The link between music preferences and cannabis use of adolescents and the role of gender, peer group homogeneity and aggression

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Abstract

Liking loud and energetic music, such as Rock and Rap, has been shown to be related to substance use. The present study aims to provide a more complete elaboration of the music preference and cannabis use link by including gender and aggression as moderators. Furthermore, adolescents that prefer loud and energetic music seek out like minded peers, who may increase cannabis use. Therefore, a preference for homogenous peer groups is included as a mediator in the link between music preferences and cannabis use. A subsample of 400 adolescents aged 13-18 ($M = 16.73$, $SD = 1.25$, 80% female) from the Qrius Switch-On project data set was used. Music preferences were conceptualized as five styles: Pop, Rock, Urban, Classical and Dance. Contrary to expectations, a hierarchical regression analysis revealed no main effect for preferring loud and energetic music on cannabis use. In addition, no moderating effects for gender or aggression were found, nor a mediation effect for peer group homogeneity. However, results indicated that adolescents preferring Pop music used less cannabis and that peer group homogeneity in liking Pop music enhanced this effect. Future studies with longitudinal research designs are needed to further investigate the causality of these relations.

Keywords: Music preferences, Adolescents, Cannabis, Peers, Aggression.

Samenvatting

Het hebben van een voorkeur voor luide en energieke muziek, zoals Rock en Rap, is gerelateerd aan middelengebruik. Het doel van de huidige studie is om een completere verklaring te bieden van de relatie tussen muziekvoorkeuren en cannabisgebruik van adolescenten door de toevoeging van geslacht en agressie als moderatoren. Adolescenten zoeken naar gelijkgestemde vrienden met dezelfde muziekvoorkeuren waardoor de kans op cannabisgebruik groter wordt, dus is het hebben van homogene vriendengroepen toegevoegd als mediator. Er is gebruik gemaakt van een subsample van 400 adolescenten tussen 13 en 18 jaar oud (M = 16.73, SD = 1.25, 80% vrouw) uit het Qrius Switch-On project. Muziekvoorkeuren werden onderverdeeld in vijf stijlen: Pop, Rock, Klassiek en Dance. Tegen verwachtingen in, werd er geen hoofdeffect voor het hebben van een voorkeur voor luide en energieke muziek op cannabisgebruik gevonden. Ook werden er geen moderatie effecten voor geslacht of agressie gevonden, en geen mediatie effect van homogene vriendengroepen. Echter, toonde de resultaten dat adolescenten met een voorkeur voor Popmuziek minder cannabis gebruiken en dat het hebben van een homogene vriendengroep met een voorkeur voor Popmuziek dit effect verder versterkt. Longitudinale vervolgonderzoeken zijn noodzakelijk om inzicht te krijgen in de causaliteit van deze relaties.

Kernwoorden: Muziekvoorkeuren, Adolescenten, Cannabis, Vriendengroepen, Agressie.

Introduction

The link between the music preferences and cannabis use of adolescents

Multiple previous studies have found that music is a crucial part of young people's life (Gowda et al., 2014; Primack et al., 2010; Ter Bogt et al., 2010). According to Mulder et al. (2009) adolescents listen up to around three hours of music each day by the end of high school, which illustrates that most adolescents love music. Obviously, adolescent music preferences differ. In research they are often categorized in the following five style genres: Pop, Urban, Highbrow, Rock and Dance (Ter Bogt et al., 2010). A preference for some music types can be linked to certain behaviours. For example, a preference for loud and energetic types of music goes hand in hand with increased levels of alcohol, tobacco, and cannabis consumption (Mulder et al., 2010; Ter Bogt et al., 2012). In contrast to this, Ter Bogt et al. (2012) found that softer and more melodic music types like Pop and Highbrow music were linked to less substance use. Ultimately, music plays a big role in the day-to-day life of adolescents and it is important to study this medium in relation to cannabis use, because cannabis is the most widely used illicit drug among adolescents (Parrott et al., 2007). Within the Netherlands around a quarter of 16-year-old high school students have ever used cannabis and around 1 in 7 of them even used cannabis last month (Stevens et al., 2017).

When trying to gain insight in the relationship between music preferences and cannabis use it is crucial to know which types of music encourage the use of cannabis among adolescents. Furthermore, the music preference and cannabis use link can be influenced by multiple factors, such as gender, levels of aggression or peer group homogeneity which may strengthen this link.

