Music, Substance Use, and Aggression*

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ABSTRACT. Objective: This study investigated whether young people's substance use and aggressive behaviors are related to their listening to music containing messages of substance use and violence. **Method:** Using self-administered questionnaires, data were collected from a sample of community-college students, ages 15-25 years ($N = 1,056$; 57% female). A structural equation model (maximum likelihood method) was used to simultaneously assess the associations between listening to various genres of music and students' alcohol use, illicit-drug use, and aggressive behaviors. Respondents' age, gender, race/ethnicity, and level of sensation seeking were included in the analyses as control variables. **Results:** Listening to rap music was significantly and positively associated with alcohol use, problematic alcohol use, illicit-drug use, and aggressive behaviors when all other variables were controlled. In addition, alcohol and illicit-drug use were positively associated with listening to musical genres of techno and reggae. Control variables (e.g., sensation seeking, age, gender and race/ethnicity) were significantly related to substance use and aggressive behaviors. **Conclusions:** The findings suggest that young people's substance use and aggressive behaviors may be related to their frequent exposure to music containing references to substance use and violence. Music listening preference, conversely, may reflect some personal predispositions or lifestyle preferences. There is also the possibility that substance use, aggression, and music preference are independent constructs that share common "third factors." (*J. Stud. Alcohol* **67:** 373-381, 2006)

LISTENING TO MUSIC is the number-one rated leisure-time activity for American youth (Roberts et al., 1999a,b). Some music genres contain more references to substance use and social defiance than others. A recent study of music popular among adolescents from 1996 to 1997 revealed that nearly half (47%) of all rap/hip-hop (hereafter referred to as "rap") songs mentioned alcohol (Roberts et al., 1999b). In contrast, other genres of music were much less likely to mention alcohol in the lyrics (country-western, 13%; hot-100/top-40, 12%; alternative rock, 10%; and heavy metal, 4%). Moreover, nearly two thirds of the rap songs mentioned illicit drugs as compared with approximately one tenth of the songs from the other genres. Another study of rap music indicated that references to alcohol in rap song lyrics increased five times (from 8% to 44%) from 1979 to 1997 (Herd, 2005). Of songs that mentioned alcohol, the positive attitude toward alcohol expressed in the lyrics increased from 43% in 1970-1989 to 73% in 1994-1997. One study assessing the content of music videos revealed that twice as much violence and criminal activity were depicted in rap and rock music videos compared with country, adult contemporary, and rhythm-and-blues music

videos (DuRant et al., 1997a). Weapon carrying also was depicted more often in rap and rock music videos. Together, these studies raise an important issue: Will frequent exposure to music containing references to substance use, violence, and social defiance impact youths' behaviors?

Empirical studies suggest that alcohol and illicit-drug use among youth may be associated with listening to popular music (e.g., hard rock, heavy metal, rap, and techno; Arnett, 1991, 1992; Forsyth et al., 1997; Hitzler, 2002; Miranda and Claes, 2004). Aggressive behaviors also have been linked to various genres of music. Studies have shown, for example, that adolescents with a preference for heavy metal or hard rock music reported higher rates of reckless behaviors than those who did not like these forms of music (Arnett, 1991, 1992). In addition, exposure to rap music was positively associated with aggressive behaviors and negative health outcomes at a 12-month follow-up for black girls ages 14-18 (Wingood et al., 2003). Experimental studies consistently demonstrated that greater exposure to popular music containing antisocial content was associated with more favorable attitudes toward antisocial behaviors and a greater likelihood of performing such behaviors (Anderson et al., 2003; Hansen and Hansen, 1990; Johnson et al., 1995).

