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Personality, Self-Estimated Intelligence, and Uses of Music: A Spanish Replication and Extension Using Structural Equation Modeling

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This study replicates and extends a recent study on personality, intelligence and uses of music [Chamorro-Premuzic, T., & Furnham, A. (2007). Personality and music: Can traits explain how people use music in everyday life? *British Journal of Psychology*, *98*, 175–185] using Spanish participants and structural equation modeling. Data from 245 university students showed that, in line with our hypotheses, individuals higher in Neuroticism were more likely to use music for emotional regulation (influencing their mood states), those higher in Extraversion were more likely to use music as background to other activities, and those higher in Openness were more likely to experience music in a cognitive or intellectual way. As predicted, self-estimates of intelligence were also linked to cognitive use of music, though not when individual differences were considered. On other hand, contrasting with initial predictions, Extraversion was *positively* rather than negatively linked to emotional use of music. Small incremental effects of gender (over personality) were also found on the emotional use of music. Results are discussed in regards to previous findings on personality traits as determinants of uses of music.

Keywords: uses of music, personality, intelligence, Big Five, Spain

For over half a century, psychologists have attempted to understand the determinants of musical preferences (e.g., Cattell & Anderson, 1953; Dollinger, 1993; Little & Zuckerman, 1986). However, the idea that such individual differences can be explained in terms of broad personality traits has been tested only recently and by a handful of studies (Delsing, ter Bogt, Engels, & Meeus, 2008; Rentfrow & Gosling, 2003, 2006; Schwartz & Fouts, 2003). Thus interindividual differences in music preferences have been predominantly understood as a function of ethnicity, social class, or age differences (see Frith, 1981; Gans, 1974).

With the increasing acceptance, since the mid 1990s, of the five factor or "Big Five" personality taxonomy as a universal language for classifying individual differences (Chamorro-Premuzic, 2007), progress in identifying some of the psychological determinants of musical preferences has been made. Most notably, studies examined the relationship between personality factors and musical taste (e.g., Dollinger, 1993; Little & Zuckerman, 1986; Rentfrow & Gosling, 2003, 2006). For instance, Rentfrow and Gosling (2003) reported that a preference (among American undergraduates) for Reflective and Complex (i.e., blues, jazz, classical, and folk music) and Intense and Rebellious (i.e., rock, alternative, and heavy metal) music was positively associated with the personality factor of Openness to Experience, which assesses individual differences in need for cognition, intellectual curiosity, and unconventionality (Costa & McCrae, 1992), and a recent longitudinal replication of this study with Dutch adolescents generally confirmed these associations between personality and music preferences (Delsing et al., 2008).

A different line of research has examined the association between the Big Five personality traits and the functions or *purposes* of listening to music, a field of research that has received limited attention (see Chamorro-Premuzic & Furnham, 2007).Typically, this line of research has tended to focus on the relationship between music and social identity (e.g., North, Hargreaves, & O'Neill, 2000; Tekman & Hortaçsu, 2002), but very little research has examined the association between personality traits and individual differences in the way in which music is used or the reasons for choosing to listen to music in the first place.

Connections between uses of music and established personality traits have a number of interesting theoretical and practical implications. From a theoretical perspective, traits may explain why people use music in different ways, something that has not been addressed before. Given the ubiquitous status of music in every society, understanding the determinants of differences in uses of music is an obvious goal for psychological research. From an applied point of view, the connection between personality traits and uses of music can inform clinical interventions based on therapeutic uses of music, industrial/organizational designs assessing the effects of music on employees' performance at work, and consumer behavior research into musical preferences.

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The first study to have examined personality and individual differences in how people use music is a recent article by Chamorro-Premuzic and Furnham (2007), who designed a novel scale for assessing the uses of music, which they showed to factor into three distinct categories: emotional use of music (the extent to which music is used for inducing moods that change an individual's experienced emotionality), cognitive, intellectual, or rational use of music (the extent to which an individual listens to music in an intellectual manner, analyzing the structure of the composition or parts played by different instruments), and background or social uses of music (the extent to which an individual uses, tolerates, and enjoys music while working, studying, socializing, or performing other tasks).

