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Gendered scrobbling: Listening behavior of young adults on Last.fm.

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Abstract

Combining insights from the psychology and sociology of music, this article addresses to what extent the listening behavior of young adults differs between men and women with regard to (i) preferred music genres, (ii) gender of music acts, and (iii) omnivorousness. Drawing on innovative data from the music-based social networking site Last.fm, the analyses show that young females listen more often to ‘softer’ and more mainstream music genres, to female acts and to a wider range of genres than males. Furthermore, by looking into actual listening behaviour and user-generated genre classifications – instead of self-reported preferences – this study contributes to research on gender stratification in music taste, showing that within male-dominated genres young women have carved out particular feminized niches, that women’s pro-female bias is stronger within male-dominated music genres and that the gender difference in omnivorousness disappears when we examine only respondents’ favourite music genres.

Introduction

Popular music plays an essential role in the everyday lives of young adults (DeNora 2000; Frith 2002; Williams 2001). While young adults – in contrast to younger age groups – spent an equal amount of time listening to music (Von Feilitzen and Roe 1990), music preferences are highly stratified along gender lines. Psychologists have extensively studied these gendered taste patterns in music. First, uses-and-gratifications scholars (Katz, Blumler and Gurevitch 1973; Gantz et al. 1978) have argued that young men and women use music to fulfill gendered social and psychological needs, emphasizing personal identity construction and mood management respectively (Ter Bogt et al. 2010). As a result, males prefer more aggressive and non-mainstream music genres, whereas women often opt for melodic and mainstream genres (e.g., Christenson and Peterson 1988; Christenson and Roberts 1998; Hargreaves, Comber and Colley 1995; North and Hargreaves 2007).

Building on an influential article by Goldberg (1968), a second group of psychologists has studied how the gender of an artist affects how people evaluate his or her performance (Pheterson, Kiesler and Goldberg 1971; Top 1991). Although male artists are usually rated more favorably compared to their female counterparts, this pro-male bias is stronger among men than women. Few studies have however examined the relationship between gendered genre preferences and the gendered evaluation of music acts (Colley, North and Hargreaves 2003; Millar 2008).

In contrast to most psychological research, sociologists of culture have increasingly focused on the breath of genre preferences, signaling a shift in marking elite status from snobbish exclusion to an omnivorous taste pattern (López-Sintas and Katz-Gerro 2005; Peterson and Kern 1996; Peterson and Simkus 1992; Van Eijck 2001). Even though gender issues are at the core of popular music consumption

(Christenson and Peterson 1988), such sociological studies have been occupied with class and occupational status, largely ignoring gender. Furthermore, if addressed at all, they provide mixed evidence on whether women are over- or under-represented among omnivores (Ollivier 2008).

Integrating insights from the psychology of music and the sociology of culture, this study examines to what extent the listening behavior of young adults differs between men and women with regard to (i) preferred music genres, (ii) gender of music acts, and (iii) omnivorousness. The article focuses primarily on describing – and tentatively contextualizing – gendered taste patterns by examining actual listening behavior drawing on the music-based social networking site Last.fm. Previous studies of such Web sites focus primarily on issues of privacy and risk, often in relation to gender (Hinduja and Patchin 2008; Livingstone 2008). But in contrast to some of its competitors, Last.fm allows us to track actual music consumption as members upload (‘scrobble’) the songs they have listened to – both online and offline – onto their online profile (see Data and methods section for more details).

The innovative data derived from these profiles has several advantages over surveys used in previous studies on music consumption. First, both psychologists and sociologists nearly always measure music taste by asking people – sometimes only students – which music they prefer (e.g., Christenson and Peterson 1988; Colley 2008). Often scholars confuse such findings on music preferences with actual listening behavior (Chan and Goldthorpe 2007; Sullivan and Katz-Gerro 2007). Data derived from Last.fm users might solve issues of social desirability in reported preferences and accurate recollection of listening habits (Millar 2008). In particular, since Last.fm records all listening behavior, including music that is not central to users’ identity construction, but accompanies everyday activities, such as working or

making homework (DeNora 2000; Wells and Hakanen 1991). This may affect the outcomes of this study as the former and latter functions are more important for males and females, respectively.