Rap music is one genre that, more than others, is identified as particularly glorifying and encouraging the use of alcohol, other substances and violence (Herd, 2005). A closer look at some features of rap music is warranted. It is the predominant musical genre of hip-hop culture. Rap music rose to American prominence in the early 1980s with

New York disc jockeys appropriating Jamaican deejays' style of talking over prerecorded instrumental tracks (Ayazi-Hashjin, 1999; Davey D., 1984; Ogg and Upshal, 1999). It is the genre of music most listened to by black and Latino youth and the second-most listened to genre for youth of European descent (Roberts et al., 1999a). Rap music is used by many advertisers to promote products targeted for urban teens and young adults (Atkinson and Halliday, 2003; Friedman, 1992; Spiegler, 1996). Moreover, many rap musicians are involved in promoting alcoholic beverages (Alaniz and Wilkes, 1998; Allen-Taylor, 1997; Herd, 1993, 2005). Malt liquor, in particular, is portrayed as the "gangsta drink of choice, the brew of alienation" in rap music (interview with Makani Themba; Allen-Taylor, 1997) and is associated in popular culture with drug use, underage drinking, misogyny, violence, and irresponsible sex (Alaniz and Wilkes, 1998; Herd, 1993). Concerns about how marketing tactics may influence youth drinking have been raised (Alaniz and Wilkes, 1998; Allen-Taylor, 1997; Center for Science in the Public Interest, 1998; Herd, 1993, 2005), and additional concerns about rap music's influence on youth are generated by the messages embedded in the music and the violent lifestyles of the performers (e.g., Alaniz and Wilkes, 1998; Hansen, 1995; Herd, 1993). Misogynistic lyrics, profane language, and glorification of violence are hallmarks of the form of rap music known as "gangsta rap" (Rule, 1994; Toop, 2004). The undercurrents of violence and profane language of gangsta rap are criticized for potential detrimental influences on youth, resulting in calls from musicians, politicians, black church groups, music retailers, the police, and Tipper Gore's Parents' Music Resource Center (Rule, 1994; Toop, 2004) for self-discipline from gangsta rap musicians.

Individuals' listening preference for certain styles of music may be related to personal characteristics. Liking the music genres of punk, heavy metal, and reggae was found to be associated with higher levels of sensation seeking among college students (Weisskirch and Murphy, 2004). Arnett (1991, 1992) consistently reported that adolescents who preferred heavy metal or hard rock music had higher levels of sensation seeking than did adolescents who did not prefer these forms of music. More importantly, the associations between musical preference and most adolescent reckless behaviors were no longer significant when level of sensation seeking was controlled. Arnett suggested that sensation seeking underlies both reckless behaviors and music preference; adolescents with higher levels of sensation seeking are more attracted to heavy metal or hard rock music and have a greater propensity for reckless behaviors.

In summary, prior research suggests a connection between preferences for certain genres of music and alcohol and illicit-drug use, aggression, and other risky behaviors. Rap music more recently has been viewed as a genre of music that is associated more with these behaviors and is therefore of greater concern for its influence on youth. The present study investigates whether young people's substance use (i.e., alcohol and illicit-drug use) and aggressive behaviors are related to their listening to popular music, particularly rap music. Because references to alcohol, illicit drugs, and violence are frequently shown in various forms of popular music (DuRant et al., 1997a,b; Roberts et al., 1999b), a wide spectrum of music genres are included in this study. Personal attributes (e.g., sensation seeking and important demographic characteristics) are included in the analyses as control variables. The present study addresses four research questions: (1) Is listening to music that contains messages of substance use and violence significantly associated with behaviors of substance use and aggression? (2) Are behaviors of substance use and aggression particularly associated with listening to rap music? (3) Is malt liquor use particularly associated with listening to rap music? and (4) Are relationships between music preference, substance use, and aggression accounted for by sensation seeking and other predisposing factors?

Method

Sampling and data collection

Students from a 2-year community college in the central valley of California were recruited to participate in this study. The data were collected using self-administered paper-and-pencil questionnaires. Community colleges in the United States generally have a wider range of ages among their students compared with 4-year colleges. To have a study sample compatible with the age range of students in 4-year colleges, students ages 25 or younger were the focus of the study. The registrar indicated that students in this age range mostly attended daytime classes. As all new students were required to take an English course, the surveys were therefore administered in daytime English classes (8:30 AM-5:00 PM) over a 2-week period in September 2002. One week before the survey, a letter and a fact sheet describing the study were distributed to all students enrolled in daytime English classes ($N = 1,409$; 45 class sessions) inviting them to participate in the study. Trained research staff administered the survey, and, prior to beginning, students were reminded that the survey was anonymous and their participation was voluntary. At the end, students were paid $20 for their participation. In total, 1,226 students took part in the survey, for a response rate of 87%.