Chamorro-Premuzic and Furnham (2007) further investigated the association between these factors and Big Five personality traits, predicting and reporting a positive correlation between Neuroticism and emotional use of music, consistent with the fact that less emotionally stable individuals are more susceptible to emotional regulation via music and that they are more likely to use music to influence mood states (e.g., Juslin & Laukka, 2003; Juslin & Sloboda, 2001). The authors also predicted and found a positive link between Openness and cognitive or intellectual use of music, explained in terms of the higher need for cognition and cognitive resources available to individuals with a higher IQ, as well as the positive link of Openness with both self-assessed or self-estimated intelligence and psychometrically measured intelligence (Chamorro-Premuzic & Furnham, 2005). In line, the authors predicted and found that IQ was positively linked to this use of music.

Chamorro-Premuzic and Furnham (2007) also expected Extraversion to be linked to background use of music (which their data failed to support) and found emotional use of music to be negatively linked to Extraversion (though this association was not predicted). The positive link between Extraversion and the extent to which individuals choose to listen to music while doing other activities (e.g., driving, working, or exercising) is congruent with Eysenck and Eysenck's (1985) postulation that extraverts are underaroused compared to introverts, whereas the latter seek to avoid arousing activities (see Chamorro-Premuzic & Furnham, 2005; Graziano, Feldesman, & Rahe, 1985). The negative link between Extraversion and emotional use of music was interpreted post hoc in terms of the higher sensitivity of introverts to the arousal properties of music in general, including its affective component. This is also consistent with the negative association between Extraversion and Neuroticism (Digman, 1997).

Thus in the present study the following hypotheses were made:

h1: Neuroticism would be positively correlated with emotional use of music.

h2: Extraversion would be positively correlated with background use of music.

h3: Extraversion would be negatively correlated with emotional use of music.

h4: Openness would be positively correlated to cognitive uses of music.

h5: Self-assessed intelligence (SAI) would be positively correlated to cognitive use of music. Although SAI has not been previously examined in connection to uses of music, given that self-estimates of intelligence are a relatively accurate reflection of people's actual cognitive ability (Chamorro-Premuzic & Furnham, 2005), and that musical preferences are linked to self-perceptions (North, Hargreaves, & O'Neill, 2000; Rentfrow & Gosling, 2003; Tekman & Hortaçsu, 2002), one would expect that individuals would be more likely to use music for intellectual purposes and experience it in a more rational way if they perceive themselves as being intelligent.

As we sought to replicate previously reported correlations, we opted for a Structural Equation Model (SEM) that enabled us to simultaneously test the validity of broad personality traits in predicting the three different uses of music identified by Chamorro-Premuzic and Furnham (2007). Unlike regression analyses, SEM is a confirmatory method which simultaneously examines the effects of several predictors on *more than one* criterion or dependent variable (Byrne, 2006).

Some studies suggest that concern for music is a central priority in the lives of adolescents from many different countries (e.g., Fitzgerald, Joseph, Hayes, & O'Regan, 1995), while other suggest minor cross-cultural differences in the manner in which music is used (e.g., Rana & North, 2007) and in the association between personality and music preferences (Rawlings, Vidal, & Furnham, 2000). In the present study, therefore, we tested the generalizability of Chamorro-Premuzic and Furnham's (2007) findings in a sample of Spanish university undergraduates. The choice of examining music uses in Spain was primarily based on convenience, but the present study constitutes the first test of the psychology of music use in this country.

Method

Participants

Participants in the present study were 247 students (all European Caucasian) from a university of Barcelona. Their ages ranged from 18 to 41. Only two participants (aged 41) were older than 29 and thus we removed them from the database. The retained sample consistent of 245 participants, aged 18 to 29 ($M = 20.1$, $SD = 1.7$). Missing values (fewer than 5% in all cases) were replaced using the mean replacement method of SPSS prior to computing the factor scores. The majority of participants were female (227), with 24 males and 18 cases for which gender data were unavailable.