Music preferences, peer group homogeneity and cannabis use

When examining the link between the music preferences and cannabis use of adolescents, there are multiple findings on the way adolescents use music as a socializing agent and the role of music in the formation of peer groups. Miranda (2013) states that adolescents use music as a resource to develop a social image and that it shapes their peer groups. Slater and Henry (2013) found that adolescents' music preferences lead to a selection of peer networks that are consistent with the implicit norms and values of these music preferences, thereby influencing the adolescent's behaviour. For example, adolescents that prefer rap music with lyrics about substance use select peer networks that prefer the same music and its messages of substance use. These peer networks reaffirm these implicit norms and values, heightening the likelihood that these adolescents start using substances. An explanation for the social use of music can be found in the Music Marker theory (Ter Bogt et

al., 2013). The Music Marker theory suggests that music has a social use and is important for the choice of friends. Music preferences have a 'badge' function. This 'badge' communicates values, attitudes, and opinions. Through their music preferences, adolescents both show who they are and are drawn to specific crowds of friends consistent with their own image. These crowds may then subsequently influence their behaviour (Ter Bogt et al., 2013). Selfhout et al. (2008) propose that adolescents that are more deeply embedded in a deviant peer setting, usually have more peer models and thus more rewards for exhibiting problem behaviour. This particularly concerns adolescents with preferences for heavy metal and hip-hop, as these music genres frequently refer to controversial topics such as violence and substance use, and adolescents listening to these music styles are often drawn to crowds in favor of these behaviors.

As earlier stated, adolescents that prefer loud and energetic music styles are more likely to use cannabis (Mulder et al., 2010). The adolescents that prefer these music styles often seek out like minded peers and form homogenous peer groups, according to the Music Marker theory (Ter Bogt et al., 2013). Moreover, according to the Peer Socialisation Hypothesis (Selfhout et al., 2008), these adolescents are then rewarded for problem behaviours by like-minded peers within these peer groups, which makes them associate stronger with these groups. When linking these results to the objective of current study, this implies that adolescents with preferences for loud and energetic music styles often seek out and associate stronger with their homogeneous peer groups which makes them more likely to use cannabis. Since research on this process is scarce, the current study will examine whether peer group homogeneity is a mediator or a possible moderator in the link between music preferences and cannabis use (see Figure 1).

Aggressive behaviour and cannabis use

Coyne and Padilla-Walker (2015) found that listening to aggressive content in music was associated with increased aggressive behaviour and decreased prosocial behaviour over time. An explanation for this link can be provided by the General Aggression Model (GAM) (Anderson & Bushman, 2002). The GAM describes that music influences a person's internal state. This includes cognition (music activates related scripts in memory), arousal (music can physiologically arouse or calm an individual) and affect (music puts an individual in a good or bad mood). In addition, the GAM states that music can also potentially influence long-term personality development, which makes a person think and behave in a consistent aggressive manner. In short, if an adolescent prefers music with aggressive lyrics, such as harder forms

of rap or heavy metal, they may be at risk to develop aggressive thinking and behavior patterns (Coyne & Padilla-Walker, 2015).

In turn aggression is also linked with other deviant behaviors, such as substance use. Miranda and Claes (2004) found significant links between liking rap music and violence, aggressive behaviours, soft drugs, and alcohol use. However, there is only limited research on whether having a higher level of aggression strengthens the music preference and cannabis use link. Therefore, the current study aims to investigate this further by including aggression as a moderator on the link between music preferences and cannabis use (see Figure 1).

Gender

Hemsing and Greaves (2020) state that boys report higher rates of cannabis use and that they also use more ways to administer cannabis than girls. The same effect was found among Dutch students in high school, according to the HBSC-study boys used cannabis significantly more frequently than girls (Stevens et al., 2017). Ter Bogt et al. (2012) found small gender differences in the associations between music and substance use, but they were still quite similar for both genders. Nonetheless, other previous research found that liking loud and energetic music types co-occurs with cannabis consumption and that boys more often prefer loud and energetic music types (Mulder et al, 2010). Thus, showing the importance of including gender differences in research about music preferences and cannabis use. Considering that only little further research has been conducted on if being a boy can strengthen the music preference and cannabis use link, the current study includes gender as a moderator (see Figure 1).

Age and education level

Lastly, there are other important demographics to be considered when investigating cannabis use of adolescents. According to the HBSC-study, there is a strong age effect for cannabis use (Stevens et al., 2017). This implies that when adolescents get older, they significantly use more cannabis, and they use cannabis more often. Stevens et al. (2017) also state that adolescents in the lower level of high school education use more cannabis than their peers in the higher level of high school education, with regards to monthly as well as in lifetime cannabis use. It is therefore important to control for age and education level when studying music preferences in relation to cannabis use.

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Current study

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An extensive amount of research has already been conducted on the link between the music preferences and cannabis use of adolescents. However, the current study aims to further extend this previous research, as it also includes aggression and gender as moderators

and peer group homogeneity as a mediator and a possible moderator. By adding these factors, the current study will provide a more complete explanation on the music and substance use link. Consequently, the current study aims to answer the central research question: '*Is there a link between the music preferences and cannabis use of adolescents?'*. As stated above, there are several factors within the link between the music preferences and cannabis use of adolescents that the current study aims to investigate further. Therefore, the sub research questions are as followed:

SQ1: Is there a mediating effect of the homogeneity in peer groups in the link between the music preferences and cannabis use of adolescents?