Second, music preferences are usually studied by having respondents rate their likings on a preformatted list of genres (e.g., Mulder et al. 2010; Stevens 2001; Ter Bogt et al. 2003; Van Wel et al. 2008). Instead of being defined by their intrinsic characteristics, music genres are particular sets of expectations and conventions that bind together an industry, performers, critics, and fans in making what they identify as a distinctive sort of music (Lena and Peterson 2008: 698). Hence, genre groupings formed by young adults themselves often differ – and are more diffuse and fragmented – from those constructed by outsiders looking in (Christenson and Peterson 1988; Tillekens 1993). As Last.fm users produce (‘tag’) genre categories themselves, this study – in contrast to most other quantitative studies – examines the genre distinctions that are meaningful to male and female listeners themselves.

I will be discussing previous research on the relation between gender, and preferred genres, gender of music acts and omnivorousness. Next, hypotheses are derived from these earlier studies, which are then compared to the results of the analyses of actual (possibly gendered) listening behavior. In the last section of the paper, I will present and evaluate the findings as well as the benefits – and some drawbacks – of using Last.fm data to study gendered music consumption.

Gender, role socialization and stratification

Before discussing previous research on gendered taste patterns, I will first briefly elaborate of the concepts of gender (identity), role socialization and gender stratification. First, gender concerns the way particular societies deal with human

bodies (male-female) and the continuity, and the many consequences of that “dealing” in our personal and collective lives (Connell 2009: 11). Second, the dominant gender structures (including stereotypes) are mainly socially – instead of biologically – reproduced. A dominant theory with social psychology – sex role socialization - indicates that various agencies (the family, the school, the peer group and the mass media) through a huge number of small interactions socialize girls and boys into compliance with a specific set of gender norms (Connell 2009: 95). While conformity leads to rewards (e.g. approval of friends), deviance (e.g. when women listen to ‘masculine’ music) results in sanctions. As such, sex role socialization might result in gender stratification, that is, unequal access to and unequal distribution of resources (material and nonmaterial) opportunities (Lamont and Molnár 2002: 168). However, while such gender norms strongly shape behaviour, individuals are not (always) passive learners, but (playfully) do gender in negotiation with dominant gender structures (West and Zimmerman 1987). Even though the data does not allow us to strictly explain the findings, the result show examples of resistance to dominant gender norms.

Gender and music genres

Most research on gender and music taste has focused on genre preferences (see Christenson and Peterson 1988 for an overview). Males tend to prefer ‘harder’ and non-mainstream forms of popular music, e.g. rock (Colley 2008; Hargreaves, Comber and Colley 1995; Roe 1985), 70s rock, Southern rock, psychedelic rock (Peterson and Christenson 1988), hard rock (Skipper 1975) and heavy metal (Christenson and Roberts 1998; Roe 1990, 1998; Stevens 2001). Females have a stronger preference for ‘softer’ and more mainstream genres, such as chart pop (Christenson and Peterson

1988; Christenson and Roberts 1998; Colley 2008), folk (Hargreaves, Colley and Comber 1995; Roe 1985; Skipper 1975) and classical music (Christenson and Roberts 1998; Stevens 2001; Van Wel et al. 2008). Taste patterns regarding the genres dance (Mulder et al. 2010; North and Hargreaves 2007) and Black music, particularly rap, are less clear-cut. The latter genre attracts both male and female attention, because of its aggressive message and dance ability respectively (Christenson and Roberts 1998). The abovementioned findings have remained fairly stable across time and place, indicating a highly gendered distinction between pop and rock (Frith 1983).

Scholars have suggested several reasons for these differences, mainly pointing to traditional gender role socialization and developmental issues of men and women (Schwartz and Fouts 2003). Whereas males are raised to be tough, independent and competitive – they need to stand out, females are brought up to be romantic, social, flexible and popular – they need to fit in (Christenson and Roberts 1998; Schwartz and Fouts 2003). As a consequence, most people feel pressured to act out these gender roles. First, music listeners gravitate towards music genres which (perceived) intrinsic characteristics reflect the gendered needs they have. Whereas ‘softer’ music is associated with feminine traits as emotions and relationships, it apparently gratifies traditional female needs (Larson 1995). Rock and heavy metal are cognitively linked to aggression and assertiveness – important aspects in male socialization, which explains why males prefer these genres (Arnett 1991; Hansen and Hansen 1991).¹ Second, as men are socialized to stand out, they often use music to construct and communicate their group affiliation and related identity (‘badge’), and to impress others (North, Hargreaves and O’Neill 2000; North and Hargreaves 1999; Ter Bogt et al. 2010). As a result, males are more likely to adopt fringe or non-mainstream music genres (Colley 2008). Women, who are socialized to fit in, approach music more

instrumentally and socially, preferring more sociable and mainstream genres (Christenson and Peterson 1998; Colley 2008).