Measures

Uses of music inventory (Chamorro-Premuzic & Furnham, 2007). This is a 15-item scale measuring views regarding music, when it is listened to, and why. Items are rated on a 5-point scale (1 = Strongly disagree, 5 = Strongly agree). This inventory has three subscales: Emotional use of music (M[emot], 5 items; sample item: 'Listening to music really affects my mood'); Cognitive, intellectual, or rational use of music (M[cog], 5 items; sample item: 'I often enjoy analyzing complex musical compositions'), and; Background or social uses of music (M[back], 5 items; sample item: 'I enjoy listening to music while I work'). Cronbach's alpha for the three subscales in this study are reported in Table 1.

Neuroticism, Extraversion, Openness Five-Factor Inventory (NEO-FFI; Costa & McCrae, 1992), abbreviated version (McManus, Keeling, & Paice, 2004; McManus, Smithers, Partridge, Keeling, &

Table 1
Descriptive Statistics for Target Measures

	M	*SD*	α
Neuroticism (3 items)	8.4	2.7	.73
Extraversion (3 items)	11.1	1.9	.61
Openness (3 items)	10.3	2.2	.61
M(cog) (5 items)	12.3	3.0	.64
M(emot) (5 items)	18.0	3.2	.61
M(back) (5 items)	14.5	4.1	.62
SAI (13 items)	103.4	5.9	.81

Note. $N = 245$.

Fleming, 2003). The Big Five personality factors (Neuroticism, Extraversion, Openness to Experience, Agreeableness, and Conscientiousness) were assessed on a 5-point Likert-type scale which included 15 items—three per supertrait—based on the NEO-FFI. Cronbach's alpha for the three subscales used in this study are reported in Table 1.

SAI. Self-Assessed Intelligence (SAI) was assessed through a 13-item inventory that requires participants to estimate their multiple abilities (based on Gardner, 1983; e.g., mathematical, spatial, verbal, and musical) on a standardized IQ bell curve (i.e., a normal distribution of scores showing appropriate labels and a Mean of 100 and *SD* of 15 points for the overall population). As in previous studies the first component was extracted and retained for further analyses (see Chamorro-Premuzic & Arteche, in press, for studies using similar instruments and scoring procedure). Table 1 reports the internal consistency for this measure.

Scale Translations

Catalan versions of the Uses of Music Inventory, an abbreviated version of the NEO-FFI and the SAI were used in the present study. The translation of the 3 instruments was done using the back-translation method. Due to well-known methodological concerns related to adaptation processes (Breslin, 1970; Flaherty et al., 1988) all the researchers were psychologists, and some of them had experience with cultural studies. The second author, who is proficient in both languages, translated the English version into the Catalan language, paying special attention to the content of the items and the scale they belonged to. A second bilingual psychologist, living in the U.K., translated the Catalan version back into English. Any discrepancy was discussed until an agreement was reached.

Procedure

All participants were recruited opportunistically by two of the authors of this study. They volunteered to take part in the study and did not receive any credit for their participation. The instruments were administered anonymously to groups in classroom settings once ethical approval was obtained.

Results

Descriptive statistics (*M*, *SD*, and Cronbach's alpha) for all target measures are reported in Table 1. The NEO-FFI *M*s, *SD*s, and αs were in line with previously reported descriptives (McManus, Keeling, & Paice, 2004; McManus, Smithers, Partridge, Keeling, & Fleming, 2003). As for the Uses of Music factors, descriptive statistics are in line with Chamorro-Premuzic, Swami, Furnham, and Maakip (in press), the only study to report descriptives for this inventory. As reported in Table 1, the internal consistencies of the Uses of Music inventory were acceptable—note that for 5-item scales a reliability of .6 is acceptable (Cronbach, 1949), especially when the items have an introspective nature (Youngman, 1979).