SQ2: Is the link between loud and energetic music preferences and cannabis use of adolescents stronger for adolescents with higher levels of aggression?

SQ3: Is the link between loud and energetic music preferences and cannabis use of adolescents stronger for boys?

The following hypotheses are derived from the above-mentioned research questions, which are visually represented in the conceptual model of the current study (Figure 1). Firstly, literature suggests that cannabis is the most widely used illicit drug among adolescents (Parrott et al., 2007). Liking loud and energetic music types, such as heavy metal and rap music, co-occurs with cannabis use (Ter Bogt et al., 2012). Leading to the main hypothesis of the current study:

H1: Preferences for loud and energetic music types can positively predict the cannabis use of adolescents.

Secondly, multiple studies suggest adolescents with preferences for loud and energetic music types prefer having homogenous peer groups and associate stronger with their homogeneous peer groups which makes them more likely to use cannabis (Mulder et al., 2010; Selfhout et al., 2008; Ter Bogt et al., 2013). Consequently, the following hypothesis is assumed:

H2: The preference for homogenous peer groups has a mediating effect on the link between the music preferences and cannabis use of adolescents.

Thirdly, literature on aggressive behaviour suggests that music styles containing aggressive lyrics often lead to more aggression (Coyne & Padilla-Walker, 2015). Music that contains aggressive lyrics also leads to increased soft drug use (Miranda & Claes, 2004), but the role of aggression as a person characteristic moderating the music substance use link has not yet been investigated. It is proposed that:

H3: The link between loud and energetic music preferences and cannabis use of adolescents is stronger for adolescents with higher levels of aggression.

Fourthly, findings on gender suggest that boys report higher rates of cannabis use (Hemsing & Greaves, 2020; Stevens et al., 2017). Moreover, boys more often prefer music styles associated with cannabis use, such as rap music (Mulder et al., 2010). However, the interaction between these factors needs closer attention. Leading to the final hypothesis:

H4: The link between loud and energetic music preferences and cannabis use of adolescents is stronger for boys.

Lastly, age and education level are important demographics to consider when studying music preferences and cannabis use. Consequently, as illustrated in Figure 1, the current study controls for effects of both age and education level.

Figure 1

Conceptual model of the proposed hypothesis
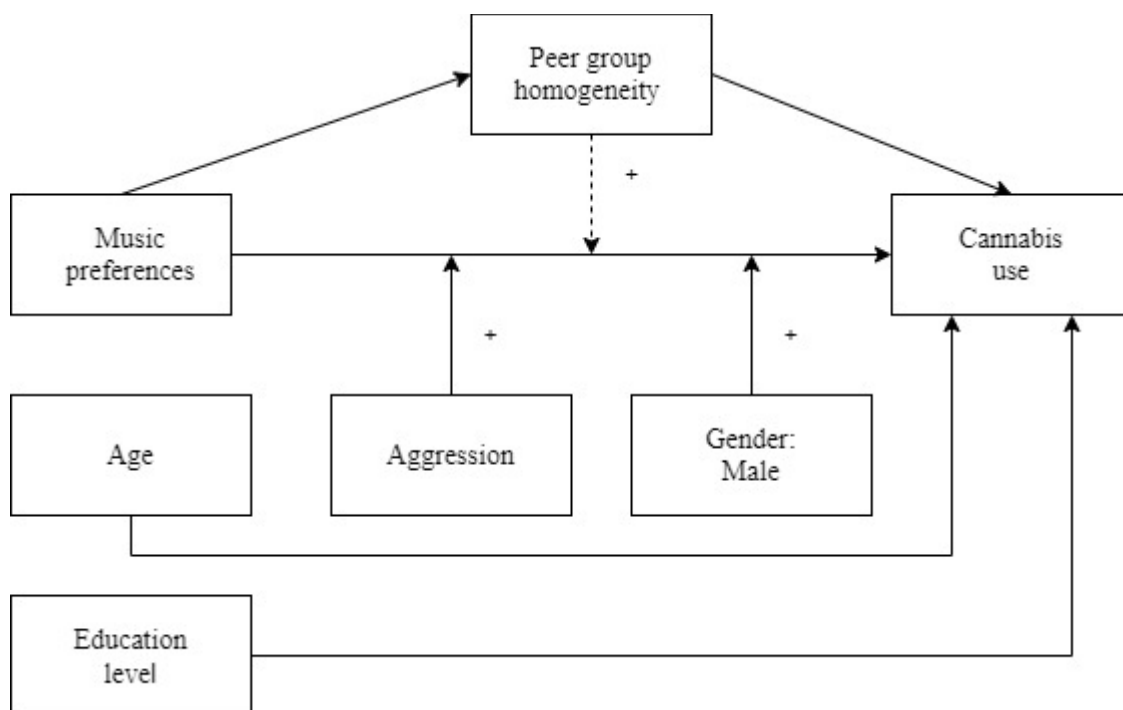
Method