Participants' ages ranged from 15 to 65 years. Data analyses for the present study were limited to 1,056 students who were 25 years old or younger (57% of these were females). Data for 149 people were excluded because they were older than 25 years; another 21 were dropped because most data were missing ($n = 9$) or because gender or age information was not available ($n = 12$).

Measures

Music listening. Respondents indicated how often they listened to music overall, using a 5-point scale (never, less than monthly, monthly, weekly, daily or almost daily). In addition, they were provided with a list of 15 categories of music and were asked to check (yes/no) the type of music they listened to "often." The list comprised alternative, Christian, classical, country, heavy metal, jazz, Latin/salsa, top-40/hot-100, punk, rap, rhythm-and-blues/soul/funk/urban (hereafter referred to as R&B), reggae, rock, techno/house, and world music. "Often" was not specifically defined but relied on respondents' subjective assessment. In the data analyses, we considered a person as having a listening preference for a particular genre of music if that person (1) reported listening to music "daily or almost daily" and (2) checked that particular genre of music as a type that he or she listened to "often." We then assumed that this person had been frequently exposed to the messages embedded in that genre of music. Respondents were allowed to check more than one genre of music, and equal weight was given to each of the checked genres.

Alcohol use and alcohol-use disorder. The survey used the Alcohol Use Disorders Identification Test (AUDIT; Babor et al., 2001) to measure alcohol use and alcohol-use disorder. The AUDIT consists of 10 questions covering three domains: hazardous alcohol use (three questions), alcohol dependence (three questions), and harmful alcohol use (four questions). Each question is scored, and a sum score over the 10 items is computed to construct an overall AUDIT score; the possible AUDIT score ranges from 0 to 40. A score of 8 or higher indicates a strong likelihood of alcohol-use disorder. Respondents who did not report any alcohol use in the past 12 months did not respond to these questions and were given a score of 0 for each of these questions in the data analyses. The internal consistency of the AUDIT scale, estimated by Cronbach's α, was .84. For the purposes of this study, three alcohol-use measures were yielded from the AUDIT. Frequency of alcohol use in the past 12 months was measured using a 5-point scale (1 = never, 2 = monthly or less, 3 = two to four times a month, 4 = two to three times a week, and 5 = four or more times a week). The sum score was the second measure, and a higher sum score indicates a greater likelihood of having an alcohol-use disorder; the third was a dichotomous indicator of potential alcohol-use disorder (AUDIT score ≥ 8 vs < 8).

If respondents reported any alcohol use in the past 12 months, they were asked about their use of malt liquor in the past 12 months, using a 6-point scale (1 = never, 2 = less than once a month, 3 = once a month, 4 = two to three times a month, 5 = once a week, and 6 = more than once a week).

Illicit-drug use. Two types of illicit-drug use were assessed: marijuana and club drugs. Marijuana use was measured by asking respondents to indicate, on a 5-point scale, how often during the past 12 months they used marijuana (0 = never, 1 = once a month or less, 2 = two to three times a month, 3 = once a week, and 4 = more than once a week). Club-drug use was measured by asking respondents to indicate how often during the past 12 months they used each of the following three categories of drugs: (1) Ecstasy (i.e., methylenedioxymethamphetamine [MDMA]), gamma hydroxybutyrate (GHB), ketamine; (2) amphetamines and methamphetamines (e.g., crystal, ice, speed); and (3) hallucinogens (e.g., phencyclidine [PCP], lysergic acid diethylamide [LSD], mushrooms), on the same 5-point scale. Cronbach's α was .76 for the three club-drug measures.