Table 2 reports the intercorrelations among the target measures, with numbers in bold highlighting hypothesized associations. As predicted, and in line with Chamorro-Premuzic and Furnham (2007), (h1) Neuroticism was positively correlated with M[emot], (h2) Extraversion was positively correlated with M[back], (h4) Openness was positively correlated with M[cog], which also (h5) correlated positively with SAI. However, contrary to our predictions and Chamorro-Premuzic and Furnham's (2007) finding—but in line with Chamorro-Premuzic et al. (in press) – (h3) Extraversion was positively rather than negatively correlated with M[emot]. In addition, M[emot] was positively correlated with gender, showing that women were more likely than men to use music for emotional regulation, and negatively correlated with age.

SEM was carried out via AMOS 4.0 (Arbuckle & Wothke, 1999) in order to test the overall fit of our hypothesized model, which included SAI and three of the Big Five traits as exogenous variables, enabling Neuroticism to correlate with Extraversion, (Chamorro-Premuzic, 2007; Digman, 1997), and Openness, Extraversion and Neuroticism (negatively) with SAI (Chamorro-

Table 2
Bivariate Correlations Among Target Measures

	2	3	4	5	6	7	8	Age
1. M[emot]	.17**	.15*	**.27****	**.15***	.09	−.02	.20**	−.14*
2. M[back]	—	.32**	.05	**.17****	.03	−.00	−.01	−.09
3. M[cog]		—	.19**	−.02	**.38****	**.20****	−.12*	−.04
4. Neuroticism			—	−.14*	.07	−.17**	.02	−.19**
5. Extraversion				—	.00	.11	.27**	.01
6. Openness					—	.40**	−.08	.05
7. SAI						—	.02	.12
8. Gender							—	−.11

Note. $N = 245$. SAI = self-assessed intelligence; M[emot] = emotional use of music; M[back] = background use of music; M[cog] = cognitive use of music; gender coded 1 = men, 2 = women; **bold** coefficients refer to hypothesized correlations.
* $p < .05$. ** $p < .01$.

Premuzic & Furnham, 2005). On the other hand, the endogenous variables were the three main uses of music factors. These factors were enabled to correlate in line with Chamorro-Premuzic and Furnham (2007), and Table 2. The hypothesized model included paths from Neuroticism to M[emot] (h1), from Extraversion to M[back] (h2) and M[emot] (h3), from Openness to M[cog] (h4), from SAI to M[cog] (h5). The hypothesized model (shown in Figure 1) fitted the data well[1] : $\chi^2(12, N = 245) = 18.5$; $p > .05$; CFI = .98; PGFI = .35; RMSEA = .04 (low = .00, high = .09); AIC = 51.4; CN = 50.

As shown in Figure 1, support was also found for individual hypotheses, namely the positive path from Neuroticism to M[emot] (supporting h1), the positive path from Extraversion to M[back] (supporting h2), and the positive path from Openness to M[cog] (supporting h4). However h3 and h5 were not supported as the path from Extraversion to M[emot] was positive rather than negative, whereas the path from SAI to M[cog] was not significant. It is however noteworthy that the positive association between Extraversion and M[emot] replicates the finding from Chamorro-Premuzic et al. (in press), whereas SAI did correlate positively with M[cog] (see Table 2) though it failed to be a significant predictor in the model (when other exogenous variables were taken into account). The combined predictors accounted for 15% of the variance in M[cog], 10% of the variance in M[Emot] and 4% of the variance in M[back].

A final model—illustrated in Figure 2—was tested whereby gender and age were added to the modified model (without no-significant paths) shown in Figure 1. In this model, gender and age were hypothesized to affect M[emot], and additional paths were drawn from gender to Extraversion and Openness, and from age to Neuroticism (all following the correlations reported in Table 2). Age and gender were allowed to correlate. The model fitted the data well: $\chi^2(15, N = 245) = 26.4$; $p > .01$; CFI = .94; PGFI = .40; RMSEA = .05 (low = .01, high = .09); AIC = 68.2; CN = 66. As the model shows, when individual difference factors were considered, the link between gender and M[cog] remained significant, but the link between age and M[cog] dropped to nonsignificant levels. The combined predictors accounted for 15% of the variance in M[cog], 13% of the variance in M[Emot] and 4% of the variance in M[back]. Thus gender increased the percentage of variance accounted for in M[Emot] over personality traits.