Hypothesis 1 (gender and music genres)

Female young adults generally listen to 'softer' and more mainstream genres, while male listeners exhibit greater attraction to 'harder' and more non-mainstream types of music.

Gender and gender of music acts

Psychologists of music also have a long tradition in studying the gendered evaluation of, amongst others, artists. In his seminal study, Goldberg (1968) found that female college students value the professional work of males more highly than that of female academics, solely based on the author's name. Similar findings – oftentimes controlling for the amount of available information – were found in the evaluation of the artistic performance of male and female painters (Pheterson, Kiesler and Goldberg 1971), poets (Starer and Denmark 1974) and authors (Surmann 1997). Recent studies indicate that the evaluation of male professors is unaffected by gender, while finding an anti-female bias in the male evaluation of female professors (Basow 1995). Thus, this anti-female bias is stronger among male than female respondents (Colley, North and Hargreaves 2003; Millar 2008; Paludi and Strayer 1985; Ward 1981). As many performance evaluation studies are experiments in which respondents are explicitly asked to evaluate artistic works, such analyses lead to problems with regard to external validity (see Top 1991). In this article the evaluation of music acts is therefore studied by the extent to which male and female young adults differ in how often they listen to male, female and mixed gender acts (see Data and methods section).

Performance evaluation scholars have primarily attributed their findings to sex stereotypes and prejudices, regarding males and females in general and their artistic abilities in particular (North, Colley and Hargreaves 2003; Top 1991). Others suggest that same sex identification is strong among males. In contrast, females have adopted the opposite sex's perspective as result of the overwhelming male presence in – in this case – pop music (Bussey and Bandura 1999; Millar 2008). Finally, as women recognize the differential social evaluation of males and females at an early age, they arguably have an incentive to try to raise their status by mastering traditional masculine activities (Millar 2008: 440).

Hypothesis 2 (gender and gender of music acts)

Female young adults listen relatively more to female acts than their male counterparts.

Few studies have examined potential differences in the strength of this pro-female bias between different music genres (cf. Colley, North and Hargreaves 2003). Scarce evidence suggests that within 'masculine' genres the pro-female bias among evaluations by women is stronger than within more 'feminine' genres (North, Colley and Hargreaves 2003). While males arguably identify strongly with male sex-typed genres – and do not like to be associated with 'feminine music' (Colley 2008), women are 'reacting to their perceptions of the psychological and institutional barriers which deter women from participating in areas which are heavily male dominated' (North, Colley and Hargreaves 2003: 150). Considering the absence of data on actual genre sex-typing, I focused on genre popularity among male or female listeners.

Hypothesis 2a (gender, gender of music acts and genres)

The pro-female bias among female young adults is stronger within male-dominated music genres than within genres that are more popular among women.

Gender and omnivorousness

Sociologists of culture have been studying the relationship between social stratification and music taste since the 1960s. Building on the work of – amongst others – Gans (1974) and Bourdieu (1984 [1979]), one group of scholars has found support for the homology argument, that is, a strong fit between social stratification and cultural stratification. Individuals in higher social strata ‘exclusively’ prefer and consume ‘highbrow’ art (‘snobs’), primarily to distinguish themselves from people in lower social strata who prefer and consume ‘lowbrow’ culture (‘slobs’). Most contemporary sociologists have suggested that this homology argument is outmoded (Chan and Goldthorpe 2007). Current cultural stratification revolves more around the range – instead of type – of preferences and consumption (Peterson and Kern 1996; Peterson and Simkus 1992; Savage and Gayo 2011; Van Eijck 2001). Individuals in higher social strata no longer mark their elite status by snobbish exclusion. Instead, they distinguish themselves by an omnivorous taste pattern – comprising not only more ‘highbrow’, but also more ‘lowbrow’ and ‘middlebrow’ forms of culture.

Following Bourdieu’s lead, sociological studies on cultural consumption have primarily focused on social class and occupational status, largely ignoring gender issues. Furthermore, previous research among adults provides mixed evidence on how gender affects cultural consumption (Ollivier 2008), either finding no significant effect (Warde, Martens and Olsen 1999) or an under-representation of women

omnivores (Peterson and Kern 1996; Van Eijck 2001; Chan and Goldthorpe 2007). In contrast, studies among adolescents oftentimes find that girls are generally over-represented among omnivores, while boys are more often non-participants or popular music univores (Van Wel et al. 2006; Van Wel et al. 2008). A possible explanation might be that females use music more for mood regulation purposes (Colley 2008; Wells and Hakanen 1991), and as such are likely to switch between genres to satisfy a wider range of needs. While males use music mainly for identity formation and therefore more clearly distinguish likes from dislikes (North, Hargreaves and O'Neill 2000).