Aggressive behaviors. Respondents indicated how often in the past 12 months, on a 5-point scale (not at all, 1-2 times, 3-5 times, 6-9 times, and 10 times or more), they engaged in each of five aggressive behaviors: being in a fist fight in which they hit someone, being in a gang fight, starting a fist fight or shoving match, threatening someone with a knife or gun, and attacking someone intending to seriously injure that person (Cronbach's α = .80).

Sensation seeking. Five items from the Impulsive Unsocialized Sensation Seeking Subscale of the Zuckerman-Kuhlman Personality Questionnaire (Zuckerman et al., 1991) were selected to construct a short sensation-seeking scale. Respondents indicated how much they liked or disliked, on a 4-point scale (dislike very much, dislike, like, like very much), going to wild parties, doing things that are scary, watching a sexy movie, doing "crazy" things just for fun, and doing things on impulse. These items were selected based on their relevance to young people's lifestyle and have been used in our previous studies with youth (Cronbach's α = .77).

Background variables. Background variables were respondents' age, gender, race/ethnicity, school enrollment status, employment and parents' educational achievement.

Data analysis

The associations between music genres and behaviors of substance use and aggression were first examined through bivariate analyses. *T* test analyses were conducted to examine the associations between music genres and continuous behavioral variables. Chi-square test analyses were used to examine the associations between music genres and the dichotomous behavioral variable (i.e., potential alcohol-use disorder; AUDIT score ≥ 8 vs < 8). Music genres significantly associated with these behaviors in bivariate analyses (either positively or negatively and at $p < .01$) were then included in a structural equation modeling analysis that simultaneously assessed the associations between music preference and alcohol use (frequency of any alcohol use,

frequency of malt-liquor use, AUDIT sum score), use of illicit drugs (marijuana and club drugs), and aggressive behaviors. Gender, age, race/ethnicity, and level of sensation seeking were included in the model as control variables. The structural equation modeling analysis was conducted using a maximum likelihood method implemented with the EQS software (Bentler, 1985-2004). Latent variables were constructed to represent constructs that were measured using multiple items (i.e., sensation seeking, club-drug use, and aggression). No cross-factor loadings were allowed. No error covariances between the latent variable indicators were added into the model. The covariances between exogenous variables (i.e., age, gender, race/ethnicity, sensation seeking, and music genres) and the covariances between the residuals of the dependent variables (i.e., any alcohol use, malt-liquor use, AUDIT sum score, marijuana use, club-drug use and aggressive behaviors) were included in the model. Because the data were not normally distributed, robust estimates of the standard errors were requested. Per the recommendation of Hu and Bentler (1999), the comparative fit index (CFI) and root mean square error of approximation (RMSEA) indices were used to assess the model fit. A value close to .95 for CFI and a value close to .06 for RMSEA were considered indications of good model fit. Among the 1,056 cases included in the analyses, 37 cases (3.5% of the study sample) had some missing data. Missing data were handled through the missing data procedure (expectation-maximization [EM] imputation) implemented with the EQS.

Results

Sample characteristics

The study sample ($N = 1,056$) was 57% female. About two fifths of the respondents (38%) identified themselves as white, 27% as Latino American, 21% as Asian or Pacific Island American ("Asian American" hereafter), 5% as black, and 9% as other (Native American, mixed ethnicity or unknown). Their ages ranged from 15 to 25 years (mean [SD] = 18.9 [1.80]; 86% were younger than age 21). Four fifths of the respondents (81%) were full-time students and 82% had a paid job during the 12 months prior to the survey. For most respondents, father and mother had similar levels of education (mean = 12.5 years).

Approximately three quarters of the respondents (74%) reported drinking alcoholic beverages of any type in the past 12 months, and about two fifths (38%) reported drinking malt liquor during the same period. In addition, 29% of the study sample had an AUDIT score of 8 or higher. Two fifths of the study sample (38%) reported using marijuana, and 13% reported using club drugs in the past 12 months. More than one fourth (27%) reported being engaged in at least one act of aggressive behavior in the past 12 months.

