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The Longitudinal Associations Between Music Clusters and Delinquency among Dutch Adolescents:

Popularity, Peer Acceptance and Peer Rejection as Mediators

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Abstract

Delinquency among adolescents is a current societal problem in the Netherlands. In order to decrease delinquency rates, it is important to gain knowledge on predictors and underlying mechanisms of delinquency. The aims of this longitudinal research were to investigate (1) the relationship between music cluster preference and delinquency among adolescents, and (2) if this relationship was mediated by three different social positions: popularity, acceptance, and rejection. As part of the Social Network Analysis of Risk behavior in Early adolescence study (SNARE), a seven-wave sample of 11 to 14-year-old adolescents (N = 1,124, M_{age} = 12.5, 50.2% boys) was utilized. With K-means cluster analysis 6 different music preference clusters were distinguished: *'Pop', 'Rock', 'Anti's', 'Afro-American', 'Dance',* and *'Omnivores'*. However, after adding the control variables sex and previous delinquency to the analysis, the music clusters did not significantly predict delinquency over time. Despite that no mediation effect has been found, the results showed an association between music cluster preference and the three different social positions. The three social position were, however, not significantly related to later delinquent behavior. This research highlights that it seems less important among early adolescents to focus on prevention and intervention in the relationship between music and delinquency.

Keywords: music preferences, music clusters, popularity, acceptance, rejection, adolescents.

Samenvatting

Delinquentie is een actueel maatschappelijk probleem onder adolescenten in Nederland. Om delinquentiecijfers om laag te brengen is het belangrijk om eventuele voorspellers en onderliggende mechanismen van delinquentie te onderzoeken. Het doel van dit longitudinale onderzoek was om (1) de relatie tussen de voorkeuren van de muziekclusters en delinquentie onder adolescenten te onderzoeken en (2) of de relatie gemedieerd werd door drie verschillende sociale posities: populariteit, acceptatie en afwijzing. Als onderdeel van de Social Network Analysis of Risk behavior in Early adolescence study (SNARE), werd een steekproef met zeven meetmomenten bij 11 tot 14-jarige adolescenten (N = 1,124, $M_{leeftijd}$ = 12.5, 50,2% jongens) gebruikt. Met een K-means cluster analyse werden 6 verschillende muziekvoorkeurenclusters onderscheiden: *'Pop', 'Rock', 'Anti's', 'Afro-American', 'Dance', 'Omnivores'*. Na het toevoegen van de controlevariabelen 'geslacht' en 'eerder delinquentie', bleken de muziekclusters geen significante voorspellers voor later delinquent gedrag. Ondanks dat er geen mediatie-effect aangetoond is, toonden de resultaten wel een verband

tussen muziekclusters en de drie verschillende sociale posities. De drie sociale posities waren echter niet significant gerelateerd aan delinquentie. Uit deze studie is gebleken dat het bij jonge adolescenten minder van belang lijkt om op preventie en interventie in te zetten op de relatie tussen muziekcluster en delinquentie.

Trefwoorden: muziekvoorkeur, muziek clusters, populariteit, acceptatie, afwijzing, adolescenten.

The Longitudinal Associations Between Music Clusters and Delinquency among Dutch Adolescents: Popularity, Peer Acceptance and Peer Rejection as Mediators

The incidence rates of delinquency are the highest among adolescents (Moffit, 1993). Also, in the Netherlands, delinquency is a current societal problem. Specifically, based on self-reports, more than one third (34%) of adolescents between 12 and 17 years old has committed a crime within the last twelve months (Van der Laan & Goudriaan, 2016). In the current study delinquency will be operationalized as minor delinquency (i.e., shoplifting, vandalism) (Van der Laan & Beerthuizen, 2018). A safe society starts by reducing the delinquency rates among adolescents in particular because early delinquent behavior is an important predictor for risk-behaviors in adulthood, such as unemployment and several health risks (Bradshaw, Schaeffer, Petras, & Ialongo, 2010). To decrease delinquency rates, it is crucial to have an understanding of possible predictors of delinquency (Herrenkohl, 2000).

A potential predictor of delinquency is music preference (Mulder, Ter Bogt, Raaijmakers, & Vollebergh, 2007). Music preferences refer to the preference someone has for a music genre (Ter Bogt, Keijsers, & Meeuws, 2013). Empirical evidence indicates that a non-mainstream music preference (i.e., urban, rock, and dance) is positively associated with delinquency (Arnett, 1990; Franken, Keijsers, Dijkstra, & Ter Bogt, 2017). To understand the relationship between music preference and delinquency, it is important to investigate possible underlying mechanisms. For example, music contributes to the development of adolescents' (social) identity (Ter Bogt, Mulder, Raaijmakers, & Nic Gabhainn, 2011), as it is part of the identity of a peer group and may contribute to adolescents' social positions among peers (Tekman & Hortacsu, 2002). Therefore, it is possible that music is associated with different types of social positions (i.e., popularity, acceptance, rejection), which in turn may lead to delinquency. However, few studies investigated whether social positions are an underlying mechanism of the relationship between music preference and delinquency. The aim of this study is to investigate whether music preferences predict delinquency among adolescents, and whether this relation is mediated by popularity, acceptance, and rejection.

Music Preference and Delinquency

A possible explanation for the effect of music preference on delinquency is the Music Marker Theory (MMT) (Ter Bogt, Keijsters, & Meeuws 2013). This theory specifically explains why non-mainstream music is related to delinquency. The MMT assumes that constant exposure to non-mainstream music can lead to delinquency, because of its deviant lyrics which promote violence and minor delinquency. Besides, the MMT indicates that

adolescents who like non-mainstream music will look for peers who also listen to non-mainstream music. This can lead to contagion; adolescents imitate and stimulate each other's deviant behavior.