Hypothesis 3 (gender and omnivorousness)

Female young adults generally listen to a wider range of music genres than their male counterparts.

Previous research indicates that listening frequency also affects the degree of omnivorousness. While the number of genres individuals listen to occasionally ('passing knowledge') is related to occupational status, this association is not found when omnivorousness is measured by the number of genres people listen to most frequently ('favorites') (Van Eijck 2001; López-Sintas and Katz-Gerro 2005). One interpretation suggests that higher-status groups – having a broader social network – interact with people from different social circles. In order to produce social approval within different groups, they need to know something about a wide range of genres (Peterson 1992; Van Eijck 2001: 1165). While the relation between omnivore taste, listening frequency and gender has not yet been explored, I similarly anticipate that the gender gap in omnivorousness differs between passing knowledge and favorites. More specifically, while both men and women have a relatively univore set of favorite

music genres, women – in contrast to men – listen to more genres occasionally to fulfill mood management functions (see above).

Hypotheses 3a (gender, omnivorousness and listening frequency)

While female young adults generally listen to a wider range of music genres than males, this gender gap is larger for passing knowledge than for favorites.

Data and methods

Last.fm

Last.fm was started in London in 2003 and bought by the CBS Corporation in May 2007 (Rothman 2007). The number of users worldwide rose exponentially from 1 million in 2005 to 30 million in 2009 (Hijink 2005; Kiss 2009). On the one hand, Last.fm is a social networking site. Users can become members and construct a profile (including: username, photo, ‘about me’), add friends, recommend music and leave comments (‘shouts’) at other users’ profile page. As such, Last.fm can be used ‘to make identity claims – public statements about who they are, who they want to be, and how they want others to perceive them’ (Rentfrow, McDonald and Oldmeadow 2009: 329). A few studies have indeed focused on its social networking potential (Baym and Ledbetter 2009; Fitzpatrick 2008). On the other hand, Last.fm is a music streaming service where members can listen to each other’s personal radio.² Members (not only paying subscribers) can install what Last.fm calls the ‘Audioscrobber’. This desktop application uploads (‘scrobbles’) all music users listen to onto one’s online profile. The ‘Audioscrobber’ tracks online listening behavior as it is compatible with various media players. In addition, it ‘scrobbles’ music that has been listened to offline when a portable audio device is plugged into a computer. In contrast to peer-

to-peer downloading services, Last.fm records all 'listened to tracks' which allows us to see what users have been listening to ever since they became members.

Unfortunately, its users do not form a representative sample of a country's population. Scarce data suggests that Last.fm has an equal amount of male and female users, about 10% of the users are between 18-24 years old and 63% of its members have had at least some college education (Chappell 2009). Furthermore, Last.fm is predominantly used by youngsters that prefer indie, alternative and metal music (Kamer 2008). According to North and Hargreaves (1999) indie music fans are indeed generally highly educated. Recruiting respondents with a reasonably similar orientation to music – while not explicitly being part of a subculture (Williams 2001) has however the advantage of doing justice to the subtleties of taste patterns within our sample (Christenson and Peterson 1988).

Quantitative content analysis and sampling

To study the gendered listening behavior of young adults, my students and I performed a quantitative content analysis of Last.fm user profiles (Riffe, Lacy and Fico 2005). Last.fm enables users to 'Browse People' by sex, age range, country, 'About Me' keywords and musical taste. First, we selected all Dutch users aging between 18 and 25 years old of any gender. This resulted in a population of 30,692 users on May 14 2009. Second, since Last.fm only allows browsing per 20 users at once, my students and I drew a systematic sample whereby we first recorded the username of every 100th member.³ When users did not disclose their sex, we selected the next (101st) user and so forth. In order to draw a representative sample of all Dutch young adults users, we did not make any further selections (e.g., between active/inactive users, large libraries, many favorite artists etc.). This resulted in 306

Dutch users, 206 males and 100 females, between 18 and 25 years old that have become Last.fm member between 2002 and 2009. Third, once we had put the user names in our database, all other information was collected between May 15 and May 23 (see below).

Measures

Besides user background characteristics already mentioned (user name and user sex), we recorded each respondent's age. This resulted in a total mean age of 20.84 ($SD = 2.09$). The 206 males were slightly older ($M = 21.04$, $SD = 2.12$) than the 100 female users ($M = 20.42$, $SD = 1.96$).

