

THE COMBINED INFLUENCE OF MUSIC FUNCTION AND PREFERENCE ON COGNITIVE ATTENTION: A CROSS CULTURAL COMPARISON

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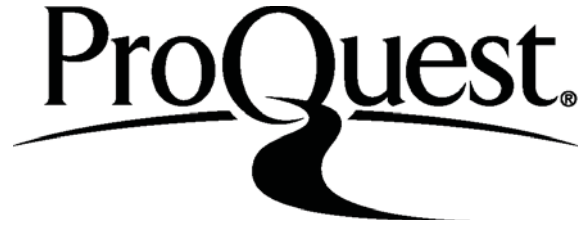
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Abstract

This study provides an investigation into the cross-cultural functions of music listening and their ability to predict music preference in both individualistic and collectivistic cultural clusters. It is further investigated whether music preference exerts varying effects on the reaction time of participants during a Stroop task dependent on cultural background, an area of cognitive research not yet fully understood. Quantitative analyses on the qualitative data revealed seven salient functions of music listening, only one of which revealed statistically significant differences between groups, namely *background music*. Only two functions of music were predictive of music preference, namely *emotions through music* and *identity expression*, and only within the collectivistic sample. A mixed-between analysis of variance (ANOVA) revealed significant between-group differences in response times during the Stroop task. Those of a collectivistic background responded faster whilst listening to music they least preferred, and those of an individualistic background responded faster whilst listening to music they most preferred. Results are discussed in line with the current literature, with future research suggested to overcome the methodological limitations of this study to aid the expansion of this exciting field of psychological research.

Keywords: Music Function, Music Preference, Listening, Cross-Cultural, Cognitive, Perception

1. Introduction

Music is a ubiquitous art form of universal importance, stemming from pre-historic roots and maturing into a constituent part of every-day life. Cultural diversity contributed to the heterogeneity of music, varying in its cross-cultural significance, definition, creation and function: a vehicle for the promotion of national identity. The development of the ‘world

music' genre during the 1980s and the subsequent prevalence of musical hybridity threatened cultural entanglement. Yet as Connell & Gibson (2004) discussed, on the contrary it appears to have stimulated multiculturalism, both relying upon and encouraging ethnic diversity, whilst enabling the unified appreciation of music that transcends cultural boundaries for commercial consumption. Such an increased interest in the globalization of music means its incorporation within the lives of people the world over continues to grow. In 2015 the International Federation of the Phonographic Industry (IFPI) reported global music industry revenues of US\$14.97 billion. Of this, US\$6.9 billion (46%) constituted digital revenue alone, an increase of 6.9% on 2014 (International Federation of the Phonographic Industry, 2015). These figures reflect a notable transition in the dissemination and accessibility of music as an increasingly digital, web-based streamed experience. Music applications such as Spotify © and Tidal © along with social media platforms including Facebook © supply listeners on a global level with access to music at all times, and in all places. Such changes in access and availability of music have led to concurrent changes in personal listening habits and behaviours. These contemporary changes in the way we access and experience music open up possibilities to empirically explore the psychological and in particular, the cognitive functions of music listening.

Early attempts at identifying the functions of music listening matured on the back of research into the 'uses and gratifications model' (Katz, Blumler, & Gurevitch, 1973), which posits that audiences are 'active' in utilising mass media as a means of need gratification, and seeks to unearth corresponding traits and motives to justify the reasoning in each instance. For example, the 'uses and gratifications model' has been implemented in studies highlighting the fundamental function of music in the management of mood, self-identity and interpersonal relationships (Hargreaves & North, 1999; North, Hargreaves & O'Neill, 2000; Tarrant, North & Hargreaves, 2000). More recently, Lonsdale & North (2011) elaborated on

these findings by means of a multi-sectional uses and gratifications study, concluding that there are several reasons why people listen to music; namely mood management, background noise, reflection, enjoyment, to facilitate social interactions and as a means of distraction. However, the validity of such findings is questionable when considering the underlying assumption that music is homogenous in function, since Lonsdale & North (2011) neglected to account for variations between participants at an individual, social and cultural level, allowing the generalisation of results across a nondescript sample of university students.

Conversely, research has suggested that dissimilarities in both personality and intelligence may influence the function of music at an individual level, with those high in extroversion seemingly more likely to draw on music as a means of intellectual stimulation, versus those high in neuroticism who favour its use as a means of emotion regulation (Chamorro-Premuzic & Furnham, 2007). Furthermore, social group, setting and timing have also been proven to exert an influence on the use of music (North, Hargreaves & Hargreaves, 2004; Rana & North, 2007). On a cultural level, research has uncovered noteworthy cross-cultural similarities in music function, particularly with regards to an Eastern – Western division. In their article on the role of music in everyday life, Rana & North (2007) sent a sample of 200 Pakistani (Eastern) participants 1 text message per day for 14 days. Upon receipt of each message participants were asked to immediately record whether they were aware of music within their hearing range. They were then asked to complete a questionnaire on music function which investigated whether they were listening actively or passively to music at the time, the social situation they were in and how much they liked the music in question. Their results identified several prominent music functions: to aid concentration, to pass the time, to create an atmosphere, to prompt recall of memories, to accentuate emotion, habit and enjoyment. These findings echoed those found in a similar British (Western) sample by North et al. (2004), from which conclusions were drawn surrounding cross-cultural

utilitarian function of music. Similarly, Juslin & Laukka (2004) identified emotion, as a means of promoting positive affect, as the one of the strongest motivators for music listening amongst a sample of 141 Swedish (Western) participants, whilst Schäfer, Tipandjan & Sedlemeier (2012) noted that an Indian (Eastern) sample more commonly attributed the emotional functions of music to their listening practices than did those from a similar German (Western) sample.