Several studies confirmed the relationship of adolescents' music preference and delinquency. First, a preference for pop music is seen as mainstream (Ter Bogt, Keijsers, & Meeus, 2013) and is negatively associated with delinquency (Mulder, Ter Bogt, Raaijmakers, & Vollebergh, 2007). In contrast, longitudinal research indicated that adolescents with a preference for non-mainstream music (i.e., rock, urban, dance) are more frequently engaged in delinquent behavior than adolescents with a preference for mainstream music (Franken, Keijsers, Dijkstra, & Ter Bogt; Selfhout, Delsing, Ter Bogt, & Meeuw; Ter Bogt, Keijsers, & Meeus, 2013).

Previous studies mainly investigated music preferences separately, which neglects that adolescents may prefer more than one music genre. Therefore, it is important to look at music clusters (i.e., combination of music genres), to compare groups based on their music preferences. The cross-sectional study of Ter Bogt, Raaijmakers, Vollebergh, Van Wel, and Sikkema (2003) found a structure consisting of six clusters: 1) 'Pop', 2) 'Afro-American' (i.e., rap/hip-hop), 3) 'Rock', 4) 'Dance', 5) 'Omnivores' (i.e., prefer all music genres), and 6) 'Anti's' (i.e., no music preference). There are no studies that investigated the relationship between these music clusters and delinquency. Only the cross-sectional research of Mulder and colleagues (2007) used clusters and showed that rock, omnivores, and urban (i.e., rap/hip-hop) fans showed more aggression and delinquency.

Social Position as Underlying Mechanism

The social position (i.e., popularity, acceptance, rejection) of adolescents could explain the relationship between music preferences and delinquency. Whereas *popularity* refers to the social visibility of power and status in a peer group, *acceptance* refers to the level of prosocial characteristics and likability (LaFontana & Cillessen, 2002). *Rejection* is conceptualized as a dominant form of negative treatment among peers, isolation, and being disliked (Juvonen, Graham, & Schuster, 2003). Although there is no research on social positions as a mediator, there is empirical evidence for a relationship between both music preferences and social positions, and social positions and delinquency.

Music preference as predictor for social position. An explanation for the relationship between music preferences and social positions is the 'Uses and Gratifications Approach (UGA)' (Arnett, 1995; Rubin, 1994). The UGA states that music preference acts as

a ‘badge of identity’ and influences the social world of adolescents, in structuring peer groups. For example, a certain music preference determines whether someone is judged positively or negatively by peers. For that reason, the consequences of a certain music preference on someone’s social position are associated with the degree to which the music style is prestigious according to their peers (Arnett, 1995; Doornwaard, Branje, Meeuws, & Ter Bogt, 2012).

Current evidence indicates an association between music preferences and social positions. For ‘popularity’, the review of North and Hargreaves (1999) concluded that adolescents with a preference for British pop receive more respect and have more friends compared to a preference for rock. In line, adolescents with a preference for music that is related to sexual pleasure, substance use, and violence (i.e. Afro-American, dance) increase in their social status and prestige (Herd, 2008; Kubrin, 2005). For ‘acceptance’, no research investigated this relationship except the cross-sectional study of Swartz and Fouts (2003), which found that peer acceptance is more important for adolescents with a preference for pop. For ‘rejection’, two cross-sectional studies found that adolescents with a preference for non-mainstream music (i.e. rock) were positively correlated with rejection (Swartz & Fouts 2003; Wells & Hakanen, 1991). Therefore, the current study suggests that a preference for mainstream music is positively related to acceptance and popularity and a preference for non-mainstream music (i.e., Afro-American, dance) is only positively related to popularity. In additionally, the findings suggest that a preference for rock is associated with rejection.

Social position as predictor for delinquency. Empirical evidence confirms that social position is related to delinquency. While popularity and rejection are positively related to delinquency, acceptance is negatively related to delinquency. For ‘popularity’, an explanation for this relationship is that adolescents want to maintain their popularity by showing delinquent behavior (Cillessen & Mayeux, 2004). According to Brown (2004) it is rewarding to perform delinquent behavior, as it brings admiration and respect. Two longitudinal studies found that popularity is positively associated with subsequent delinquency among adolescents (Allen et al., 2005; Gallupe, 2017).

For ‘rejection’, a possible explanation for this relationship is the general strain theory (GST) (Agnew, 1992). According to GST, experiencing strain/stress leads to negative emotions, which trigger coping mechanisms (e.g. property crimes, violence) to deal with the strainful experiences. GST indicates that strains, like peer rejection, could eventually induce crime. Several longitudinal studies confirmed that peer rejection was positively related to delinquency among adolescents (Di Giunta et al., 2017; Higgins, Piquero, & Piquero, 2011).

In contrast to popularity and rejection, 'acceptance' may be negatively related to delinquency. This relationship could be explained due to the fact that social acceptance inhibits antisocial development (Dodge et al., 2003). Specifically, social accepted adolescents are likely to learn from their peer interaction and develop cooperation skills, social problem solving, and empathy (Coie & Dodge, 1998), which in turn reduces delinquency.