It is noteworthy that intercorrelations among the three uses of music factors were modest (with the highest $r = .34$ for M[cog] and M[back]). Therefore, an individual's tendency to use music in one way, for instance emotionally, may or not be accompanied by the tendency to also use music in other ways, namely as background or for intellectual stimulation. To test whether personality traits relate to these potential interactions between uses of music, we conducted three 3-way Analyses of Variance, with Openness, Extraversion, and Neuroticism as dependent variables and M[Cog], M[Emot] and M[back] as the independent variables—with two levels each, high and low (computed via median-split). No significant two- or three-way interactions were found.

Discussion

The current study examined the relationship between personality, self-estimated intelligence, and uses of music. Its results provide support to a number of hypotheses, namely that individuals higher in Neuroticism are more likely to report using music for emotional regulation; that more extraverted individuals are more likely to report using music as background to other activities; and that individuals higher in Openness are more likely to use music for intellectual purposes. Overall, this set of results supports previous findings by Chamorro-Premuzic and Furnham (2007) as well as a recent replication with Malay participants reported by Chamorro-Premuzic et al. (in press).

The positive association between Neuroticism and emotional use of music is consistent with the idea that individuals higher in Neuroticism experience higher intensity of emotional affect, especially negative emotions (Costa & McCrae, 1992). The positive association between Extraversion and use of music as background is similarly consistent with the extant literature. Specifically, extraverts may use music to counter the monotony of everyday tasks or events (e.g., cleaning or jogging) and they may also experience lower distraction levels when listening to background music than introverts (e.g., Furnham & Strbac, 2002). Finally, the finding that more open individuals are more likely to report using music for intellectual uses is consistent with the link between Openness and intelligence (Chamorro-Premuzic & Furnham, 2005), suggesting that these individuals use music to create cognitively enriching experiences. Indeed, this link is consistent with Rentfrow and Gosling (2003) finding of open and intelligent individuals being characterized by a tendency to listen to music that can be described as 'reflective and complex.'

Although the current study did not include a measure of (psychometrically) "tested" cognitive ability, we did examine the link between self-estimated intelligence and uses of music, particularly M[cog], predicting a positive association between these measures. Thus the more individuals regarded themselves as intelligent, the more likely they would be to use music in an intellectual or cognitive way. In line, a positive, albeit modest, correlation between these measures was found. However, when other individual differences were considered the effects of SAI on M[cog] were not significant. Given that Chamorro-Premuzic and Furnham (2007) only reported correlations, no published data are available on the relationship between tested cognitive ability and M[cog] while controlling for the Big Five and other personality traits. That said, tested cognitive ability is more orthogonal to personality than is SAI (Chamorro-Premuzic & Furnham, 2005), which explains why the Big Five may have accounted for the association between M[cog] and SAI rather than tested IQ.

[1] The following fit indexes were used: χ^2(Bollen, 1989), which tests whether an unconstrained model fits the covariance/correlation matrix as well as the given model (although non-significant χ^2 values indicate good fit, well-fitting models often have significant χ^2 values); the parsimony goodness-of-fit indicator (PGFI; Mulaik et al., 1989), which measures power and is optimal around .50; the CFI (Bentler, 1990), which compares the hypothesized model with a model based on zero-correlations among all variables (values around .90 indicate very good fit); for the root-mean-square error of approximation (RMSEA; Browne & Cudeck, 1993), values $<.08$ indicate good fit; Akaike's information criterion (AIC; Akaike, 1973) provides an estimate of the extent to which the parameter estimates from the original sample will cross-validate in future samples; Hoelter's critical *N* (CN; Hoelter, 1983) provides the maximum sample size for which a model with same sample size and *df* would be acceptable at the .01 level.