Participants

In the current study data from the third wave of the Qrius Switch-On project in Amsterdam was used. The Switch-On project was a collaboration between MTV Networks and Qrius (Ter Bogt et al., 2010). The total sample of the third wave from the study (*N* =

1077) consisted of 316 men (29%) and 761 women (71%). Participants were aged 13 to 30 years old ($M = 20.19$, $SD = 3.60$). Since the target population for the current study was adolescents, a subsample was selected ($N = 400$). This subsample consisted of 81 men (20%) and 319 women (80%). Participants in the subsample were aged 13 to 18 years old ($M = 16.73$, $SD = 1.25$). Most of the participants (69%) were in a higher level of education (higher vocational and academic track). The other 31% of the participants were in a lower level of education (lower and middle vocational track).

Design and procedure

Qrius is a market research bureau specialised in children, adolescents and young adults. Qrius has been closely following developments in this young audience for the past 25 years. For more information see www.qrius.nl (Qrius, z.d.). The sample was obtained by approaching members of an internet-panel regularly on topics such as media preferences, social and political attitudes. There were rewards for participating such as draws for small prizes and a point-saving system in which participants were granted $10 after participating in multiple waves.

Measuring instruments

Music preferences

Music preferences were measured with five subscales of music genres. Individual genres were rated on a 5-point Likert scale, which ranged from 1 (*dislike strongly*) to 5 (*like very much*). Scales were created for the following music genres. Firstly, for Pop (or mainstream) music, which consisted of the genres: Top 40 (chart-based music), Boy Band, Latin pop, and Dutch pop ($\alpha = .69$). The second scale was created for Urban music which consisted of the genres: Soul, RnB, and Rap ($\alpha = .84$). A third scale was created for Rock music, which consisted of the genres: Hardrock, Heavy Metal, Rock, Punk, Alternative and Gothic ($\alpha = .88$). Then a fourth scale was created for Dance music, which consisted of the genres: Dance, Euro house, Trance, Electronic, Techno and Hard house ($\alpha = .80$). Lastly, a subgenre of Classical music was created, which consisted only of the Classical music genre, thus internal validity could not be measured.

Cannabis use

Cannabis use was measured with an item about frequency of use (Have you ever used cannabis?). This item was measured on a 5-point Likert scale where a lower score meant less frequent cannabis use. The scale ranged from 1 (*never*) to 5 (*daily*).

Peer group homogeneity in music preferences

Peer group homogeneity was measured by creating a scale out of five items that were all about characteristics of peer groups ($\alpha = .60$), for example: 'I find it important that my friends listen to the same music as me'. All items were measured on a 5-point Likert scale, which ranged from 1 (*completely disagree*) to 5 (*completely agree*). A higher score indicated a higher preference for peer group homogeneity.

Aggression

Aggression was measured by creating a scale out of four items that regarded aggressive behaviours ($\alpha = .75$), for example: 'Indicate in how much this relates to you: I fight a lot'. All items were measured on a 5-point Likert scale, which ranged from 1 (*completely incorrect*) to 5 (*completely correct*). A higher score indicated more aggressive behaviour.

Data-analysis

Data was analysed using IBM SPSS statistics version 27. Firstly, descriptives and frequencies of all variables were retrieved and the mean, standard deviation, minimum and maximum scores were checked. After this, Pearson correlations were computed regarding the relations between the variables.

A hierarchical regression analysis was conducted to assess the main effect as well as the moderating roles of aggression, gender, and the possible moderating role of peer group homogeneity. The first model contained the control variables age and education level. In the second model all music preferences were added. In the third model, gender, aggression, and peer group homogeneity were added. Then, in the last model, the interaction between music preferences and, respectively gender, aggression, and peer group homogeneity were added to assess moderating effects.

Lastly, a mediation analysis using the Baron and Kenny (1986) method was conducted to investigate the mediating role of peer group homogeneity on the relation between music preferences and cannabis use. This mediation analysis was only conducted for music preferences with a significant main effect. The first step assessed the direct effect between the independent variable, which is one of the music preferences, and the dependent variable cannabis use. Subsequently, the second step assessed the relationship between the independent variable and the mediator peer group homogeneity. The third step assessed the effect of the mediator peer group homogeneity on the dependent variable cannabis use. If all steps are found to be significant, the last step is to investigate the effect of both the

independent variable as well as the mediator on the dependent variable and check whether the effect of music is attenuated by the mediator, peer group homogeneity.

