content analysis of prevalence and genre. *Journal of Adolescent Health*, 37, 81–83.
- Harakeh, Z., & Vollebergh, W. A. M. (2012). The impact of active and passive peer influence on young adult smoking: An experimental study. *Drug and Alcohol Dependence*, 121, 220–223.
- Herd, D. (2008). Changes in drug use prevalence in rap music songs, 1979–1997. *Addiction Research & Theory*, 16, 167–180.
- Herd, D. (2014). Changes in the prevalence of alcohol in rap music lyrics 1979–2009. *Substance Use & Misuse*, 49, 333–342.
- Lang, P. J. (1980). Behavioral treatment and bio-behavioral assessment: Computer applications. In J. B. Sidowski, J. H. Johnson, T. A. Williams (Eds.), *Technology in mental health care delivery systems* (pp. 119–137). Norwood, NJ: Ablex.
- Milliman, R. E. (1986). The influence of Background music on the behavior of restaurant patrons. *The Journal of Consumer Research*, 13, 286–289.
- Miranda, D., & Claes, M. (2004). Rap music genres and deviant behaviors in French-Canadian adolescents. *Journal of Youth and Adolescence*, 33, 113–122.
- Mulder, J., Ter Bogt, T. F. M., Raaijmakers, Q. A. W., Gabhainn, S. N., Monshouwer, K., & Vollebergh, W. A. M. (2009). The

- soundtrack of substance use: Music preference and adolescent smoking and drinking. *Substance Use & Misuse*, 44, 514–531.
- Primack, B. A., Dalton, M. A., Carroll, M. V., Agarwal, A. A., & Fine, M. J. (2008). A content analysis of tobacco, alcohol, and other drugs in popular music. *Archives of Pediatrics & Adolescent Medicine*, 162, 169–175.
- Oberle, C. D., & Garcia, J. A. (2015). Predicting Alcohol, Cigarette, and Marijuana use from preferential music consumption. *Journal of Drug Education: Substance Abuse Research and Prevention*, 45, 113–125.
- Saarikallio, S., & Erkkilä, J. (2007). The role of music in adolescents' mood regulation. *Psychology of Music*, 35, 88–109.
- Sloboda, J. A. (1991). Music Structure and Emotional Response: Some Empirical Findings. *Psychology of Music*, 19, 110–120.
- Steele, J. (1999). Adolescent sexuality: Factoring in the influences of family, friends and school. *The Journal of Sex Research*, 36, 331–341.
- Steele, J. R., & Brown, J. D. (1995). Adolescent room culture: Studying media in the context of everyday life. *Journal of Youth and Adolescence*, 24, 551–576.
- Ter Bogt, T. F. M., Keijsers, L., & Meeus, W. H. J. (2013). Early adolescent music preferences and minor delinquency. *Pediatrics*, 131, e380–e389.
- Ter Bogt, T., Raaijmakers, Q., Vollebergh, W., Van Wel, F., & Sikkema, P. (2003). Youngsters and their musical taste: Musical styles and taste groups. *The Netherlands Journal of Social Sciences*, 39, 35–52.
- Tanner, J., Asbridge, M., & Wortley, S. (2008). Our favourite melodies: musical consumption and teenage lifestyles. *The British Journal of Sociology*, 59, 118–144. ReferenceXX.