However, according to Boer and Fischer (2010) such research, whilst presenting a comprehensive account of cross-cultural music function, routinely devotes a significantly larger proportion of its attention towards the individual functions of music, rather than those social aspects inherent within each specific culture. Furthermore, the questionnaires used in some of these studies (Rana & North, 2007; Schäfer et al., 2012) were developed using research exclusively concerned with Western samples, thus the use of such measures with non-Western samples increases the likelihood of construct bias interfering with the validity and subsequent generalisability of results. To overcome the influence of construct bias and allow the formulation of valid conclusions concerning the cross-cultural functions of music on a personal, but more importantly social and cultural level, Boer & Fischer (2010) adopted a qualitative, culturally decentred approach, concentrating on the individualism-collectivism dimension of cultural variability (Hofstede, 2001). Collectivistic here is used to define those cultures which place a greater emphasis on social unity and the abandonment of individual goals in favour of those which enhance the integrity of the group, for example, China & Japan. Conversely, Individualistic refers to those cultures in which personal autonomy and the attainment of individual goals is prioritised over group cohesion, for example, Germany & the United Kingdom. Their results revealed seven prominent functions of music: background music, recollection of memories, diversion, emotions and self-regulation, self-reflection and social bonding. Overall, results revealed more cross-cultural similarities than

differences in relation to the seven functions of music, with self-regulation and social bonding the most salient functions of music at a personal and social level, respectively. The only function of music listening attributable to an individualism – collectivism effect was that of diversion, a more routinely reported use amongst those from a collectivistic background.

Nevertheless, whilst the work of Boer and Fischer (2010) and the preceding body of literature may go part way towards identifying why people around the world choose to consume music, our psychological relationship with music is far more elaborate, and it seems necessary to consider how our musical preferences may also be influenced and whether these too are determined by the same personal, social and cultural elements. Through everyday social interactions it is obvious that clear differences exist between individuals in terms of the music they prefer. However, what is seemingly less apparent are the mechanisms underlying these disparities. Research has once again shown a tendency to analyse causal factors contributing to the development of music preferences according to their personal, social and cultural correlates.

At the personal level, research has identified personality traits as some of the most salient determinants in the formation of music preferences, with research as far back as the 1950's suggesting a causal link between the two (Cattell & Saunders, 1954). This notion was later elaborated upon in the work Rentfrow & Gosling (2003) who, with reference to the Big 5 personality traits (Goldberg, 1992), reported a positive relationship between extraversion and preference for upbeat and cheerful music, and a further positive correlation between preference for artistic / intricate music and those with a demonstrable openness to new experience. This theoretical foundation was later examined in work revealing music preference as the most commonly used means of initiating conversation with strangers, carrying information pertaining to the personality of one individual to the next, aiding interpersonal perception and personality profiling (Rentfrow & Gosling, 2006). However, it

must be noted that similar studies have not always yielded results that are wholly consistent with that of Rentfrow & Gosling (2003; 2006), with some alluding to the mediating effect of music genre on the formation of music preference, even amongst those seemingly similar in personality (George, Stickle, Rachid & Wopnford, 2007; Zweigenhaft, 2008). Furthermore, the overriding majority of work into the relationship between personality and music preference has focussed almost exclusively on samples from North America and Western-Europe (Rentfrow & Gosling, 2003; Rentfrow & Gosling, 2006; George et al., 2007; Zweigenhaft, 2008). Yet interestingly, studies drawing on Eastern samples have returned results indicating that personality is less intrinsically related to music preference (Brown, 2012), casting doubt on the generalisability of individuals' personality as a determinant of music preference cross-culturally.

Viewing music preference from an alternative angle, research has put forward a number of social factors that psychologists believe may aid development. For example, it has been claimed that music serves as a social identity 'badge' which transmits information concerning the values, attitudes and self-views of individuals to those around them (North & Hargreaves, 1999), which Dunn, de Ruyter & Bowhuis (2011) propose may pave the way for social desirability to influence responses to questions concerning an individual's music preference. In particular, the study by North & Hargreaves (1999) found that individual music preferences existed as a result of the relationship between their self-view and the personality of a prototypical music fan. For example, those with a preference for 'chart pop' music demonstrated a greater tendency to mould their self-concept to reflect their perception of those who typically consume music of this style. Yet, this relationship was mediated by the individual's self-esteem, a finding verified in further studies drawing on samples of varying demographic characteristics (North et al., 2000; Tarrant et al., 2000). Boer (2009) upheld the notion of an apparent relationship between the expression of individual values and

music preference, observing that individuals who advocate values expressing an openness to change at the expense of conservative values show greater preference for rock and punk music. Conversely, those with self-transcendent values favour jazz or classical.