Music listening

Almost all respondents (94%) reported listening to music "daily or almost daily." Rap music appeared to be popular among this sample of students. Of these "daily or almost daily" music listeners, 69% reported listening to rap music "often." Also popular among this sample were the music genres of alternative (65%), R&B (57%), rock (51%), top-40/hot-100 (37%), techno/house (32%), country (31%), punk (28%), and heavy metal (22%). The rest of the music genres were listened to often by less than 20% of the "daily or almost daily" music listeners: Latin/salsa (19%), reggae (17%), classical (16%), jazz (14%), world (11%), and Christian (0%). On average (SD), respondents listened often to 4.8 (2.8) genres of music. Very few of them (5%) listened to only one genre of music. Only three respondents reported listening to music "daily or almost daily" without identifying music genres that they listened to often.

Bivariate analyses

Results from t tests indicated that frequency of any alcohol use was significantly and positively associated with often listening to music genres of alternative, heavy metal, punk, rap, R&B, reggae, rock, and techno (p's $< .01$), but negatively with often listening to world music ($p < .01$). Frequency of malt-liquor use was significantly and positively associated with often listening to music genres of heavy metal, punk, rap, reggae, rock, and techno (p's $< .01$). Frequency of marijuana use was significantly and positively associated with often listening to music genres of punk, rap, reggae, and rock (p's $< .01$), but negatively with often listening to world music ($p < .01$). Level of club-drug use was significantly and positively associated with often listening to music genres of rap and techno (p's $< .01$). Level of aggressive behaviors was significantly and positively associated with often listening to rap music ($p < .01$), but negatively with often listening to country music ($p < .01$). Results from chi-square tests indicated that alcohol-use disorder was significantly and positively associated with often listening to music genres of heavy metal, punk, rap, reggae, and rock (p's $< .01$). Based on these bivariate analyses, music genres of alternative, country, heavy metal, punk, rap, R&B, reggae, rock, techno, and world were included in the further multivariate analysis.

Structural equation modeling analysis

A structural equation model was specified to simultaneously assess the associations between music genres and behaviors of substance use and aggression, taking into account gender, age, race/ethnicity, and level of sensation seeking. Dummy variables were constructed for gender (1 =

TABLE 1.   Measures included in the structural equation modeling analysis

Measures	Values	Mean (SD)	Latent variable factor loading (standardized)
Age	0 = 21-25, 1 = <21	0.85 (0.35)	
Gender	0 = female, 1 = male	0.43 (0.50)	
Race/ethnicity			
Black	0 = no, 1 = yes	0.05 (0.22)	
Asian American	0 = no, 1 = yes	0.21 (0.40)	
Latino American	0 = no, 1 = yes	0.27 (0.44)	
Other	0 = no, 1 = yes	0.09 (0.29)	
Sensation seeking			
Dislike/like going to wild parties	1-4	2.72 (0.97)	.62
Dislike/like doing things that are scary	1-4	2.58 (0.84)	.64
Dislike/like watching sexy movies	1-4	2.77 (0.85)	.54
Dislike/like doing crazy things just for fun	1-4	2.87 (0.86)	.75
Dislike/like doing things on impulse	1-4	2.78 (0.83)	.66
Music (genre) listening			
Alternative	0 = no, 1 = yes	0.64 (0.48)	
Country	0 = no, 1 = yes	0.31 (0.46)	
Heavy metal	0 = no, 1 = yes	0.22 (0.41)	
Punk	0 = no, 1 = yes	0.28 (0.45)	
Rap	0 = no, 1 = yes	0.68 (0.46)	
R&B	0 = no, 1 = yes	0.57 (0.50)	
Reggae	0 = no, 1 = yes	0.17 (0.38)	
Rock	0 = no, 1 = yes	0.51 (0.50)	
Techno	0 = no, 1 = yes	0.32 (0.47)	
World	0 = no, 1 = yes	0.11 (0.31)	
Any alcohol use	1-5	2.35 (1.11)	
Malt-liquor use	1-6	1.67 (1.07)	
AUDIT sum score	0-40	5.33 (5.93)	
Marijuana use	0-4	0.79 (1.27)	
Club-drug use			
Ecstasy, GHB, ketamine	0-4	0.12 (0.44)	.77
Amphetamines/methamphetamines	0-4	0.08 (0.41)	.66
Hallucinogens	0-4	0.07 (0.33)	.76
Aggressive behaviors			
Being in a fist fight where you hit someone	0-4	0.35 (0.73)	.77
Being in a gang fight	0-4	0.16 (0.53)	.79
Start a fist fight or shoving match	0-4	0.06 (0.37)	.65
Threatening someone with a knife or gun	0-4	0.05 (0.34)	.49
Attacking someone intending to seriously injure that person	0-4	0.08 (0.38)	.75