The Current Study

The current study focuses on the research question: 'Is there a relationship between music cluster preferences and delinquency over time among adolescents, and is this relation mediated by popularity, acceptance, and/or rejection?' (Figure 1). As a first hypothesis, according to the study of Ter Bogt and colleagues (2003), a structure consisting of six factors 1)'Pop', 2)'Afro-American', 3)'Rock', 4)'Dance', 5)'Omnivores', and 6)'Anti's' is expected. Second, for the relationship between music clusters and subsequent delinquency, it is expected that non-mainstream music (i.e., Afro-American, rock, dance) is positively related to delinquency and mainstream music (i.e. pop) is negatively related to delinquency. Other music preferences will be examined exploratively. Third, the mediation-effect is threefold. Regarding popularity, it is expected that adolescents with a preference for pop, Afro-American, and dance will gain more popularity, which in turn is expected to be related to more delinquency (Hypothesis 3a). Regarding acceptance, it is expected that a preference for mainstream music (i.e. pop) is related to more social acceptance, which in turn is expected to be related to less delinquency (Hypothesis 3b). Regarding rejection, it is expected that adolescents with a preference for rock music are more rejected, which in turn is expected to be related to more delinquency (Hypothesis 3c).

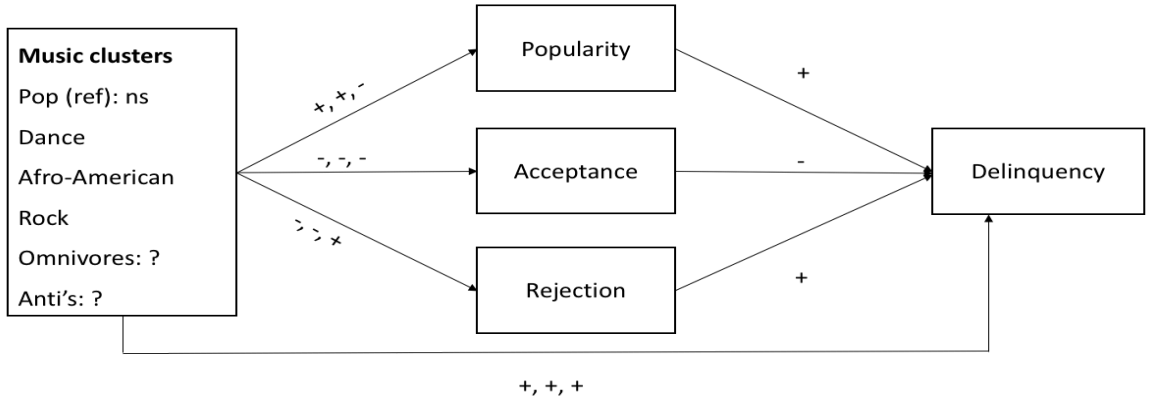

Figure 1. The relationship between music clusters and delinquency. The +/- means from left to right the clusters: Dance, Afro-American, Rock.

Method

Procedure and Participants

The current study used data from the Social Network Analysis of Risk behavior in Early adolescence study (SNARE): A longitudinal quantitative study among Dutch first- and second-year students. The SNARE-study consists of seven waves from 2011-2013. The first wave started at the beginning of the school year in 2011 (coded as T_0). Each schoolyear (2011-2012 and 2012-2013), there were three follow-ups: in October, December, and in April. After the study was approved by the ethics commission of the Faculty of Social Sciences Utrecht University, researchers started to approach high schools. When schools decided to participate, parents and students received an information letter with an invite to participate. With a passive informed consent form, they could decide to refrain from participation within two weeks. During the waves, the researcher started with an instruction on the questionnaire. Privacy and anonymity of the students were guaranteed. Thereafter, students completed the online questionnaire, which took approximately 45 minutes.

This study included data from T_0-T_3 and focused on only the first-grade students, as the focus of this study is specifically on peer nominations for social positions during early adolescence. At baseline (T_0), 1,124 adolescents participated (M_{age} = 12.5, SD_{age} = 0.46, age range: 11.24 – 14.51). At T_1, 1,117 adolescents participated (M_{age} = 12.7, SD_{age} = 0.50). At T_2, 1116 adolescents participated (M_{age} = 12.8, SD_{age} = 0.50), and at T_3, 1,111 adolescents participated (M_{age} = 12.7, SD_{age} = 0.71). The current study only included adolescents that participated in all three waves (N = 1,111, M_{age} = 12.7, SD_{age} = 0.71). The attrition was due to absence of the respondents during the waves. Additionally, adolescents were excluded from the analyses when information on one of the main variables was missing (N = 53). The final sample consisted of 1058 adolescents (M_{age} = 12.6, SD_{age} = 0.51). Approximately half (50.2%) of the participants were male and 97% of the participants had a Dutch ethnicity. At education level, 46.6% of the participants followed lower education (LWOO, VMBO-B/T), and 53.4% followed higher education (HAVO/VWO).

Measures

Music preferences (T_1). Music preferences were measured by the question: ‘What is your favourite music style?’ (Ter Bogt et al., 2003). Answer options were: ‘Alternative rock’, ‘Foreign pop music’, ‘Folk’, ‘Hardhouse’, ‘Heavy metal’, ‘Gothic’, ‘House, Dance, Trance’, ‘Jazz’, ‘Classicalmusic’, ‘Dutch pop’, ‘R&B’, ‘Reggae’, ‘Rap & Hip-hop’, ‘Rock’, ‘Techno’,

and ‘Dubstep’. Multiple answers were possible, and participants could choose between ‘yes’ or ‘no’ (coded as 1 and 0) (Ter Bogt et al., 2003).