Interestingly, further research has found that such values and self-views elicited by music preference have a facilitative effect on social bonding through value similarity, as opposed to personality traits (Boer, Fischer, Strack, Bond, Lo & Lam, 2011); social bonding being one of the most salient cross-cultural functions of music listening at a personal and social level, as previously noted (Boer & Fischer, 2010). Therefore, this body of literature highlights the contribution of social identity and value expression towards the formulation of music preference. Yet it is worth considering whether this extends to identity at a cultural level, and whether the cultural background of listeners exerts a supplementary influence on preference.

Much of the research already conducted concerning cultural influences on the formation of music preferences can be attributed to Social Identity Theory (Tajfel & Turner, 1979); the notion that individuals derive a sense-of-self / identity based on group membership, whether with reference to social class, family or in this instance, culture / nationality. Indeed, correlations of varying strengths have been identified between music preference and the cultural background of the listener. In an early study comparing preference responses to vocal performers of varying ethnic backgrounds amongst Black, White and Hispanic junior high students in the United States, Killian (1990) reported a notable preference amongst listeners for performers of their own race. Similarly, even when the ethnic background of performers was not disclosed, McCrary (1993) still found that Black listeners in particular still showed significant preference for tracks performed by those vocal artists *perceived* to be closest in racial identity to that of their own. However, interestingly in a similar study by Morrison (1998) this influence was only prevalent when the ethnic identity of the performer *was* known to the listener. More recently, Brittin (2014) conducted a study

in which 4th – 6th grade children in the USA both estimated their cultural affinity and rated their preference for popular music of English, Spanish and Asian origin. Subsequent results revealed a significant, yet small relationship between the two variables, with notable correlations between preference ratings for Hispanic and Asian music and listeners aligning themselves with each culture.

However, when drawing conclusions at a cultural level, sample sizes must be scrutinised in order to ensure the legitimacy of the findings and, in the case of the previous literature in this instance, it needs to be considered that, whilst ethnically diverse, samples used have tended to focus primarily on school-aged children / young adults from the United States (Killin, 1990; McCrary; 1993; Morrison; 1998; Brittin; 2014), a Western and individualistic culture. Yet, the little work that has extended its reach out-with the USA has suggested that the tendency for listeners to show preference for music of their own culture does not necessarily translate across the Eastern-Western divide. For instance, Boer, Fischer, Atilano, Hernández, García, Mendoza, Gouveia, Lam & Lo (2013) found a link between listeners' national identity and culture-specific music styles in Asian, Latin *and* Western students. Yet, in testing the preference of 487 non music majors in the USA and Japan, Darrow, Haack & Kuribayashi (1987) found no definitive preference amongst participants for music of their own culture, with results revealing an overall preference amongst both cultural groups for music of a Western origin. This alludes to the possibility of other confounding variables engaging in complex interactions that may inhibit the generalizability of results across wider cultural boundaries as later suggested by LeBlanc, Jin, Stamou & McCrary (1999). In any case, research into the impact of culture on music preference is somewhat lacking, with few articles addressing the relationship in recent years, a gap future research ought to address in order to substantiate or dismiss the aforementioned findings.

Evidently therefore, similar personal, social and cultural factors as categorised by Boer & Fischer (2010) appear to exert their influence to varying degrees upon both music function and preference. It therefore seems logical to assume that the functions of music may be intertwined *within* the musical preferences of listeners. However, only in recent years has interest begun to grow in how the two may be interrelated. Behne (1997) intimated that preferences may mirror the functions of music listening, with Schäfer et al. (2012) using step-wise regression analysis to statistically evidence cross-cultural variations in the power of music functions to predict music preferences. Their findings suggested listening function was much more foretelling of music preference amongst those from an individualistic (German) culture than those of a collectivistic (Indian) culture. Clearly however, more research is required to substantiate these initial findings: research that draws on collectivistic and individualistic samples encompassing a more extensive list of countries under each cluster to verify the extent to which these findings are generalizable.

Considering that which has so far been discussed, it seems of value to contemplate how the use of music and the formulation of musical preferences may in turn impact upon listeners at a psychological level. One particular area of Psychology which has proven to be of significant interest to experts concerns how the use of music may interfere with our cognitive abilities. Much of the research in this field stems from the theoretical work of Rauscher, Shaw & Ky (1993) and the notion of the 'Mozart Effect', following a study in which they noted an improvement in participant performance during a spatial task after exposure to a Mozart sonata. Subsequent studies criticised this conclusion, instead arguing that the music merely stimulated 'enjoyment arousal' (Chabris, 1999), as further evidenced in studies revealing similar alterations in task performance both subsequent to and during exposure to music of various styles and complexities (Thompson, Schellenberg & Husain, 2001; Hussain, Thompson & Schellenberg, 2002; Schellenberg, Nakata, Hunter & Tamoto,

2007). Such research posits that heightened levels of cognitive arousal are activated by enjoyable stimuli (e.g. a Mozart sonata) which lead to improved performance in such tasks that utilise the same cortical regions of the brain ('Arousal & Mood Hypothesis'). Tied in with research on music and cognitive arousal is that which centres on the personality of participants. Furnham & Bradley (1997) established that extroverts performed significantly better than introverts when exposed to background music during a cognitive task, a finding they later attributed to Eysenck's (1967) theory of personality (Furnham & Allass, 1999) and the reported difference in the level of external stimulation required by introverts and extroverts to achieve the optimum level of arousal. Interestingly however, Nantais & Schellenberg (1999) established that, rather than the participants themselves, performance appeared to be mediated by the preference of individuals to each of the listening conditions, suggesting that musical preference as influenced by the functions of music may alter arousal levels and subsequently impede upon cognitive capacity. This finding has been substantiated in research highlighting the influence of background music, both liked and disliked, on task performance in both Eastern samples (Huang & Shih, 2011) and most recently Western samples (Perham & Sykora, 2012), in which task performance was inferior under exposure to liked, rather than dis-liked, music.