In addition, several variables measuring the frequency of Last.fm use were included in the analysis: number of plays and the number of artists users have listened to. On average, men used Last.fm more frequently ($M = 12340$, $SD = 20423$) than female users ($M = 7328$, $SD = 11342$) measured by the number of plays. Furthermore, male users had more artists in their library than their female counterparts ($M = 403.6$, $SD = 442.8$ compared to $M = 307.4$, $SD = 307.0$). Both variables are strongly and significantly correlated ($r = 0.454$; $p < 0.01$). As such, men are more voracious cultural consumers (Sullivan and Katz-Gerro 2007).

Every user's music profile has a section showing – in most cases – 15 artists that he or she has been listening to most frequently since signing up at Last.fm, the so-called Top Artists. We included the name of every artist in this top 15 list and the respective number of plays.

By clicking on an artist, Last.fm shows how most users have 'tagged' a particular artist. Although Last.fm shows more than one tag, we recorded the most frequently used genre classification only. Initial analysis resulted in 230 different

genres ranging from ‘a-capella metal’ to ‘world,’ including 31 different metal subgenres. I then recoded these into nine broad genres, which I partly based on previous studies (Ter Bogt et al. 2003). Considering the assumed preference for indie, alternative and metal music among Last.fm users, I included rock, indie/alternative, metal and punk/emo as separate genres. Furthermore, several subgenres were distinguished based on their popularity and theoretical relevance. This resulted in the following (sub)genres: Pop, Elite (jazz/blues, soul/gospel, folk/country, world, singer-songwriter, classical), Urban (hip hop, R’n’B, reggae/ska), Dance (electronic, electro, techno, house, trance), Rock (rock, Britpop), Indie and alternative (including new wave and female vocalists), Metal (including gothic), Punk/emo and Other (including soundtrack and country specific genres, e.g. j-pop).

Finally, using various Internet sources (e.g. All Music Guide), we recorded the gender composition of each act: no females (0), females as well males (1), or females only (2). I added up all gender scores (0, 1, 2) for every artist in each listener’s Top 15 list (range = 0-30). Then I divided this total gender score by the number of artists in each Top list, which resulted in an average gender score (range = 0-2).

Results

Different gender, different genres... and subgenres

Before examining genre preferences, Table 1 shows the distribution of artists that have the most plays in users’ Top 15 Artist list. The two most popular artists among male and female users are similar – Coldplay and Radiohead. However, while males listen more to Metallica (trash metal), Linkin Park, Red Hot Chili Peppers and Incubus (rock), Fall Out Boy (emo), Jack Johnson (acoustic) and John Mayer (singer-songwriter) are most popular among female users. Only one female user has Metallica

among her Top Artists. These results already point to a specific genre distinction in listening behavior between male and female young adults.

TABLE 1 *Artists that appear most frequently in the Top 15 Artist list*

Rank	All Users (n=306)	Male Users (n=206)	Female Users (n=100)
1	Coldplay (47)	Coldplay(37)	Radiohead (11)
2	Radiohead (38)	Radiohead (27)	Coldplay (10)
3	Linkin Park (31)	Metallica (26)	Fall Out Boy (10)
4	Muse (30)	Linkin Park (24)	Muse (10)
5	Red Hot Chili Peppers (28)	Red Hot Chili Peppers (22)	Snow Patrol (9)
6	Metallica (27)	Muse (20)	Arctic Monkeys (8)
7	Snow Patrol (25)	Incubus (17)	Jack Johnson (8)
8	Arctic Monkeys (24)	Arctic Monkeys (16)	John Mayer (8)
9	Jack Johnson (23)	Snow Patrol (16)	Placebo (8)
10	Incubus (21)	Foo Fighters (15)	Yann Tierson (8)

Table 2 shows which genres young adult users actually listen to most.⁴ Several of the findings are in line with previous studies. First, female Last.fm users listen significantly more to pop (10.4%) and elite music (12.1%) – with the exception of jazz/blues – than males (3.4% and 6.8% respectively). As such, the results confirm the apparent ‘uncoolness’ of the genre pop among young males (Christenson and Peterson 1998) as well as the oft-mentioned increased feminization – in terms of participation rates – of high culture over the past decades (Ollivier 2008: 123).⁵ Second, males listen significantly more to rock (23.6%), metal/gothic (17.0%) and (punk (8.1%) than females (16.8%, 6.3% and 8.7% respectively), corroborating earlier studies on gendered genre preferences. Third, as indicated by previous research, urban is an ambiguous genre with regard to gendered preferences (Christenson and Robert 1998). Overall Table 2 shows no significant differences between males (9.3%) and females (9.0%). At the subgenre level, males listen significantly more to lyrically-aggressive hip hop (Dutch artists Opgezwolle and The Opposites) and reaggae/ska, while females prefer more pop-oriented R’n’B (Ne-Yo, Rihanna, Beyoncé). Thus, these findings

largely confirm hypothesis 1, that females generally listen to ‘softer’, more mainstream genres, while males exhibit greater attraction to ‘harder’ and more non-mainstream genres, particularly at the (main) genre level.