Delinquency (T_1 & T_3). Delinquency has been measured with an 18 self-reported items scale (Nijhof, Scholte, Overbeek, & Engels, 2010). The scale indicated different types of delinquency (e.g., vandalism, violence, stealing), for example, ‘During the last month, how often did you steal something from a shop?’. The items were scored on a five-point Likert scale (1= *0 times*; 2 = *1-3 times*; 3 = *4-6 times*; 4 = *7-12 times,* and 5 = *more than 12 times*). Mean scores are used to indicate the level of delinquency. Cronbach’s alpha T_1 =.91, Cronbach’s alpha T_3 = .97. A higher score on the scale means a higher rate of delinquency.

Popularity, acceptance, and rejection (T_2). The different social positions were measured with the valid scale of Cillessen and Mayeux (2004). Popularity was measured with the question: ‘Who are the most popular in school?’, acceptance was measured with the question: ‘Who do you like?’, and rejection was measured with the question: ‘Who do you dislike?’ (Cillessen & Mayeux, 2004). Students could unlimited nominate peers from their own class or other classes. Because some students could be nominated more often than others due to varying class sizes, proportion scores were calculated for all three aspects of social positions. The higher the score, the more popular, accepted, and rejected the adolescents were.

Control variables. The current study controlled for self-control, sex, age, and delinquencyT_1. Low-self-control predicts later delinquency and refers to controlling impulses, thoughts, and emotions (Schreck, Stewart, & Fisher, 2006). Self-control has been measured with an 11-item scale developed by Tangney, Baumeister, and Boone (2014). With this scale the ability to control impulses were measured. For example: ‘I have trouble concentrating’. Participants could choose answers on a 5-point Likert scale (1 = *not at all*, to 5 = *very much*). Mean scores are used to indicate the level of self-control. Cronbach’s alpha = .773. A higher score on the scale, means less self-control. For sex, previous research indicated that boys show more delinquent behavior than girls (Moffit, Caspi, Rutter, & Silva, 2001). Participants could fill in their sex, which was coded as a dichotomous variable (0 = girls, 1 = boys). Furthermore, age is an important factor for delinquency because the incidence rates of delinquency peaks in adolescence and decrease in (young) adulthood (Moffit, 1993). The current study also controlled for delinquencyT_1 to investigate the change in delinquent behavior over time.

Data Analysis

To analyse the data, IBM SPSS Statistics 24 has been used. Outliers, which were detected with the *Mahalanobis distance,* were not removed from the sample, as the outliers will not distort the analysis significantly due to the large sample size (Field, 2013). Descriptive statistics (*M* and *SD*) were examined and Spearman correlations between the variables were conducted. A chi-square test was conducted to test the difference between boys and girls for 'music cluster preference', and an independent sample t-test for 'delinquency' and 'self-control'.

For Hypothesis 1, a K-means cluster analysis was conducted to investigate different clusters based on music preferences (Hypothesis 1). The K-mean cluster analysis was controlled for five to eight cluster solutions. The discriminant analysis and previous findings on music clusters (Ter Bogt et al., 2012) determine the best solution of the number of clusters, 6 clusters were chosen. According to previous research (Mulder et al., 2010) the cluster '*Pop'* was taken as a reference category.

For Hypothesis 2 and 3, linear regressions were conducted to investigate the relationship between the variables. With the Kolmogorov-Smirnov test, the delinquency variables were checked for normality of the error distribution. These were not normally distributed ($D(1048) = .34$, $p < .001$, $D(1048) = .39$, $p < .001$). However, the Central Limit Theory states that with a large sample size, the regression parameters will tend to a normal distribution (Field, 2013). Therefore, it was decided to maintain these variables as continuous variables. Bootstrapping was used to account for the non-normal distribution.

To test Hypothesis 3, the mediation model, the steps from Baron and Kenny (1986) were used. The first step was to analyse Hypothesis 2 with a linear regression, the direct relationship between 'music cluster preference' and 'delinquency', controlled for sex, age, self-control, and delinquencyT_1. The second step was to analyse the relationship between 'music cluster preference' and the three different social positions: 'popularity', 'acceptance', 'rejection' using linear regression. Third, in one model the relationship between the different social positions and 'delinquency' together with music cluster preference was analysed and controlled for sex, age, self-control, delinquencyT_1. A significance level of $p < .05$ has been used for the interpretation of the results. The effect size of the analysis was measured in r^2.

Results

Cluster Analysis

The first hypothesis, which assumed a structure consisting of six cluster 1)'Pop', 2)'Afro-American', 3)'Rock', 4)'Dance', 5)'Omnivores', and 6)'Anti's', was confirmed. The results of the discriminant analysis showed that with 96.4% correct predicted observations, the cluster solution with 6 clusters of music preferences indicated the best fit. Average scores of the music preferences on the music clusters are set out in table 1 (min = 0, max = 1). Values of .50 or higher indicate that these music preferences describe the best the music cluster (Statsoft, 2013). The first cluster consisted of adolescents with a preference for 'Foreign pop' and is called *'Pop'*. The second cluster *'Rock'* involved only adolescents with a preference for 'Rock'. The third cluster had no score above the criterium of .50 and is labelled as *'Anti's'*. The fourth cluster *'Afro-American'* consisted of adolescents with only a preference for 'Rap & Hip-Hop'. Adolescents with a preference for 'Hardhouse', 'House, Dance, Trance', and 'Rap & Hip-Hop' are involved in the fourth cluster, labelled as *'Dance'*. The fifth cluster, referred to the *'Omnivores',* included adolescents with a high score on all the music genres, except for 'Gothic' and 'Folk'.