However, it is intriguing that in light of this wealth of research on cognitive arousal and musical preference, no formal attempt has been made to investigate the influence of cultural diversity on task performance during musical exposure at a comparative level. Aforementioned cross-cultural variance in the function of music listening and its contribution to the formation of musical preferences indicates it would not be unreasonable to suggest that music preference may have varying cross-cultural significance in terms of its ability to interfere with the processing capacity of participants.

The aim of this study is to consolidate previous literature by investigating which cross-cultural specificities versus universalities exist in the functions of music listening along with their contribution to the formulation of musical preferences. It will then be questioned whether cross-cultural music preferences can be used to predict an individual's susceptibility to musical distraction during a simple cognitive task. Drawing on the work of Boer & Fischer (2010), this study will focus on a cross-cultural comparison along the individualism – collectivism dimension of cultural variability (Hofstede, 2001). Such a decentred approach ensures the inclusion of multiple cultures, thus eliminating the influence of construct bias were the research focussed solely on one country 'representative' of others; jeopardising the generalizability of results.

This study hypothesises that: (1) No significant cross-cultural differences will exist in terms of music function between individualistic and collectivistic samples, with the social functions of music listening being the most prevalent within both cultural clusters. (2) Music preference will be governed by the functions of music listening, with those functions pertaining to the expression of identity the strongest predictor of musical preference, amongst those of a collectivistic background. (3) The combined influence of music preference and cultural background will reveal significant between-group differences in the reaction times of participants during a Stroop task.

2. Methodology

2.1 Participants

Participants were an opportunistic sample of sixty ($n=60$) students from the University of Glasgow, recruited from both the MSc Psychological Studies course and the wider student population. Given the musical focus of the hypotheses, the validity of results relied on the

recruitment of participants with an interest in music. Thus, the prerequisite for inclusion was frequency of music listening, with only those who reported listening to music more than once per month, whether passively or through choice, enlisted to take part. Ethical Approval was obtained from the University with the relevant permissions granted for the recruitment of students via electronic means. A subsequent campus email invitation was circulated amongst prospective students. Further advertisements were posted on the MSc Psychological Studies Group Facebook page. Participation was unpaid and anonymous. The mean age of participants was 26.8 years ($SD=4.9$) with a range of 21 - 42 years however, for the purposes of this Participant age and gender were not qualifying criteria. A culturally diverse sample of students were recruited [Figure 1], whilst maintaining an equal representation of individualistic ($n=30$) and collectivistic ($n=30$) cultures as determined by the Geert Hofstede cultural dimensions theory (Hofstede, 2001), further details of which can be found at www.geert-hofstede.com/countries.html. For the purposes of this study, participants' native country was used as a proxy for cultural back-ground. To facilitate the formulation of definitive cross-cultural comparisons, a decision was made to allocate participants between two separate samples along the individualism – collectivism dimension. As such, those countries with an individualism score of higher than 50 / 100 were treated as individualistic, whilst those with an individualism score of lower than 50 / 100 were treated as collectivistic.

Figure 1. Sample description by cultural cluster

	Male			Female			All		
	N	Age: M	Age: SD	N	Age: M	Age: SD	N	Age: M	Age: SD
Whole Sample	30	26.8	5.3	30	26.7	4.7	60	26.8	4.9
Individualistic									
UK	8	30.4	8.1	7	29.1	4.9	15	29.8	6.6

Ireland	2	26.5	4.9	3	23	1	5	24.4	3.2
Germany	3	28.7	2	1	25	0	4	27.8	2.5
France	1	25	0	1	29	0	2	27	2.8
Austria	1	22	0	0	0	0	1	22	0
Lithuania	1	25	0	2	24.5	4.9	3	24.7	3.5

Collectivistic

Malaysia	1	27	0	2	25.5	0.7	3	26	1
China	4	24.5	3.7	5	23.4	1.3	9	23.9	2.5
Japan	1	24	0	1	26	0	2	25	1
Thailand	1	24	0	1	27	0	2	25.5	2.1
Turkey	0	0	0	2	27	0	2	27	0
Russia	0	0	0	1	34	0	1	34	0
Greece	5	25.8	4.2	3	30.3	10.2	8	27.5	6.7
Nigeria	1	26	0	0	0	0	1	26	0
India	1	23	0	1	24	0	2	23.5	0.7

2.2 Design

Study 1a & 1b

Studies 1a & 1b implemented within-subjects qualitative designs employing open-ended self-report questions concerning the individual, social and cultural functions of music within the lives of an equal sample of participant's representative of individualistic and collectivistic cultures (1a), along with their musical preferences (1b).