Notes: R&B = rhythm-and-blues/soul/funk/urban; AUDIT = Alcohol Use Disorders Identification Test; GHB = gamma hydroxybutyrate.

male) and age (1 = <21). Separate dummy codes were generated to represent black, Asian American, Latino American, and other, with white being the reference group. Table 1 lists the variables included in the model and presents some descriptive statistics of these variables. The structural model fit the data adequately (CFI = .090, RMSEA = .041 [90% CI: .038-.045]). Results from this analysis are summarized in Table 2 and described as follows.

Music listening and alcohol use

Often listening to rap music significantly and positively predicted frequency of any alcohol use, frequency of malt-liquor use, and the sum score of the AUDIT when age, gender, race/ethnicity, level of sensation seeking and other music genres were taken into account. Often listening to techno music significantly and positively predicted frequency of any alcohol use, frequency of malt-liquor use, and the AUDIT sum score when all other variables were controlled. When all other variables were controlled, often listening to reggae music significantly and positively predicted frequency of any alcohol use.

Level of sensation seeking positively predicted frequency of any alcohol use, frequency of malt-liquor use, and the AUDIT sum score when all other variables were controlled. Age significantly and negatively predicted any alcohol use and the AUDIT sum score when all other variables were controlled; students under the age of 21 reported drinking alcohol, in general, less frequently and scored lower on the AUDIT than did students ages 21-25. Asian race significantly and negatively predicted all three alcohol-use variables when all other variables were controlled.

Table 2. Structural equation model assessing the associations between music preference and substance use and aggressive behaviors

Variable	Any alcohol use	Malt-liquor use	AUDIT score[a]	Marijuana use	Club-drug use	Aggressive behaviors
Age (1 = <21)	-.156‡	-.053	-.106‡	-.073*	-.095	-.109*
Gender (1 = male)	.007	-.002	.012	-.076*	-.070	.071
Race/ethnicity						
Black	-.047	-.055	-.065	.013	-.060*	.105*
Asian American	-.146‡	-.092†	-.156‡	-.117‡	-.007	.020
Latino American	-.022	-.036	-.031	-.067	-.066	.054
Other	-.044	-.010	-.041	.004	.007	.075
Sensation seeking	.397‡	.273‡	.415‡	.272‡	.198‡	.187‡
Music listening						
Alternative	-.005	-.040	.000	-.044	-.009	-.054
Country	.052	-.023	.032	-.062	-.080†	-.013
Heavy metal	-.021	-.013	-.037	-.017	.042	.054
Punk	-.030	-.019	.008	.036	-.055	-.013
Rap	.153‡	.120‡	.178‡	.117‡	.069*	.075*
R&B	-.018	-.038	-.045	-.036	-.045	-.040
Reggae	.061*	.065	.055	.129‡	.058	.023
Rock	.005	.035	-.035	.003	-.034	-.093*
Techno	.072*	.089†	.064*	-.016	.118*	.049
World	-.053*	-.040	-.042	-.059†	.009	-.037
R^2	.31	.15	.32	.17	.09	.11

Notes: The path coefficients are standardized coefficients. AUDIT = Alcohol Use Disorders Identification Test; R&B = rhythm-and-blues/soul/funk/urban. [a]The score was log transformed prior to analysis because of skewedness.
*p < .05; †p < .01; ‡p < .001.