TABLE 2 *Genres and subgenres most frequently listened to by male and female young adults (weighed by rank in Top Artist list)*

Music Genre Subgenre	Male Users (n=206)	Female Users (n=100)	χ^2
Pop	3.4%	10.4%	***
Elite	6.8%	12.1%	***
Jazz/blues	2.1%	1.3%	***
Soul/gospel	0.6%	1.9%	***
Folk/country	1.3%	2.1%	***
World	0.3%	1.1%	***
Singer-songwriter	2.3%	4.9%	***
Classical	0.2%	0.8%	***
Urban	9.3%	9.0%	ns
Hip hop	7.5%	4.8%	***
R’n’B	0.6%	3.4%	***
Reggae/ska	1.3%	0.8%	***
Dance	12.0%	9.2%	***
Electronic	8.0%	7.4%	ns
Electro	0.4%	0.1%	***
Dance/drum & bass	1.0%	0.7%	***
Techno	0.6%	0.2%	***
House	0.7%	0.6%	ns
Trance	1.3%	0.2%	***
Indie/alternative	13.7%	19.2%	***
Indie, alternative, new wave	12.7%	15.3%	***
Female vocalists	1.1%	4.0%	***
Rock	23.6%	16.8%	***
Rock	13.9%	11.8%	***
Hard/classic/prog rock	6.4%	2.1%	***
Alternative rock	1.2%	1.5%	ns
Other rock	2.0%	1.5%	***
Punk/emo	8.1%	6.3%	***
Punk/hardcore	6.9%	3.9%	***
Emo	1.2%	2.4%	***
Metal/gothic	17.0%	8.7%	***
Metal	16.1%	6.6%	***
Gothic	0.8%	2.2%	***
Other	6.1%	8.1%	***
Total	100%	100%	

* $p < .05$; ** $p < .01$; *** $p < .001$; ns = not significant (two-tailed chi-square tests).

Two rather surprising findings are likely due to a general indie orientation of Last.fm users (see Data and methods section). Table 2 indicates that female Last.fm users listen more frequently to indie/alternative (19.2%) than male users (13.7%). This conclusion holds when we do not include female vocalists (e.g., Feist, Maria Mena,

Amy MacDonald). This seems at odds with earlier research showing a female preference 'softer' and more mainstream genres. Indeed, among a representative sample of Dutch young adults, preferring mainly chart pop (cf. Mulder, et al. 2010), indie/alternative music is considered a non-mainstream genre. But within the genre preference range of Last.fm users, who 'interpret having "mainstream" or "popular music" on their profile as a negative and posit more obscure or coming artists on their profile as positive' (Fitzpatrick 2008), indie/alternative (e.g., the Killers, the Kooks) may be considered too mainstream for men (see Colley 2008). And as a result, they might shy away from this genre.⁶ This may also explain why rock is the second most popular genre among female users. In addition, while several studies find a female preference for dance (North and Hargreaves 2007), I find that male Last.fm users listen more to dance music (12.0%) than females (9.2%). Men however seem to listen primarily to (alternative) electronic music instead of more chart pop oriented dance.

Finally, within the genres punk and metal, two subgenres are significantly more popular among females than males: emo (e.g., Fall Out Boy) and gothic (e.g., Within Temptation, Tristana, Emilie Autumn). We might tentatively explain a female preference for emo music as being a 'softer' version punk, while female interest in gothic seems possible related to the presence of many female singers (see next section). The above results show that genre groupings by young adults themselves are more differentiated – oftentimes along gender lines – than many survey studies have shown.