Study 2

Study 2 implemented a within-subjects repeated measures design in which participant response times (DV) were tested using a Stroop paradigm in which the individualistic vs. collectivistic samples (IV1) were simultaneously exposed to music under two preference conditions (IV2). In condition 1, participants completed the Stroop task whilst exposed to their *most* preferred musical excerpt as determined in study 1b. In condition 2, participants completed the Stroop task whilst exposed to their *least* preferred musical excerpt.

2.3 Materials / Stimuli

Study 1a: Music Function

Music Function was investigated using the Music Function Questionnaire adapted from a previous study by Boer and Fischer (2010) consisting of five self-report questions addressing the function of music at three levels, namely personal, social and cultural. e.g. ‘*What does music mean to you? Please write your thoughts about the function / use of music in your day-to-day life.*’ and ‘*What is the meaning of music in your home country?*’. Each question was open ended and completed by every participant.

Study 1b: Music Preference

Four world music excerpts were selected at random from www.worldmusicnetwork.net, two representative of individualistic cultures, and two representative of collectivistic cultures [Figure 2].

Figure 2. Tracks in order heard

Track 1	Artist	Album	Copyright
<i>Drapetsona</i>	<i>Mikis Theodorakis</i>	<i>The Best of Mikis Theodorakis (2004)</i>	© 1997 FM Records
Track 2	Artist	Album	Copyright
<i>E ma yao Ling</i>	<i>Dacan Chen</i>	<i>Classical Chinese Folk Music (2010)</i>	© 2010 ARC
Track 3	Artist	Album	Copyright
<i>Torsa</i>	<i>Lau</i>	<i>Race The Loser</i>	© 2012 Reveal Records
Track 4	Artist	Album	Copyright
<i>Zum</i>	<i>Carel Kraayenhof</i> <i>Sexteto Canyengue</i> <i>Omar Mollo</i>	<i>Compassion</i>	© 2009 Canyengue Music

All tracks were instrumental so as not to instigate cultural bias in preference through linguistic content. Each track was subsequently downloaded in .mp3 format using Amazon Music Player. A one minute section of each track was then identified based on shared musical characteristics (tempo & dynamics) and was subsequently trimmed to 60 seconds in duration with a 10 second fade-in and a 10 second fade-out using Audacity 2.1.0 software. All four tracks were then saved for playback on a Dell Desktop PC using a Windows operating system with Windows Media Player as the default audio-playback platform, to which each participant listened using a provided pair of Sennheiser HD202 MK2 on-ear headphones.

A corresponding self-report music preference questionnaire was constructed and provided to participants to accompany the four musical excerpts. Participants were asked to circle the relevant number (1-4) which corresponded with the track they 'Most' preferred, and which track they 'Least' preferred. After each selection participants were invited to write the reasons for their choice in each instance in the blank text box provided.

Study 2: Stroop Task

Stimulus presentation, trial selection and data collection were controlled using PsyToolkit software version 2.0.2 © (www.psychtoolkit.org) with the permission of Dr Gijbert Stoet at the University of Glasgow. Colour and word combinations yielded 16 target stimuli selected at random by the software throughout the duration of each experiment. A fixation point and a further two stimuli were used to signify a 'Correct' or 'Wrong' response during each trial. All stimuli were presented in Calibri (Body) font and on a black background.

The experiment was run on Dell Desktop PC using a Windows operating system, again accompanied by the use of Sennheiser HD202 MK2 on-ear headphones. Responses to each stimuli were recorded using the relevant computer keyboard button corresponding to the 'ink'

colour of each stimuli presented simultaneously on screen (RED = R, BLUE = B, YELLOW = Y, GREEN= G).

For incorporation as part of Study 2, all four music tracks from Study 1b were uploaded in .mp3 format using PsyToolkit and subsequently embedded in the experimental paradigm.

All statistical analysis was completed using IBM SPSS Statistics (version 22) software.

2.4 Procedure

The study was conducted in laboratory conditions. Upon arrival, participants were presented with a Participant Information Sheet providing a detailed account of the research project and both its academic and ethical implications. If satisfied with the conditions of the research, participants were provided with a Consent form to read and sign before being seated in front of a computer, ready to begin. All component parts of the study were completed in the following order by each participant, each of whom was provided with a participant number in order that their responses remain anonymous yet referable across each stage of the process.

Participants were asked to fill out a Participant Registration Form providing their age, gender and Nationality, to allow for the subsequent division of participants along the collectivistic – individualistic dimension. Participants were also asked to indicate how often they listen to music (*‘Never, Once a month, Several times a month, Once a week, Several times a week, Every day.’*), before moving on to complete Study 1a.

Study 1a: Music Function

Participants were provided with a paper copy of the Music Function Questionnaire adapted from the previous work of Boer and Fisher (2010). They were asked to complete each of the 5 self-report questions in pen. Upon completion participants were asked to complete study 1b.

Study 1b: Music Preference

Using the headphones and computer provided, participants were asked to listen, in numerical order, to each of the 4 musical tracks. Thereafter, participants were provided with a paper copy of the Music Preference Questionnaire on which they were asked to indicate their *most* preferred, followed by their *least* preferred track by circling the appropriate number.