Assumptions were checked and the variables cannabis use, Classical music and aggression were right-skewed. Furthermore, the assumption of linearity between the independent and dependent variable was violated. Outliers were detected using the Mahalanobis distance and influential cases with high values on leverage were found. This meant that there was heteroscedasticity in the data. Lastly, the assumption of multicollinearity was met as no serious cases were found. When interpreting the results, it is to be considered that assumptions were not met.

Results

Descriptive statistics

As shown in Table 1, descriptive statistics for all research variables were computed. Gender and education level were unequally represented in the data, as 80% of the participants were girls, and 70% of the girls and 66% of the boys followed the higher vocational and academic education track. Participants scored an average of 1.33 (SD = .84) on cannabis use, meaning that on average most participants (almost) never used cannabis. Aggressive behaviour amongst participants was also low (M = 1.43, SD = .54). Moreover, most participants did not hold strong dislikes or preferences for having homogenous peer groups, (M = 2.9, SD = .56). T-tests were performed to assess gender differences. These T-tests indicated that boys preferred Dance music (t = 4.51, p = <.01) and having homogenous peer groups (t = 2.07, p = <.05) more compared to girls. Furthermore, girls preferred Pop music (t = -4.18, p = <.01), and Urban music (t = -3.61, p = <.01) more compared to boys.

Table 1

Descriptive statistics of all research variables

Variable	Range	*M (SD)*	Girls (80%)	Boys (20%)
Education level				
Low and middle vocational	-	-	30%	34%
Higher vocational and academic	-	-	70%	66%
Age	13-18	16.73 (1.25)	16.69 (1.25)	16.90 (1.26)
Pop	1-5	3.29 (.81)	**3.37 (.78)**	**2.96 (.83)**
Rock	1-5	2.77 (1.08)	2.76 (1.07)	2.82 (1.14)
Dance	1-5	2.54 (.94)	**2.44 (.92)**	**2.96 (.94)**
Urban	1-5	3.47 (1.24)	**3.59 (1.19)**	**3.04 (1.33)**
Classical	1-5	2.49 (1.21)	2.54 (1.22)	2.32 (1.18)
Cannabis use	1-5	1.33 (.84)	1.30 (.83)	1.43 (.87)
Aggression	1-4.25	1.43 (.54)	1.44 (.56)	1.39 (.50)
Peer group homogeneity	1-5	2.90 (.56)	**2.87 (.57)**	**3.02 (.50)**

Note. Differences between boys and girls significant at $p < .05$ indicated in bold typeface.

Correlations

Table 2 shows correlations between all research variables. Several correlations between independent variables and the dependent variable cannabis use were found. Age ($r = .12$, $p = <.05$), aggression ($r = .14$, $p = <.01$) and peer group homogeneity ($r = .14$, $p = <.01$) were positively related to cannabis use. Indicating that adolescents who are older, prefer homogeneous peer groups and show more aggressive behaviours use cannabis more often. Pop music ($r = -.23$, $p = <.01$) was negatively related to cannabis use, indicating that adolescents with a preference for Pop music use cannabis less often. However, no significant correlations were found between preferring other music styles and cannabis use.

Table 2

Correlation matrix between variables

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. Cannabis use	1.00										
2. Age	.12*	1.00									
3. Education level	-.04	-.01	1.00								
4. Pop	-.23**	-.11*	-.13*	1.00							
5. Rock	.07	.04	.08	-.25**	1.00						
6. Dance	.00	.03	-.19**	.22**	-.02	1.00					
7. Urban	-.08	-.14**	-.08	.48**	-.31**	.06	1.00				
8. Classical	-.04	.10*	.21**	-.04	.24**	.02	-.08	1.00			
9. Gender	-.06	-.07	.51	.21**	-.02	-.22**	.18**	.08	1.00		
10. Aggression	.14**	-.17**	.01	.04	.03	.01	.01	-.01	.04	1.00	
11. Peer group homogeneity	.14**	-.09	-.04	-.08	.11*	.09	.01	-.07	-.10*	.17**	1.00

Note. Effect is significant at **$p < .01$ and *$p < .05$ (two-tailed

Hierarchical regression analysis

Control variables age and education level

As shown in Table 3, step 1 tested the associations of the control variables with the dependent variable. The results showed that age was positively associated with cannabis use ($\beta = .11$, $p < .05$). Being in a high or low education level was not significantly associated with cannabis use. Overall, model 1 only explained 1.3% of the variance in cannabis use ($R^2 = .013$, $F(2, 371) = 2.46$, *ns*).

Main effects of the five music preferences

In step 2, Pop, Rock, Dance, Urban and Classical music were added to test for their main effect on cannabis use. Results showed a main effect for preferring Pop music, which is negatively associated with cannabis use ($\beta = -.27$, $p < .01$). Contrary to expectations, preferring Rock, Dance or Urban was not related to cannabis use. Age is no longer significant in this model. Model 2 explained 7.3% of the variance in cannabis use ($R^2 = .07$, $F(7, 366) = 4.10$, $p < .001$).