Table 1.
Clusters Based on Music Preferences

	Pop	Rock	Anti's	Afro-American	Dance	Omnivores
1. Alternative Rock	.02	.17	.07	.02	.08	**.84**
2. Foreign pop	**1.00**	.30	.00	.07	.25	**.91**
3. Folk	.00	.02	.02	.00	.03	.44
4. Hardhouse	.03	.02	.14	.05	**.99**	**.84**
5. Heavy Metal	.00	.15	.04	.02	.26	**.81**
6. Gothic	.00	.04	.01	.01	.02	.47
7. House, Dance, Trance	.12	.08	.31	.32	**.77**	**.91**
8. Jazz	.07	.12	.12	.13	.08	**.72**
9. Classic music	.04	.04	.06	.02	.00	**.44**
10. Dutch pop	.12	.13	.12	.06	.11	**.53**
11. R&B	.06	.06	.12	.26	.15	**.66**
12. Reggae	.02	.05	.03	.07	.12	**.88**
13. Rap & Hip-Hop	.22	.23	.00	**1.00**	**.61**	**.97**
14. Rock	.00	**1.00**	.00	.05	.45	**1.00**
15. Techno, Dubstep	.05	.08	.20	.12	.47	**.88**
N	**261**	**38**	**261**	**124**	**334**	**66**

Descriptive Statistics

In Table 2 the descriptive statistics showed that there were significant differences on the dependent and mediating variables. Boys had significant higher means on delinquency than girls. For popularity and rejection, boys also showed significant higher means than girls. In contrast, means for acceptance were significant higher for girls compared to boys. Sex differences within music clusters are shown in Table 3. Girls were significantly more prevalent in the clusters: *'Pop'* and *'Afro-American'*. Boys were significantly more prevalent in the clusters: *'Anti's'* and *'Dance'*. There were no significant differences between boys and girls for the clusters: *'Rock'* and *'Omnivores'*.

Table 2.

Descriptive Statistics of Delinquency, Popularity, Acceptance, Rejection, Self-Control by Sex

	Girls	Boys	Total		
Variables	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*t*	*p*
Delinquency T_1	1.06 (.14)*	1.21 (.41)*	1.13 (.31)	7.968	.001
Delinquency T_3	1.05 (.13)*	1.24 (.67)*	1.15 (.49)	6.539	.001
Popularity T_2	0.14 (.16)*	0.16 (.18)*	0.15 (.17)	2.581	.010
Acceptance T_2	0.44 (.15)*	0.35 (.15)*	0.40 (.15)	9.594	.001
Rejection T_2	0.09 (.12)*	0.13 (.14)*	0.11 (.13)	4.969	.001

Note. * Difference is significant for $p < .05$, *M* = mean, *SD* = standard deviation.

Table 3.

Sex Distribution in Music Clusters (MC)

	Girls		**Boys**	
Music clusters	Count	Percentage within MC	Count	Percentage within MC
1. Pop	180_a	33.5%	92_b	16.8%
2. Rock	75_a	14.0%	88_a	16.1%
3. Anti's	107_a	19.9%	164_b	30.0%
4. Afro-American	134_a	25.0%	121_a	22.1%
5. Dance	34_a	6.3%	63_b	11.5%
6. Omnivores	7_a	1.3%	19_b	3.5%

Note. A difference in letters shows a significant difference in sex for that cluster with $p<.05$

Correlations

Before testing hypotheses 2 and 3, the correlations between the variables were examined (Table 4). Several music clusters were significantly correlated with delinquency. The findings showed that *'Afro-American'* ($r = .10/r = .07$) and *'Dance'* ($r = .15/r = .12$) were significantly positively correlated with delinquency T_1/T_3 and '*Pop'* ($r = -.19/r = -.14$) was

significantly negatively correlated with delinquency T_1/T_3. In contrast, '*Rock'* (r = -.02/r = -.05), '*Anti's'* (r = .01/r = .03), and '*Omnivores'* (r = .01/r = .01) were not significantly correlated with delinquency T_1/T_3.

With respect to the relationship between music clusters and social positions, popularityT_2 was significantly negative correlated with '*Pop'* (r = -.06) and '*Rock'* (r = -.12), and positive with '*Afro-American'* (r = .16). '*Dance'* (r = .05), '*Anti's'* (r = -.05), and '*Omnivores'* (r =.04) were not correlated with popularityT_2. For acceptanceT_2, the music cluster '*Pop'* (r = .07) was significantly positively correlated and '*Rock'* (r = -.08) was significantly negative correlated. For rejectionT_2, the music cluster '*Dance'* (r = .07) was significantly positive correlated and '*Pop'* (r = -.06) was significantly negative correlated. The other music clusters were not correlated with rejectionT_2.

With respect to the relationship between social positions and delinquency, popularity T_2 (r = .20) and rejection T_2 (r = .14), were significantly positively correlated with delinquencyT_1. Acceptance T_2 was significantly negatively correlated with delinquency T_1 (r = -.10. In addition, the control variables (self-control, sex, age) were indeed significantly positively correlated with delinquency T_1.

Table 4.