Subsequently they were asked to provide the reasoning behind their decision for each, using the self-report box provided (*'Now, in the box below, please write down your own comments clarifying what it is about this track that you prefer / that you did not like'*). To avoid instigating cultural bias in the preference responses of participants, the names of the artists, tracks and countries of origin were not disclosed, instead leaving interpretation wholly to the musical content itself and the thoughts or feelings evoked by each. Upon finishing, all participants went on to complete study 2.

Study 2: Stroop Task

Participants were seated in front of a computer in silence and wearing the headphones provided. The experiment was accessed through a bookmarked link to PsyToolkit via a Google Chrome browser window. At the outset, participants were asked to input their pre-scribed participant number before clicking the relevant button to continue. Automatically expanding to full screen, the participants were then presented with 3 simultaneous screens providing details of how to complete the experiment. At each stage the participants were able to move onto the next screen by pressing the space-bar. To familiarise themselves with the use of both the software and relevant controls participants were then invited to take part in a block of 15 practice trials and were advised that their responses during this period would not be recorded. Each trial started with a black screen for 500 ms, followed by fixation cross, which stayed on screen for 200ms, followed by target stimuli (colour word), randomly

selected from the 16 possibilities. The target stimuli remained on screen for a maximum of 2000ms or until the participant responded by pressing the pre-assigned key which corresponded with the 'ink' colour of the stimuli. At which point, the stimuli disappeared and was replaced with the relevant response indicator dependent on whether the participant was 'Correct' or 'Wrong'. This remained on screen for 500ms before disappearing. This process was then repeated for all subsequent trials, with participants requested to respond as quickly as possible at stimulus on-set. At the end of the 15 practice trials, a new screen advised participants that the real experiment would now begin and inviting them to press space-bar to continue.

The main experiment consisted of 4 blocks of 30 trials, each separated by a break screen in which the participants could take as much time as they need before continuing. During each of the four blocks, the corresponding numbered track from Study 1b was played in the background whilst participants completed each trial (i.e. Track 1 for block 1 etc.) in the same manner as the practise block. Should the track finish before the participant completed the block, the track looped back and started again from the beginning until the end of the block. All participants heard the excerpts in the same order. At the end of the fourth and final block, the participants were presented with a 'Thank you' screen, advising of the end of the experiment and inviting them to click on 'continue' in order to automatically save their data to the appropriate database on PsyToolkit.

3. Results

Study 1a: Music Function

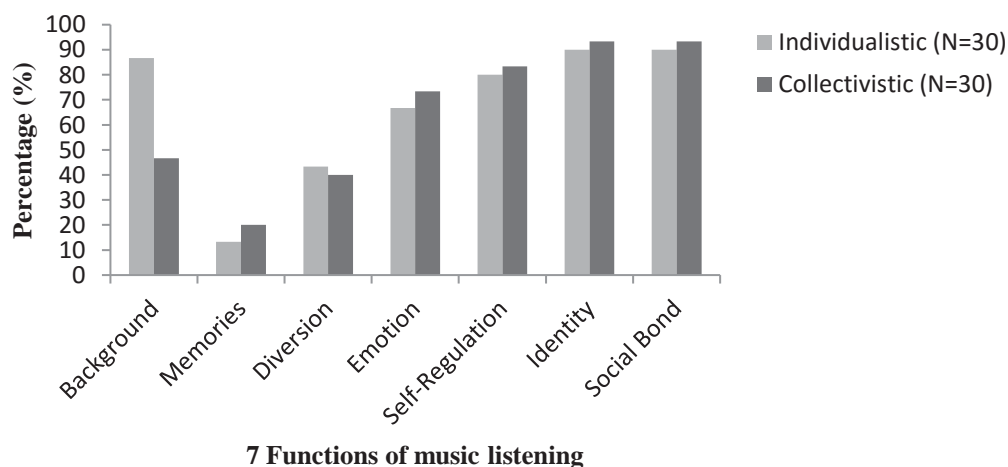
Hypothesis one proposed that no significant cross-cultural differences would exist in terms of music function across the individualism – collectivism dimension, with the social functions of music listening being the most prevalent between both cultural clusters.

Analysis

A content analysis conducted on participant responses to each of the five self-report questions contained in the music function questionnaire revealed seven salient themes relating to the cross-cultural function of music listening: *background music; memory recollection; diversion; emotion through music; self-regulation; identity expression; and social bonding.*

Following the identification of these themes, the qualitative data was quantified through the application of a nominal coding system, in which every participant response was coded according to whether each thematic function of music listening was present (value = 1) or absent (value = 0). This enabled the exploration of data via frequency analyses, in order that conclusions regarding the prevalence of the seven functions, along with cross-cultural comparisons could be made [Figure 3]. Across cultural groups, the use of music as a means of social bonding was the most salient of the seven identified functions.

Figure 3. A comparison of music function prevalence between individualistic and collectivistic samples (percentage of occurrence in responses).



Simultaneous chi-square tests of independence were performed to examine whether the prevalence of each music function was statistically proportionate between individualistic and collectivistic samples. Results conclude that only the use of *background music* was statistically significant $X^2(2, n = 60) = 9.06, p < .05$, with 40% more participants from the individualistic sample (86.67%) reporting its use as a function of music listening compared to those from the collectivistic sample (46.67%). Despite observable disparity in the percentage of occurrence from participant responses, none of the remaining six identified functions yielded statistical significance.