Main effects of gender, aggression, and peer group homogeneity

Before testing moderating effects, direct effects of gender, aggression and peer group homogeneity on cannabis use were added in step 3. Aggression ($\beta = .17$, $p < .01$) and peer group homogeneity ($\beta = .10$, $p < .05$) were positively associated with cannabis use. Pop remained negatively associated with cannabis use ($\beta = -.27$, $p < .01$) and age was a positively significant control variable ($\beta = .13$, $p < .05$). Model 3 accounts for 11.5% of the variance in cannabis use ($R^2 = .12$, $F(10, 363) = 4.73$, $p < .001$).

Interaction effects of gender, aggression, and peer group homogeneity

In step 4 interactions between all moderating variables and music preferences were added. Results showed that the interaction effect of peer group homogeneity and Pop music was negatively associated with cannabis use ($\beta = -.61$, $p < .05$), indicating that adolescents who prefer Pop music and homogenous peer groups use less cannabis (see Figure 2). All other interaction effects were found to be insignificant. Consequently, these coefficients were not reported in Table 3. Model 4 accounts for 16.1% of the variance in cannabis use ($R^2 = .16$, $F(25, 348) = 2.67$, $p < .001$).

Table 3

Regression analysis of all research variables on dependent variable cannabis use

	Model 1			Model 2			Model 3			Model 4		
	B	*SE B*	*β*	*B*	*SE B*	*β*	*B*	*SE B*	*β*	*B*	*SE B*	*β*
Background												
Age	.08	.04	.11*	.07	.04	.09	.10	.04	.13*	.09	.04	.12*
Education level	-.07	.10	-.04	-.10	.10	-.05	-.09	.10	-.05	-.12	.10	-.07
Music preferences												
Pop				-.28	.06	-.27**	-.28	.06	-.27**	-.31	.13	-.30*
Rock				.02	.04	.02	.00	.04	.00	.14	.10	.17
Dance				.05	.05	.05	.04	.05	.04	.02	.11	.02
Urban				.04	.04	.06	.04	.04	.06	.14	.08	.20
Classical				-.03	.04	-.04	-.03	.04	-.04	-.07	.09	-.09
Moderators												
Aggression							.26	.08	.17**	.24	.46	.15
Peer group homogeneity							.16	.08	.10*	1.02	.45	.66*
Gender							.01	.11	.01	.42	.71	.20
Interaction effects												
Pop * Peer group homogeneity										-.28	.12	-.61*
R^2		.01			.07**			.12**			.16**	

Note. Effect is significant at **$p < .01$ and *$p < .05$ (two-tailed). All other interactions were not significant and were not included in the Table under Model 4.

Figure 2

Simple slopes for the interaction of peer group homogeneity with Pop music and cannabis use
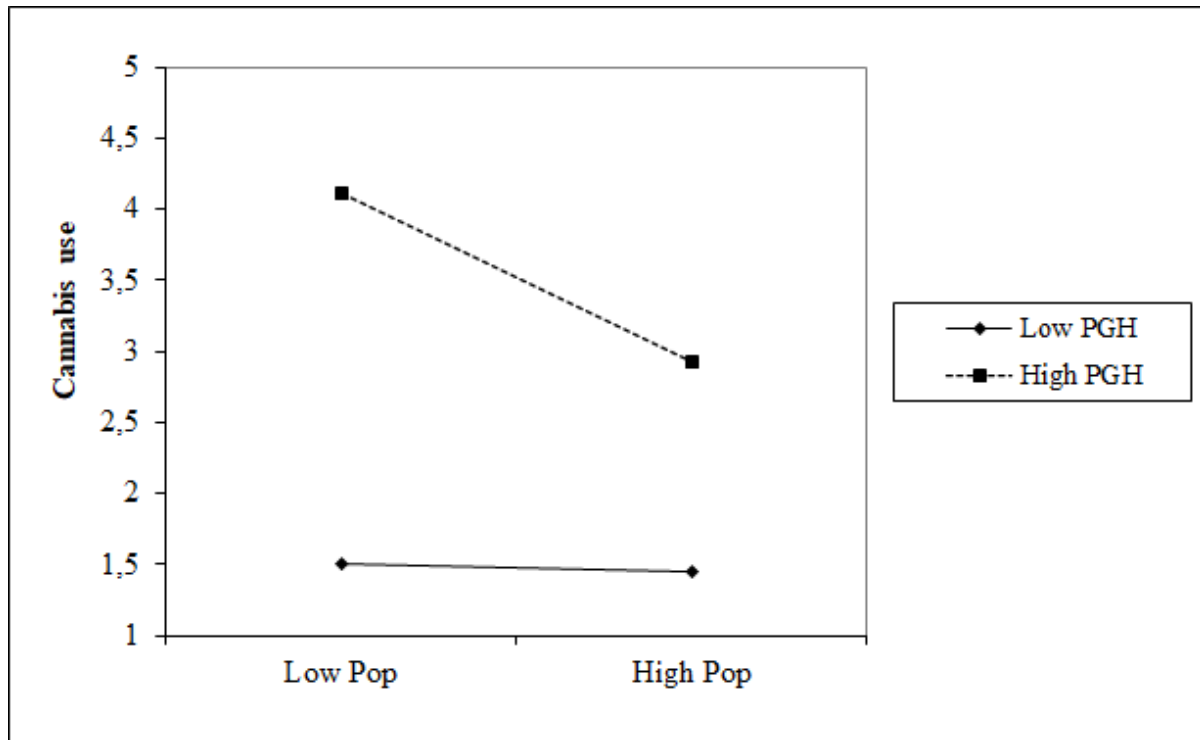