Spearman Correlations of Music Clusters, Delinquency, Popularity, Acceptance, Rejection, and control variables

Variables	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
1. Pop	1	-	-	-	-	-	-	-	-	-	-	-
2. Rock	-.23**	1	-	-	-	-	-	-	-	-	-	-
3. Anti's	-.32**	-.23**	1	-	-	-	-	-	-	-	-	-
4. Afro-American	-.31**	-.22**	-.31**	1	-	-	-	-	-	-	-	-
5. Dance	-.174**	-.13**	-.17**	-.17**	1	-	-	-	-	-	-	-
6. Omnivores	-.09**	-.06*	-.10**	-.08**	-.05	1	-	-	-	-	-	-
7. Delinquency T_1	-.19**	-.02	.01	.10**	.15**	.01	1	-	-	-	-	-
8. Delinquency T_3	-.14**	-.05	.03	.07*	.12**	.01	.53**	1	-	-	-	-
9. Popularity T_2	-.06*	-.12**	-.04	.16**	.05	.04	.20**	.22**	1	-	-	-
10. Acceptance T_2	.07*	-.08*	-.01	.02	-.02	-.05	-.10**	-.09**	.32**	1	-	-
11. Rejection T_2	-.06*	.01	-.03	.03	.07*	.01	.14**	.09**	-.14**	-.17**	1	-
12. Self-control T_0	-.05	-.01	-.09**	.05	.12**	.03	.27**	.22**	.05	.02	-.01	1
13. Sex	-.19**	.03	.12**	-.03	.09**	.07*	.30**	.24**	.04	.07*	-.27**	-.28**
14. Age	-.09**	-.01	.01	.07*	-.02	.03	.06*	.06	.15**	.14**	.01	-.01

Note. * Correlation is significant at .05, ** Correlation is significant at .01

Music Cluster Preference and Delinquency

According to Hypothesis 2, it was expected that non-mainstream music is positively related to delinquency and that mainstream music is negatively related to delinquency. The linear regression analysis, without control variables, showed that *'Afro-American'*, *'Dance'*, and *'Anti's* were significant predictors of delinquency (see Model 1 in Table 5). This means that adolescents in these music clusters were at higher risk to report more delinquency compared to adolescents in the cluster *'Pop'*. However, after adding the control variables, these relationships were no longer significant (see Model 2 in Table 6). Therefore, hypothesis 2 was not confirmed.

Table 5.

Linear Regression Analysis of The Music Clusters T_1 on Delinquency T_3

	B	*SE*	*p*	95%CI
Model 1				
Pop	0	-	-	-
Rock	.04	.04	.26	-.03 - .12
Anti's	.11	.04	.01	.03 - .20
Afro-American	.09	.04	.02	.02 - .16
Dance	.11	.05	.04	.03 - .24
Omnivores	.01	.04	.93	-.07 - .08
Model 2				
Pop	0	-	-	-
Rock	.01	.04	.99	-.07 - .07
Anti's	.05	.04	.24	-.02 - .12
Afro-American	.03	.03	.45	-.04 - .10
Dance	-.03	.06	.66	-.13 - .10
Omnivores	-.06	.04	.15	-.14 - .03
Sex	.12	.03	.01	.06 - .17
Age	.05	.04	.22	-.03 - .13
Self-Control	.05	.03	.18	-.02 - .11
Delinquency T_1	.51	.15	.01	.25 - .84

Note. Model 1: R^2 = .009, Model 2: R^2 = .154, CI = confidence interval

Popularity, Acceptance, and Rejection as Mediators

The direct relation between music clusters and delinquency has to be significant to test mediation (Baron & Kenny, 1986). This suggests that no mediation of social position could occur (Hypothesis 3). Therefore, the relationship between music clusters preference and social position, and social position and delinquency were examined exploratively.

First, the relation between music clustersT_1 and the different social positionsT_2 (Table 6) was analysed. Regarding popularity, it was expected that adolescents with a preference for *'Pop'*, *'Afro-American'*, and '*Dance'* will gain more popularity. Adolescents in the clusters *'Afro-American'* and *'Dance'* were significantly more likely to show popularity three months later compared to adolescents in the cluster *'Pop'*. Besides, adolescents in the cluster '*Pop'* were significantly more likely to show popularity three months later compared to adolescents in the cluster '*Rock'*. The clusters '*Anti's'* and '*Omnivores'* did not significantly predict popularity. Regarding acceptance, it was expected that a preference for mainstream music (i.e. pop) is related to more social acceptance. Adolescents in the cluster '*Pop'* were significantly more likely to show acceptance three months later compared to adolescents in the cluster 'Rock' and 'Omnivores'. The clusters '*Anti's'*, '*Afro-American'*, and '*Dance'* did not significantly predict acceptance. Regarding rejection, it was expected that adolescents with a preference for '*Rock'* music are more likely to be rejected. Adolescents in the cluster *'Dance'* were significantly related to rejection, meaning that adolescents in the cluster *'Dance'* report more rejection three months later than adolescents in the *'Pop'* cluster. The clusters '*Rock'*, '*Anti's'*, '*Afro-American'*, and '*Omnivores'* did not significantly predict rejection.

Second, the relation between social position and delinquency in one model with music clusters (Figure 2) was analysed. The results of Table 7 showed that the three aspects of social position were not significantly related to delinquency, which is inconsistent with hypothesis 3.

Table 6.

Linear Regression Analysis of Music Clusters T_1 on Social Positions T_2

	Popularity			**Acceptance**			**Rejection**		
	B	*SE*	95%CI	*B*	SE	95%CI	*B*	*SE*	95%CI
Pop	0	-	-	0	-	-	0	-	-
Rock	-.03*	.01	-.06 - -.01	-.05*	.02	-.08 - -.02	.01	.01	-.01 - .04
Anti's	.01	.01	-.02 - .04	-.02	.01	-.05 - .01	.01	.01	-.02 - .02
Afro American	.06*	.01	.03 - .09	-.02	.01	-.04 - .01	.01	.01	-.01 - .04
Dance	.06*	.02	.02 - .10	-.03	.02	-.06 - .01	.03*	.02	.01 - .07
Omnivores	.06	.04	-.01 - .15	-.07*	.03	-.12 - -.01	.04	.04	-.03 - .12

Note. *Predictor is significant at .05, R^2 = .009, R^2 = .013, R^2 = .011, CI = confidence interval

Table 7.