To examine whether greater malt-liquor use was simply due to greater overall alcohol use, the equation predicting malt-liquor use was respecified by including frequency of any alcohol use as one of the predictors. This analysis showed that the associations between rap and techno music and malt-liquor use were no longer significant when controlling for any alcohol use.

Music listening and illicit-drug use

When age, gender, race/ethnicity, level of sensation seeking and other music genres were controlled, often listening to rap music significantly and positively predicted frequency of marijuana use. Often listening to reggae music also significantly and positively predicted frequency of marijuana use. In contrast, often listening to world music negatively predicted frequency of marijuana use. Often listening to rap and techno music significantly and positively predicted frequency of club-drug use, whereas often listening to country music significantly and negatively predicted frequency of club-drug use.

Sensation seeking significantly and positively predicted frequency of marijuana use and frequency of club-drug use. Age, gender, and Asian race negatively predicted marijuana use. Being black was negatively associated with frequency of club-drug use when all other variables were controlled. Because the association between marijuana use and gender was counterintuitive, further analyses were conducted. Males reported more marijuana use than did females in bivariate

analysis (p < .01); however, when levels of sensation seeking were controlled, marijuana use for females became significantly greater than for males. Frequency of marijuana use was thus higher among females at equal levels of sensation seeking.

Music listening and aggressive behaviors

When age, gender, race/ethnicity, level of sensation seeking and other music genres were controlled, often listening to rap music significantly and positively predicted aggressive behaviors, whereas often listening to rock music significantly and negatively predicted aggressive behaviors. Sensation seeking significantly and positively predicted aggressive behaviors. Black race significantly and positively predicted aggressive behaviors. Last, age significantly and negatively predicted aggressive behaviors.

Discussion

To investigate whether young people's substance use and aggressive behaviors were related to their listening to popular music, we conducted a survey study with a sample of community-college students. Listening to rap music, compared with other music genres examined, was consistently and positively related to general alcohol use, malt-liquor use, potential alcohol-use disorder, marijuana use, club-drug use, and aggression, even after controlling for listening to other genres of music, important demographic characteristics,

and sensation seeking. The persistent significant and positive associations between rap music and measures of alcohol use, illicit-drug use and aggression are of critical importance. Findings of other connections between music and substance use provide additional supports to the idea that substance use is associated with listening to certain genres of popular music.

These findings, however, also suggest that some situational mechanism may be involved. For example, the significant association between marijuana use and listening to reggae music seems logical, given the historical use of marijuana in Rastafarian, religious ceremonies (e.g., King and Jensen, 1995; Llosa, 2002). Reggae music, however, has been commonly played in club settings, neighborhood street parties, and open-air concerts in which, although attendants are probably not Rastafarians, the reggae music-marijuana use connection is sustained. In addition, significant associations were found between club-drug use, alcohol use, and listening to techno music, which consists of virtually no lyrics. Previous studies report that young people gather in rented settings or nightclubs to engage in late-night dance parties that feature electronically produced music (i.e., techno music), light shows, and intense physical dancing (e.g., Randall, 1992a,b; Schwartz and Miller, 1997; Weir, 2000). Drugs such as ecstasy and other amphetamines are known to be used at such parties and are believed to facilitate dancing for long hours and increase enjoyment of the event. As Hunt and Evans (2003) maintain, music listening and dancing are important activities for many young people and often occur in settings in which alcohol and drugs play a part.

Our data also showed that listening to certain genres of music was negatively associated with substance use and aggressive behaviors. Listening to world music, for example, was associated with less alcohol and marijuana use, listening to country music was associated with less club-drug use, and listening to rock music was associated with fewer aggressive behaviors when all other variables were considered. The negative associations between music genres and behavioral outcomes were, however, less consistent than the positive associations, and the music genre that was consistently related to lower risks (world music) was listened to "often" by only one tenth of the study sample. It may be premature, therefore, to conclude that listening to certain genres of music is related to lower levels of problem behaviors among youth.