The results of this study support hypothesis one in that the social function of music listening was the most salient between both cultural groups. Furthermore, as predicted no significant differences were found within the music functions of music listening across the individualism – collectivism dimension, with the exception of *background music*, a function more prevalent amongst those from the individualistic group.

Study 1b: Music Preference

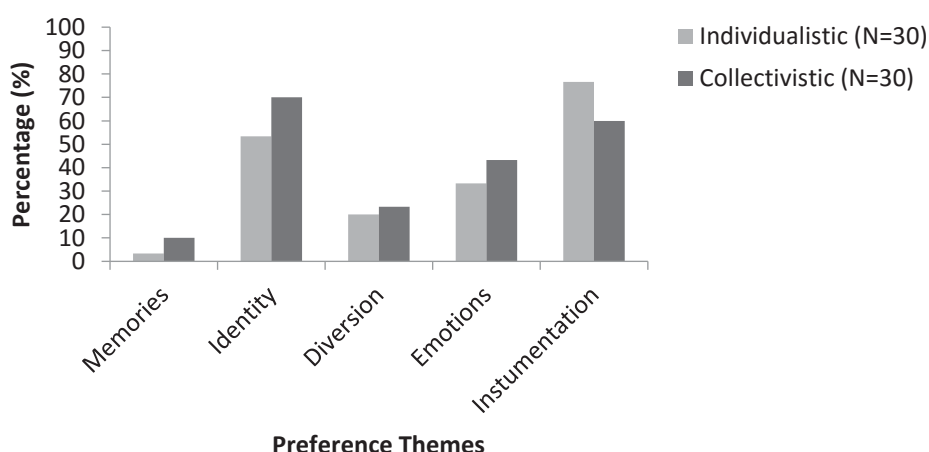
Hypothesis two proposed that functions of music listening pertaining to self / cultural identity will be more prominent in predicting musical preference amongst those of a collectivistic background.

Analysis

A content analysis conducted on participant responses to both self-report questions from the music preference questionnaire revealed five salient themes: *memory recollection*; *identity expression*; *diversion*; *emotion through music*; and *instrumentation*. These themes summarise the reasoning behind the formation of music preference amongst participants from both cultural samples, and in both the preferred and non-preferred conditions.

As with study 1a, following the identification of these themes, the qualitative data was quantified through the application of a nominal coding system, in which every participant response was coded according to whether each thematic function of music listening was present (value = 1) or absent (value = 0). This enabled the exploration of the data via frequency analyses, in order that cross-cultural comparisons could be made regarding the salience of these themes in the preference responses of participants. [Figure 4].

Figure 4. A comparison of music preference response between individualistic and collectivistic samples in terms of the 5 themes identified (percentage of occurrence in responses).



Simultaneous chi-square tests of independence were performed to examine whether the prevalence of each of the identified themes was statistically proportionate in the preference responses of participants from both individualistic and collectivistic samples. Despite observable disparity in the percentage of occurrence from participant responses, none of the five identified functions yielded statistical significance.

Study 1a & 1b: The Predictive Power of Music Function on Music Preference

The content analysis revealed 4 cross-cultural themes, salient within both the responses of the music function and music preference questionnaires, namely *emotion through music*, *diversion*, *memory recollection* and *identity expression*. To address hypothesis two concerning the predictive power of music function on music preference, multiple chi-square tests were performed to examine the proportion of participants who reported each of 4 the identified themes in both their function and preference responses, versus those that did not.

Memory recollection and *diversion* were not recurrent themes, yielding significant differences in the proportion of those who reported them in both their function *and* preference responses vs. those that did not ($p < .05$). This was the same between both cultural clusters and suggests that neither *memory recollection* nor *diversion*, as functions of music listening, are reliably predictive of musical preference. Similar significant differences were identified ($p < .05$) in the proportion of those who reported both *emotion through music* and *identity expression* in both their function and preference responses, yet only amongst the individualistic sample of participants.

Conversely, in the collectivistic sample, no significant difference was found in the proportion of those participants who reported both *emotion through music* $X^2(1, n = 30) = 3.33, p < .068$ nor *identity expression* $X^2(1, n = 30) = .0001, p = 1.00$, in their function and preference responses vs. those that did not. In this instance, a non-significant result suggests that both *emotion through music* and *identity expression* as functions of music listening are more predictive of music preference in a collectivistic sample of participants.

These results support hypothesis 2 in confirming that functions of music listening pertaining to self / cultural identity are more prominent in predicting musical preference

amongst those of a collectivistic background. In addition, this study also revealed emotion through music to be of similar significance.

Study 2: Stroop Task

Hypothesis 3 posited that musical preference would reveal cross-cultural differences in the cognitive performance of individuals during a simple reaction-time task.

Data obtained from both *within-subjects* (preferred vs. non-preferred tracks) and *between-subjects* (individualistic vs. collectivistic) conditions was tested for normality and determined to be non-significant ($p > 0.05$) thus supporting the null hypothesis of a normal distribution. Consequently, a mixed between-within subjects analysis of variance (ANOVA) was conducted to explore the impact of music preference on the reaction time of participants from the two cultural clusters, during the Stroop task.