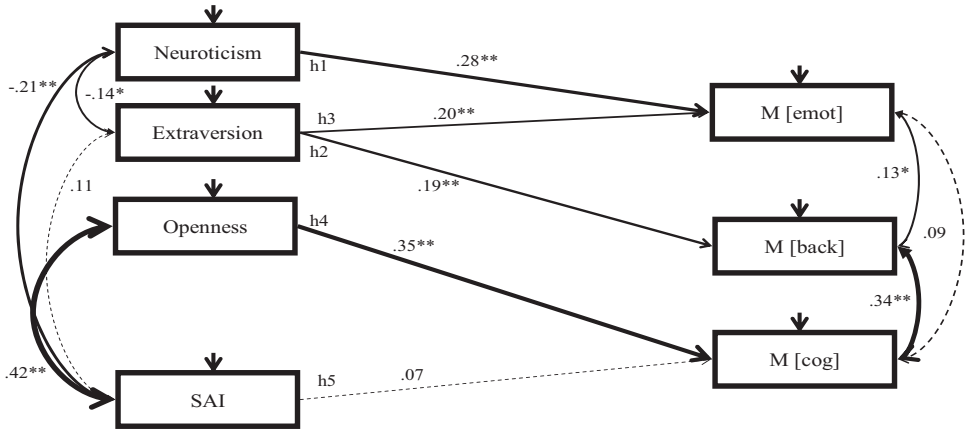

Figure 1. Hypothesized model for Big Five and SAI as predictors of uses of music.

In contrast to Chamorro-Premuzic and Furnham (2007), the current results did not reveal a negative, but a *positive* association between Extraversion and use of music for emotional regulation. However, it is noteworthy that the negative association between these variables in Chamorro-Premuzic and Furnham (2007) was low and not predicted. Moreover, a recent replication study in Malaysia found—as the current study—that the link between Extraversion and emotional use of music is *positive* (Chamorro-Premuzic et al, in press). This suggests that extraverts rather than introverts would be more likely to use music for emotional regulation, though the M[emot] factor does not distinguish between positive and negative emotional regulation (something that may account for the differential emotional use of music by extraverts and introverts). There is a well-established literature linking Extraversion to positive affect and Neuroticism to negative effect (Chamorro-Premuzic, 2007). Although the positive link between Neuroticism and M[cog] —found in three independent studies now—would suggest that the use of music for emotional regulation is linked to individual differences associated with negative affect, the fact that in two studies extraverts showed a modest but significant tendency to also use music for emotional regulation may suggest that the M[emot] dimension is equally relevant for individual with a predisposition to experience positive rather than negative affect. It would be important that future research into individual differences and uses of music disentangles the emotion-regulation process that underlie negative and positive mood induction in order to clarify previous inconsistencies in relation to Extraversion and use of music for emotional regulation.

Finally, our analyses including gender and age—which were based on a very uneven male:female ratio and a rather restricted age sample—suggest that gender (but not age) explains individual differences in M[emot] even when personality traits are taken into account. This is consistent with research showing that women are more likely than men to respond to the emotional effects of music (e.g., Kamenetsky, Hill, & Trehub, 1997; Panksepp, 1995).

The present study suffered from a number of limitations. First, it relied on self-reports of music use, which may not translate into actual music use in real life. Our method of using a self-report inventory only *assumes* that individuals accurately report on their uses of music. Future studies could overcome this limitation by including actual music usage (e.g., peer reports, observational designs). With the widespread use of online resources for purchas-