Our measure of music listening is limited in many ways. We did not measure either the amount of time spent listening to different genres of music or the attention paid to the lyrics, nor did we ask the respondents to prioritize their preference for genres of music. Clear estimates of the differential influences of various music genres on behaviors were impossible to make because most respondents listened to more than one genre of music. When we assessed the

association between a certain music genre and an outcome variable, however, we adjusted for respondents' listening to other music genres and other control variables.

Consumption of malt liquor was significantly associated with listening to rap music. When frequency of any alcohol use was taken into account, the significant and positive association between malt-liquor use and rap music was no longer significant. Thus, greater malt-liquor use was due to greater overall alcohol use. This finding, however, does not ease the concern that the alcohol industry is promoting alcohol use through rap music. The evidence that often listening to rap music was consistently and positively associated with alcohol use and problematic alcohol use further underscores concerns about the potential influences of rap lyrics on youth behaviors.

Consistent with the literature, Asian-American students reported the lowest levels of alcohol and marijuana use among all racial/ethnic groups, even when all other variables were controlled. It is interesting to note that Asian students were more likely to listen to techno music than white and Latino students (42% as compared with 24% of whites and 36% of Latinos) and just as likely to listen to rap music (65% as compared with 64% of whites and 70% of Latinos), but they apparently were not at as much risk for substance use. Future studies should examine whether factors that are protective of Asian Americans regarding substance use also help lessen the connections between substance use and music preference.

Although black students reported similar levels of substance use as students in other non-Asian racial/ethnic groups, they reported significantly more aggressive behaviors (analyses not shown). This racial/ethnic difference in aggressive behaviors remained significant even when all other variables were controlled. Further investigation was conducted and the analyses showed that the β coefficient for the variable of "black" remained virtually unchanged across three models consisting of predictors (1) of only race/ethnicity variables; (2) controlling for age, gender, and sensation seeking; and (3) further controlling for music genres. This finding indicates that rap or any other music did not mediate the relationship between being black and aggressive behaviors. It is important to note that much of the aggression expressed in gangsta rap is violence against women, particularly black women (e.g., Barongan et al., 1995; Johnson et al., 1995; Wester et al., 1997), which was not measured in our study.

The short sensation-seeking scale used in our study was consistently predictive of substance use and aggressive behaviors. Bivariate analyses examining the associations between music listening and sensation seeking indicated that respondents with higher levels of sensation seeking were more likely to listen to the music genres that were positively associated with substance use and aggression (analyses not shown). Respondents with lower levels of sensation

seeking, conversely, were more likely to listen to the music genres that were negatively associated with substance use and aggression. The associations between music genres and behavioral outcomes significantly decreased, as indicated by reductions in standardized path coefficients, when sensation seeking was entered into the regression models. In contrast, the standardized path coefficients remained almost unchanged when age, gender and race/ethnicity were entered into the regression models. These findings are in agreement with Arnett's (1991, 1992) argument that sensation seeking is likely a confounder for the relationship between problem behaviors and music preference. Future studies that examine the connection between music preference and youthful problem behaviors could shed additional light on the role of sensation seeking by using a more sophisticated sensation-seeking scale.

In summary, our findings indicate that substance use and aggressive behaviors among young people were significantly associated with listening to certain genres of popular music. Findings of this study should be interpreted with caution, however. Because of the cross-sectional nature of the data, it is difficult to make causal inferences about the relationships between music listening and substance use and aggression. It is possible that frequent exposure to rap music significantly contributes to positive values toward substance use and violence. It is also possible that individuals who often listen to rap music view substance use and violence more positively prior to listening to this genre of music; thus, music listening, at most, reinforces these values. Another possibility is that substance use, aggression, and music listening may be independent constructs but share common "third factors." Last, our study sample may not be representative of all community-college students because our study focused on students ages 25 or younger, attending daytime classes. Our study findings may not be generalizable to all college students, as a large proportion of our survey sample (62%) was nonwhite. The study findings also may not be generalizable to young people who do not attend college. Studies with longitudinal designs and general-population samples are needed to better understand the causal or dynamic relations between music listening and behaviors of substance use and aggression among young people.

Acknowledgments

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