Mediation analysis

Figure 3 illustrates the conceptual model of the performed mediation analysis using the Baron and Kenny (1986) method. The main effect of Pop music on cannabis use ($\beta = -.23$, $p = < .01$), and the association between peer group homogeneity and cannabis use were significant ($\beta = .14$, $p = < .01$). However, the relationship between Pop music and cannabis use was not mediated by peer group homogeneity, as the standardized regression coefficient between Pop music and peer group homogeneity was not statistically significant.

Figure 3

Conceptual model of Baron and Kenny (1986) mediation analysis
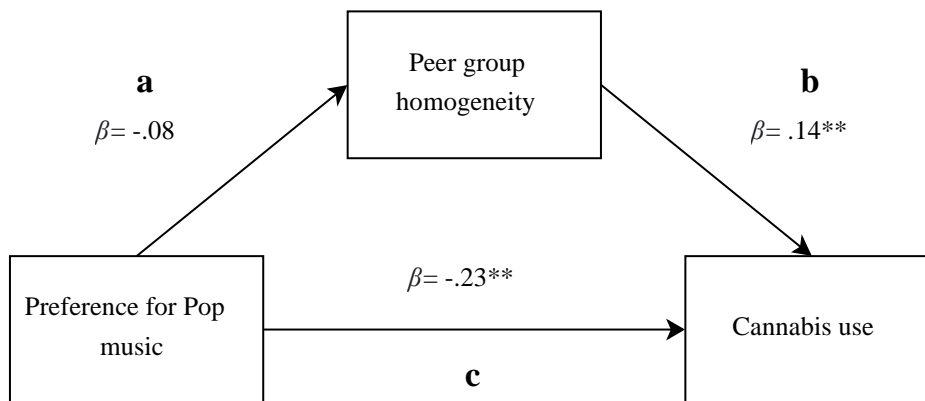
Note. Effect is significant at **p < .01 and *p < .05 (two-tailed).

Discussion

The aim of the current study was to investigate the link between music preferences and cannabis use of adolescents. It sought to further extend previous research by including peer group homogeneity as a mediator and possible moderator, and aggression and gender as moderators on the music preference and cannabis use link. Results revealed that preferring Pop music was related to lower cannabis use. Results also showed that the link between Pop music and lower cannabis use was stronger for Pop fans that preferred having homogenous peer groups. However, peer group homogeneity did not have a mediating role. No or weak links were found between liking Dance, Urban, Rock or Classical music and cannabis use. Furthermore, results implied that the link between music preferences and cannabis use was similar for boys and girls, and for aggressive and non-aggressive adolescents. The current study controlled for main effects of age and education.

Regarding the link between the music preferences and cannabis use of adolescents it was hypothesized in the current study that preferring loud and energetic music styles could positively predict cannabis use, because findings of multiple previous studies implied that liking loud and energetic music styles, such as Dance, Rock and Urban music, goes hand in hand with substance use (Mulder et al., 2010; Ter Bogt et al., 2012). Surprisingly, no such link was found. However, results did reveal that adolescents with a preference for Pop music used less cannabis. This finding is in line with previous studies suggesting that softer and more melodic music types, like Pop music, were linked to less substance use (Mulder et al., 2010; Ter Bogt et al., 2012). The absence of the link between loud and energetic styles and cannabis use might be due to the fact the role of music genres is constantly shifting, and as

Ter Bogt et al. (2012) found that the audience of Rock music has become more mainstream and less deviant. Regarding Dance and Urban music, Mulder et al., (2009) found similar results to Rock music and it was assumed that this missing relation might be accounted for by the fact that these types of music are losing their hardcore status, thus becoming more mainstream.

In the current study it was also proposed that preferring homogenous peer groups had a mediating role on the link between music preferences and cannabis use. Using the Music Marker Theory (Ter Bogt et al., 2013) and the Peer Socialisation Hypothesis (Selfhout et al., 2008) it was proposed that adolescents with preferences for loud and energetic music styles often associate stronger with peer groups that are homogeneous in terms of music preference, which makes them even more likely to use cannabis. As earlier stated no main effect was found between the preference for loud and energetic music, consequently no mediation effect of peer group homogeneity could be investigated either.