Pro-female bias, within different genres

First, if we examine the gender of the music acts to which Last.fm users listen to most – their favorites, we find – not surprisingly – that both male and female users mostly listen to male acts, 87.3% (179) and 73.2% (71) respectively. However, whereas

16.5% (17) of the female Last.fm users have an all-female music act as their favorite, only 6.8% (14) of all males listen primarily to all-female acts ($p < 0.01$). We find similar results if we examine a preference for mixed gender groups. As such, the pro-female bias seems to be stronger among female than male Last.fm users, similar to what many performance evaluation studies have found. Furthermore, if we examine the total gender scores based on users' Top 15 Artists, females also listen comparatively more to female music acts ($M = 0.448$, $SD = 0.384$) than males ($M = 0.181$, $SD = 0.234$). The differences are significant (Mann-Whitney $U = 5823.0$, $p < 0.001$). As such, our results confirm hypothesis 2, predicting that female young adults listen relatively more to female acts than their male counterparts.⁷

TABLE 3 *All female acts listened to within a particular genre (including mixed gender acts in brackets)*

Music Genre	Female /male ratio (Table 1)	Males (n=206)	Females (n=100)	Pro-female bias ratio
Pop	3.06	31.0% (39.3)	55.3% (59.2)	1.78 (1.51)
Elite	1.78	14.1% (18.2)	24.9% (29.1)	1.76 (1.60)
Indie/alternative	1.40	8.2% (16.1)	23.2% (33.1)	2.83 (2.06)
Other	1.32	12.6% (18.2)	19.1% (32.4)	1.51 (1.78)
Urban	0.98	2.2% (6.9)	14.1% (15.3)	6.41 (2.22)
Dance	0.77	7.1% (15.7)	9.4% (22.1)	1.32 (1.41)
Punk/emo	0.77	0.5% (4.6)	1.1% (3.3)	2.20 (0.72)
Rock	0.72	1.4% (6.7)	5.3% (18.5)	3.78 (2.76)
Metal/gothic	0.51	0.3% (12.3)	2.9% (32.3)	9.67 (2.62)

Hypothesis 2a predicted that women's pro-female bias is stronger within male-dominated music genres than within genres that are more popular among females. Based on previous findings (cf. Table 1), I measured popularity among females by calculating the proportion of female vis-à-vis male listening behavior. Table 3 shows first of all that – within all nine music genres – female Last.fm users listen more often to all-female acts than males (pro-female bias ratio > 1). The inclusion of mixed gender acts leads to the same results, punk/emo being the exception to the rule (0.72).

Furthermore, within genres popular among women (pop and elite music in particular), the pro-female bias among females – as compared to men – is relatively weak. Thus, the difference between male and female Last.fm users listening to all-female (or mixed gender) acts is relatively small, i.e., the pro-female bias ratio is close to one. Within more male-dominated genres (particularly rock and metal/gothic) the pro-female bias among women is much stronger (see Table 3). So it seems that within male-dominated genres, same sex identification might actually be stronger among women than men. In general, we find some support for hypothesis 2a, although we cannot really account for the high pro-female bias ratio of urban music.

Passing knowledge of female omnivores

To test hypotheses 3 and 3a regarding gender differences in omnivorousness, I calculated the mean number of genres (Pop, Elite, Urban, Dance, Indie/Alternative, Rock, Punk/Emo, Metal/Gothic and Other) male and female Last.fm users listened to.

TABLE 4 *Omnivorousness in male and female Top Artist lists**

Frequency	Males, n = 191 (SD)	Females, n = 89 (SD)	Comparison of means
Top 15	4.46 (1.44)	4.84 (1.23)	$t(198) = -2.32, p < 0.05$
Top 10	3.85 (1.31)	4.21 (1.28)	$t(278) = -2.19, p < 0.05$
Top 5	2.69 (1.00)	2.94 (1.09)	$t(278) = -1.95, n.s.$
Top 3	2.06 (0.72)	2.17 (0.74)	$t(278) = -1.13, n.s.$

* I excluded users that have less than 15 artists in their Top Artist list.

First, if we examine the degree of genre omnivorousness within the 15 most listened to artists, we find significant gender differences. Out of nine genres, male Last.fm users listen to an average of 4.46 different genres ($SD = 1.44$), while females listen to 4.84 different genres ($SD = 1.23$). This difference is significant (see Table 4). The

female omnivore thesis is also confirmed when we limit the analysis to user's ten favorite artists. As such, the results support hypothesis 3 that – among Dutch young adults using Last.fm – females indeed have a more omnivorous listening pattern than males.

However, if we approach users' favorite artist by examining their top 5 and 3, we find no significant differences in the mean range of genres male and female Last.fm users listen to. As such, both males and females have a central set of genres preferences. Men listen to artists within the same set of genres for their occasional listening behavior, whereas women listen to other genres – additional to their favorites – as passing knowledge, in most cases pop and elite music. Thus, the results presented in Table 4 also confirm hypothesis 3a, that the gender gap is larger for passing knowledge than for favorites. These results are in line with the idea that women's eclectic music taste is strongly related to flexible mood management (Schwartz and Fouts 2003). As predicted, men focus on a small set of contemporary styles which are central to their identification with particular musical subcultures (Colley 2008: 2050).