Linear Regression Analysis of The Relation between Music Clusters, Social PositionT_2 on DelinquencyT_3 with Control Variables.

	B	*SE*	*P*	95%CI
Pop	0	-	-	-
Rock	.01	.04	.85	-.06 - .09
Anti's	.05	.04	.24	-.03 - .03
Afro American	.02	.04	.64	-.05 - .09
Dance	-.03	.06	.54	-.14 - .09
Omnivores	-.07	.05	.13	-.17 - .02
Popularity	.16	.09	.10	-.03 - .35
Acceptance	-.04	.10	.66	-.24 - .15
Rejection	.10	.18	.59	-.25 - .50
Age	.05	.04	.27	-.03 - .12
Sex	.11	.03	.01	.05 - .15
Delinquency T1	.49	.14	.01	.25 - .81
Self-Control	.05	.03	.17	-.02 - .12

Note. R^2 = .157 CI = confidence interval

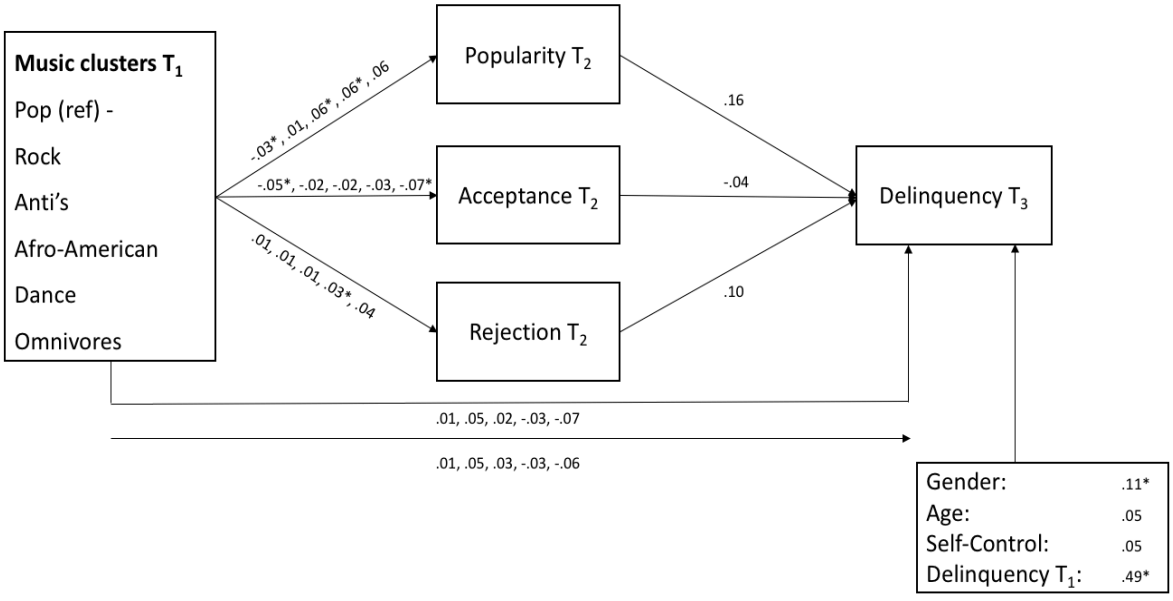

Figure 2. The relationship between music clusters at T_1 and delinquency at T_3, controlled for age, sex, delinquency T_1, and self-control. From left to right: Rock, Anti's, Afro-American, Dance, Omnivores.

Discussion

After examining the clusters of music preferences, the two aims of the current research were to investigate (1) the relationship between music cluster preference and delinquency among adolescents, and (2) whether this relationship was mediated by three different social positions: popularity, acceptance, rejection. The results showed that six music clusters were found: '*Pop'*, '*Rock'*, *'Anti's'*, *'Afro-American'*, '*Dance'*, and '*Omnivores'*. However, the music clusters did not significantly predict delinquency over time. Despite that no mediation effect has been indicated, the results showed an association between music cluster preference and the three different social positions. The three social position were, however, not significantly related to later delinquent behavior.

Music Clusters

The expectation to find a structure consisting of six music clusters was confirmed (Hypothesis 1). Overall, the structure was in line with the findings of Ter Bogt and colleagues (2003). There were, however, small differences regarding the music cluster '*Pop'* and '*Rock'*. In the current study only the music preference 'Foreign Pop' and 'Rock' had values higher than .50 in the music clusters of '*Pop'* and '*Rock'* respectively, whereas in the study of Ter Bogt and colleagues (2003) the preferences 'Dutch Pop' also belonged to the cluster '*Pop'* and 'Alternative Rock', and 'Heavy Metal' also belonged to the '*Rock'* cluster. The difference in mean age may explain this difference (M_{age} = 12.5 versus M_{age} = 18.8). The age period of 12 to 18 is a period of changes that impact personality and social identity (Hawke & Rieger, 2013). Considering that adolescents choose music preferences that relate their personalities and social identities, it stands to reason that their music preferences change as well (Bonneville-Roussy, 2013). The study of Bonneville-Roussy (2013) stated, for example, that the importance of music preferences is lower for adults compared with adolescents. Future studies are therefore advised to consider age differences in music preferences.

Music Cluster Preference and Delinquency

For the relationship between music clusters and delinquency, it was expected that non-mainstream music (i.e., Afro-American, rock, dance) was positively related and mainstream music (i.e. pop) negatively related to delinquency (Hypotheses 2). Without control variables, adolescents in the clusters *'Afro-American'*, *'Dance',* and *'Anti's'*, showed a higher risk of subsequent delinquency compared to the cluster '*Pop'*. However, these relationships were not significant anymore after adding the control variables (i.e., sex, age, self-control, and previous

delinquency). The control variables sex and previous delinquency were significant related to subsequent delinquency. This implies that there is no direct relationship between music clusters and delinquency over time, which is in contrast with Hypothesis 2.