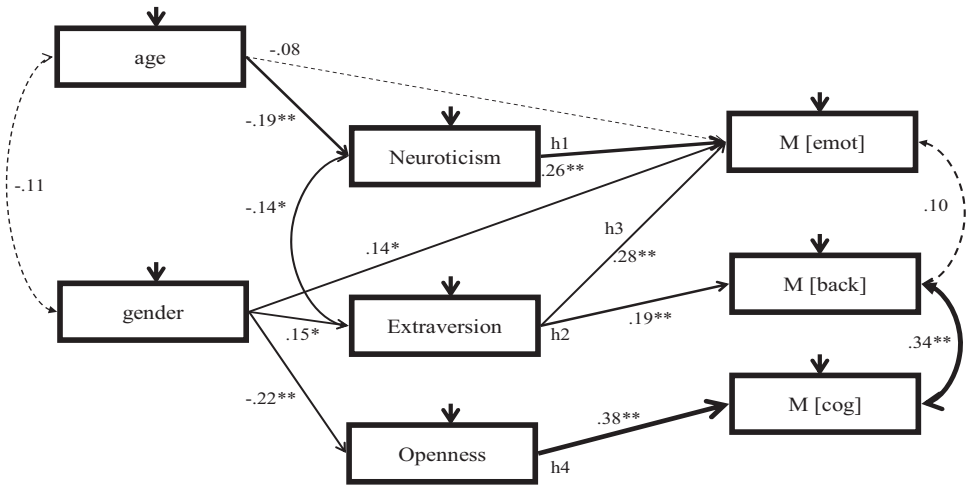

Figure 2. Modified model for age, gender, and the Big Five as predictors of uses of music.

ing and listening to music, these data should not be hard to obtain: personal web-sites or "blogs" often list people's personal "catalogues" of music and offer peer-to-peer downloads, and personal computers tend to store many hours of music and include information about how frequently each song, artist, or genre is played. Second, other individual differences, such emotional intelligence and creativity, may explain additional variance in uses of music: self-reports of emotional intelligence are related to but different from the Big Five traits, and measures of creativity, such as divergent thinking tests, can overcome the limitations of self-report methods to assess important elements of personal creativity and artistic preferences (Chamorro-Premuzic, 2007). Thus one would predict associations between uses of music and creativity and emotional intelligence to hold even when cognitive ability and personality traits are considered. Future research would do well not only to examine the association between such variables and uses of music, but also with the types of music that individuals listen to (e.g., Rentfrow & Gosling, 2003).

These limitations not withstanding, the present study adds to the literature on personality and uses of music. Taking this body of work as a whole, it appears that there are a number of interesting consistent associations between broad personality traits and uses of music, particularly the link between Neuroticism and emotional use of music, and Openness to Experience and cognitive/intellectual use of music. As for Extraversion, the relationship between this personality trait and uses of music has so far been inconsistent and requires replication. It is important, however, that these associations between uses of music and the Big Five personality traits have been replicated in three different countries now should not undermined potential mediating and moderating effects of cultural factors in the relationship between individual differences and uses of music. As noted, when it comes to investigating creativity and the arts "it is dangerous to assume that all cultures are alike, and that a research finding from one culture will automatically apply to another culture" (Oral, Kaufman, & Agars, 2007, p. 243; see also Kaufman & Sternberg, 2006). Indeed, past research suggests that psychological and cultural aspects of music are intrinsically intertwined in more than one way. For instance, historical national differences in musical perception and consumption are likely to decrease with economic and social globalisation, such that individual and personal elements of musical experience are progressively replaced by more public and universal ones (Sloboda, 2001). In that sense, the three studies that so far examined individual differences in uses of music may be deemed to have investigated culturally homogeneous samples (with the bulk of participants being recruited in three industrialized capitals, namely London, Kuala Lumpur, and Barcelona). Thus more culturally diverse samples should be examined. Even the apparently universal emotional function of music has been found to be more influenced by cultural tradition than by the inherent qualities of the music (Gregory & Varney, 1996), and there are known cultural differences in personality (Chamorro-Premuzic, 2007), self-estimated intelligence (Von Stumm, Chamorro-Premuzic, & Furnham, in press), and cognitive ability (Lynn, 2007), all of which may interact with cultural determinants of uses of music. Clearly, this area of research is only in its infancy, though the preliminary results reported and reviewed here are promising.

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