Conclusion

In this article I addressed the question to what extent the listening behavior of young adults differs between males and females with regard to preferred music genres, gender of music acts, and omnivorousness. First of all, this study shows striking similarities in the music tastes of male and female Last.fm users. At the aggregate level, both males and females share a preference for the same two acts (Coldplay and Radiohead), listen primarily to male acts and – when we examine their top 5 or 3 favorite acts – have a similar range of genres they listen to. However, this does not mean that the results completely confirm the gender similarities hypothesis (Hyde

2005). When we probe beyond young adults' favorite artists, we find significant (and sometimes surprising) differences. Males generally listen to 'harder' and more non-mainstream music genres than females. Females also listen relatively more often to female acts than males (pro-female bias) and are found to be more omnivorous. The results of this study indicate that contemporary music taste and consumption are still firmly grounded in gender stratification – despite claims of postmodern individualization, even when the data is drawn from a 'pick-and-mix' medium as the Internet (see Bihagen and Katz-Gerro 2000; Chan and Goldthorpe 2007).

The analyses of actual listening behavior also provided more surprising findings, and as such contribute to previous research on gender stratification in music taste. First, I examined the genre classifications produced by Last.fm users themselves. The findings show that genres are less monolithic and more fluid than the genre categories used in many surveys. Within male-dominated genres as punk and metal, young women have carved out particular feminized niches: emo and gothic (see West and Zimmerman 1987). Additionally, while women listen more to female acts than young men, we found striking differences between genres, i.e., women's pro-female bias is stronger within male-dominated music genres than within genres more popular among females. Second, by examining actual listening behavior instead of self-reported preferences, we cover young adults' taste that is central to their identity as well as music used for everyday activities. This study shows clear differences in omnivorousness between young males and females, and that these differences are stronger if we include genres Last.fm users listen to less frequently (top 10 or 15).

Unfortunately, the data drawn from Last.fm profiles are not without drawbacks. First, like many earlier studies, the information provided by these profiles

is rather limited, making it difficult to make causal inferences. It does not contain data on user's occupational background or education, their personality traits or how they have listened to a song (while doing homework, cycling home, etc.). Additional data on the (non-)mainstream status of a genre (e.g. by examining its presence within pop charts) and its perceived 'femininity' (cf. North, Colley and Hargreaves 2003) – instead of its popularity among female listeners – would allow us to better disentangle both factors. Second, taste patterns are not only characterized by what people like, but also by what they dislike (Bryson 1996). Since this study focuses on actual listening behavior, I have only data on what participants do not listen to, which is not the same as music they dislike. As such, this study cannot show to what extent dislikes are gendered differently than likes. In addition, do men and women genre classify ('tag') the same artists differently? Third, respondents sometimes negotiate between their self-perceived music taste and their Last.fm profile, e.g. by selectively turning off their 'Audioscrobber' or by increasing the variety of artists they have listened to (Fitzpatrick 2008). While music psychologists would hypothesize such behavior to be prevalent among young males, to what extent are female music enthusiasts involved in impression management as well? This is a particularly interesting topic to pursue, since music consumption increasingly revolves around 'coolness', i.e. knowing about the latest and emerging music artists and genres (Savage and Gayo 2011). By fully exploring the possibilities of new (music) media, scholars of music as well as gender may provide new answers to these questions.

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Notes

1. Recent studies have shown that underlying personality characteristics might also affect gendered music preferences (cf. Rentfrow and Gosling 2003; Delsing et al. 2008).
2. In the Netherlands, this free service turned into a subscription service in the beginning of April 2009.
3. As user profiles change continuously, it has not been possible to calculate the intercoder reliability.
4. The weighed and non-weighed results hardly differ.
5. When sociologists of culture refer to the feminization of high culture, they primarily talk about participation numbers (DiMaggio and Mukhtar 2004). Studies in modernism however demonstrate that femininity had strong connotations with mass culture. Yet, “the universalizing ascription of femininity to mass culture always depended on the very real exclusion of women from high culture and its institutions,” (Huysen (1986: 62), and exactly this exclusion seems to be (to some extent) in decline.
6. Unfortunately, the data do not allow us to disentangle the perceived intrinsic qualities of music (‘soft’ or ‘hard’) and its (non-)mainstream status.
7. However, while Millar (2008) found that respondents were more likely to report having listened to female artists than classifying such artists as their

personal favorites, our data shows hardly any differences in pro-female gender bias between respondents' top 15 and top 5 lists.

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