There are two possible explanations for not finding a relationship between music clusters and subsequent delinquency. First, this research investigated music clusters and not music sub-cultures. According to Arnett (1993), adolescents who have a preference for non-mainstream music, but not belong to the corresponding sub-culture, show less externalizing problem behavior (i.e., delinquency) compared to adolescents who belong to the corresponding sub-culture. This could indicate that the relationship between music clusters and delinquency has only been found among adolescents who belong to the corresponding subculture. Selfhout and colleagues (2008) indeed considered sub-cultures and confirmed that music preferences significantly predict externalizing problems (i.e., delinquency). Therefore, future studies have to take youths 'sub-cultures' into account when examining music clusters and delinquency.

A second possible explanation is that the current study was conducted among early adolescents (M_{age} = 12.5) and the incidence rates of offending peaks at age 17 (Moffit, 1993). This could have affected the results, as delinquency has a higher delinquency rate among older adolescents and is therefore difficult to measure among early adolescents. This also explained the skewness of the sample. Future studies on early adolescence are therefore advised to investigate predictors of delinquency (i.e., aggression) or to focus more on general factors such as externalizing problem behaviors when examining music preferences.

Social Position as Underlying Mechanism

No mediation of the three different social positions has been indicated, because the current study did not find a significant relationship between music clusters and subsequent delinquency (Hypothesis 3). Therefore, the relationship between music clusters and the social positions, and the relationship between social position and subsequent delinquency, were exploratively investigated. With respect to the first relationship, the results showed that different music clusters were related to different social positions.

For 'popularity' hypothesis 3a was confirmed, adolescents in the non-mainstream clusters (i.e., '*Afro-American*' and '*Dance'*), were indeed significantly more likely to show more popularity compared with adolescents in the *'Pop'* cluster. For 'acceptance', adolescents in the clusters '*Rock'* and '*Omnivores'* reported significantly less acceptance than adolescents in the cluster '*Pop'*. This is in line with the previous research that indicated that adolescents

with a preference for rock are more disliked (Swartz & Fouts, 2003). A possible explanation for the '*Omnivores'* who report less acceptance, is that these adolescents may not have a strong identity, as results of more social problems (Mulder et al., 2007). Further research should focus on the clusters tested exploratively in this research; '*Anti's'* and '*Omnivores'* to investigate if these clusters belong to mainstream music or non-mainstream music.

For 'rejection', adolescents in the cluster '*Rock'* were not at higher risk for rejection, but adolescents in the cluster '*Dance'* however were. This is in contrast with previous research (Swartz & Fouts). An explanation is that in the 80s and 90s rock music was a popular genre and according to previous research related to peer rejection (Wells & Hakanen, 1991). However, rock is currently more seen as mainstream music (Ter Bogt et al., 2013). It could be that the cultural context of a preference for rock music has changed over time. Future studies should focus on the '*Dance'* cluster to investigate also the role of dance music and rejection.

Surprisingly, the three social positions were not related to subsequent delinquency. These results contradict with previous findings (Gallupe, 2017). A possible explanation for this inconsistency could be the relative low mean age of the adolescents. Only the first-grade students were included to this study, whereas the study of Gallupe (2017) included students in grades 7-12. The results in this study might suggest a minimum age at which delinquency is associated with different social positions. To investigate the exact onset of social positions associated with delinquency, future studies need to examine broader arrays of age groups to obtain a comprehensive picture.

Strengths and Limitations

The current study is innovative in the use of a personal-centred cluster analysis in the association between music cluster preference and delinquency which is more informative, compared to the use of music preference solely. The use of clusters also ensures to investigate the relationship between two new groups: '*Anti's'* and '*Omnivores'*. Additionally, the study focused on social positions and distinguished three different social positions: popularity, acceptance, and rejection, as possible underlying mechanisms, to understand the relationship between music cluster preference and delinquency.

There are also limitations that need to be mentioned. First, the music clusters were measured on a binary scale, whereas the use of a 5-point Likert scale is more in line with previous research (Mulder et al., 2010). The comparisons between the music cluster from the current study and those from previous research are therefore not completely justified. Second, the K-mean cluster analysis has the limitation that the order of the data affects the final results

of the data set (Aggarwal & Aggarwal, 2012). Therefore, the current study has chosen the clusters that were most clearly and consistent with previous literature. Third, to investigate change over time, future studies should also control for previous values of the social positions.

Conclusions and Implications

This longitudinal research gave insight in the relationship between music clusters and delinquency, and the underlying mechanisms of the three different social positions: popularity, acceptance, rejection. The results showed that six music clusters were identified. However, the music clusters did not significantly predict subsequent delinquency. This research has shown that the control variables sex and previous delinquent behavior are important factors in predicting delinquency, which may be helpful for prevention and intervention programs.

The current results showed that among early adolescents, it seems less important to focus on prevention and intervention in the relationship between music clusters and delinquency. However, previous research has shown that there is indeed support for music preference as a predictor for externalizing problem behaviors. Therefore, future longitudinal studies have to investigate the specific effects of music clusters in relation to delinquency; suggesting taking youths ‘sub-culture’ in to account when examining music clusters and delinquency. Additionally, in order to understand the relationship between music clusters and delinquency, future research first needs to examine the more general development of externalizing problem behavior.

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