However, the current study also investigated a possible moderating effect of peer group homogeneity on the Pop music and cannabis use link. Results implied that adolescents that preferred Pop music and were in a homogenous Pop music-liking peer group used less cannabis than peers that were not in these peer groups. In other words, in peer groups where all adolescents are avid fans of Pop music cannabis use is even lower. As earlier mentioned, no mediation effect was found, which indicates that both the Music Marker Theory and Peer Socialisation Hypothesis were not confirmed in the sense that preferring Pop music *leads to* homogenous peer groups, but the potential influence of homogenous peer groups on cannabis use that these theories predict is corroborated. According to Ter Bogt et al. (2012), it is not so much the music that leads to substance use but one's personality traits. Pop music might be attractive to adolescents with low deviant personality traits and a greater orientation in the adult world. When adolescents with these personality traits form peer groups with like-minded individuals, it can be seen as a protective factor for cannabis use.

Furthermore, it was hypothesized that the link between loud and energetic music and cannabis use was stronger for adolescents with higher levels of aggression. The General Aggression Model provided an explanation for this hypothesis stating that when adolescents prefer music with aggressive lyrics, they may develop aggressive thinking and behaviour patterns (Anderson & Bushman, 2002; Coyne & Padilla-Walker, 2015). A main effect for aggression on cannabis use was found, however no significant interaction effects between aggression and music preferences were found in their relation to cannabis use. Additionally, the correlation matrix showed no associations between aggression and music preferences.

This indicated that the GAM was not corroborated, since loud and energetic music styles apparently no longer attract aggressive adolescents and neither do these music styles make adolescents more aggressive. As earlier stated, this could be due to the shifting roles of music genres, making the audience for loud and energetic music more mainstream (Mulder et al., 2009; Ter Bogt et al., 2012). Thus, aggression in itself was related to more cannabis use, but the interaction between aggression and loud and energetic music styles does not pose an extra risk.

Lastly, the current study proposed that the link between loud and energetic music preferences and cannabis use of adolescents was stronger for boys. According to multiple studies boys use cannabis more often (Hemsing & Greaves, 2020; Stevens et al., 2017) and prefer loud and energetic music types (Mulder et al, 2010). Results were not in line with the proposed hypothesis, as no moderating effect nor main effect of gender was found. However, this corroborates findings of Ter Bogt and colleagues (2012), who found that associations between music preferences and substance use were similar for both boys and girls.

Strengths and limitations

Several limitations of the current study should be noted. First, the current study is limited by its use of cross-sectional data, which implies that it was not possible to identify causal links or even properly model mediation processes. Further longitudinal research is needed to assess whether music preferences can positively predict cannabis use. Second, a subsample was selected from the data to ensure all participants were within the adolescent age range. This resulted in a smaller sample size in which gender and education level were unevenly represented, impacting the generalizability of the current study. A third limitation is that new scales had to be created to measure aggression and peer group homogeneity, as the data did not include validated scales on these variables. The internal consistency and reliability of both scales was relatively low. It must be noted though that relations between aggression and cannabis use were found corroborating earlier research (Coyne & Padilla-Walker, 2015; Selfhout et al., 2008; Ter Bogt et al., 2013) and that peer group homogeneity moderated the Pop and cannabis use link, implying that these concepts relate real life phenomena, and, thus, are meaningful. Lastly, the current study did control for age and education level as possible confounders, but it would have been useful to also examine peer cannabis use as well as personal characteristics, such as sensation seeking, which are important predictors of adolescents' cannabis use. Unfortunately, the data did not include items on peer cannabis use or sensation seeking. Despite these limitations, a strength of this study is that it includes peer group homogeneity. Research on homogenous peer groups in

relation to music preferences and substance use is relatively scarce. Since results of the current study implied that peer group homogeneity does affect the music and substance use link, it is useful to further examine this in future research.

Conclusion and implications

To conclude, findings of the current study suggest that liking loud and energetic music styles did not increase the cannabis use of adolescents, nor did being a boy or being aggressive strengthen this link. Positively, the current study did show a link between liking Pop music and using less cannabis, which was even stronger for adolescents with homogenous peer groups. This can be seen as a reassuring message, as Pop music continues to be the most popular music and the most popular music decreases cannabis use. Primack et al. (2010) warned that heavy exposure of substance use references in Pop music lyrics and videos increased the cannabis use of adolescents, but according to the findings in the current study this should not be a point of concern. Lastly, these findings imply that future longitudinal studies are needed to further investigate the causality of the relations between the music preferences and cannabis use of adolescents. More importantly, future research should aim to uncover further mechanisms behind peer group homogeneity and its association to lessening the use of cannabis in adolescents when combined with Pop music preferences.

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