Results yielded a significant interaction between culture and the two levels of music preference, Wilks' Lambda = .75, $F(1, 58) = 19.08$, $p < .001$, $\eta^2 = .28$. The reaction time (ms) of those from the collectivistic sample was slower during exposure to their most preferred track ($M=902.26$, $SD=189.53$) than those of from the individualistic sample ($M=779.84$, $SD=152.12$). The opposite was true during exposure to their least preferred track, with those from the collectivistic sample responding faster ($M=793.28$, $SD=178.30$) than those from the individualistic sample ($M=873.73$, $SD=169.87$).

No significant main effect of music preference was found, Wilks' Lambda = .998, $F(1, 58) = .106$, $p > .05$, $\eta^2 = .002$. Similarly, the main effect of culture was revealed to be non-significant, $F(1, 58) = .30$, $p > .05$, $\eta^2 = .005$.

These results support hypothesis 3 in that musical preference revealed cross-cultural differences in the cognitive performance of individuals during a simple reaction-time task.

4. Discussion

This study hypothesised that: (1) No significant cross-cultural differences would exist in terms of music function between individualistic and collectivistic samples, with the social functions of music listening being the most prevalent within both cultural clusters. (2) Music preference would be governed by the functions of music listening, with those functions pertaining to the expression of identity the strongest predictor of musical preference, amongst those of a collectivistic background. (3) The combined influence of music preference and cultural background would reveal significant between-group differences in the reaction times of participants during a Stroop task.

With regards hypothesis 1, a qualitative analysis revealed seven salient functions of music listening existent within the self-report responses of participants: *background music, memory recollection, diversion, emotion through music, self-regulation, identity expression and social bonding*. These themes, along with results from the quantitative analyses on the qualitative data, echo the work of Boer & Fischer (2010) in revealing more similarities than differences in the cross-cultural functions of music listening. As anticipated, the *social bonding* functions of music listening were revealed to be the most prevalent within both cultural clusters, followed closely by the expression of *identity, self-regulation and emotion through music*. The salience of these predominant themes within the responses of participants from both collectivistic and individualistic samples gives substance to the previous literature (Hargreaves & North, 1999; North, Hargreaves & O'Neill, 2000; Tarrant, North & Hargreaves, 2000) which established the prevalence of similar functions of music listening through the utilisation of the 'uses and gratifications model' (Katz et al. 1973). They also emphasise the utilitarian functions of music listening proposed by the juxtaposition of findings from previous studies using culturally distinct samples (North et al., 2004; Rana & North, 2007). The incorporation of the music function questionnaire extracted from the

Boer & Fischer (2010) study enabled a more extensive exploration into the functions of music listening across the three levels of questioning, namely individual, social and cultural. In doing so the findings of this study give validity to the previously uninformed notion of homogeneity in music function raised by Lonsdale & North (2011) following their failure to account for variations between participants at the three levels of questioning through their use of a non-descript sample of university students.

Despite statistical analyses revealing no significant cross-cultural differences in the prevalence of all but one of the identified functions of music listening, namely *background music*, there are notable variations in the percentage of occurrence of responses under each theme. For example, those from the collectivistic sample more readily reported *emotion through music* as a function of music listening which points to, albeit subtle, cultural differences between groups mirroring the findings of Schäfer et al. (2012). Similarly, as hypothesised the *social bonding* function of music listening was more notable in the responses of those from a collectivistic background. Such differences in the wake of thematic similarities suggest the influence of external variables that may influence the response of participants on a group-to-group basis. One such influence may be found in the preceding body of literature in which personality has been proven to influence the way in which individuals use music (Chamoro-Premuzic & Furnham, 2007). With reference to the Big 5 personality index (Goldberg, 1992), those higher in extraversion are often characterised by outgoing, talkative behaviour used to facilitate social interaction with others. Similarly, those from a collectivistic culture place greater emphasis on social integration (Hofstede, 2001). Research has highlighted the cross-cultural robustness of the Big 5 personality traits (Schmitt, Allik, McCrae & Bennet-Martínez, 2007). Thus, it may be that any extroverts present within the collectivistic sample of this study are bolstered by their cultural milieu making them more likely than their individualistic counterparts to report using music as a tool

to facilitate social bonding. The incorporation of personality profiling was out-with the scope of this study but its use as an additional variable in future research may shed some light on this supposition.

Background music was the only function of music listening to reveal significant differences between the two cultural clusters represented in this study, being more routinely reported by those of an individualistic background. This may be attributed to the commonly noted tendency for music to be used by individuals in solitary circumstances as an accompaniment whilst attending to other activities (Behne, 1997); a facet of use more likely amongst those of an individualistic background who place greater importance on personal autonomy and the attainment of individual goals, over group activity. Yet interestingly those reporting *background music* as a function of listening in this instance did so on the basis that it entertained, created a positive atmosphere and facilitated social interactions rather than accompanied individual pursuits.

An alternative explanation for the cross-cultural contrast in the use of *background music* may lie in literature concerning Eysenck's (1967) theory of personality. Just as extroverts and introverts differ in the level of external stimulation required to achieve the optimum level of cortical arousal (Furnham & Allass, 1999) which may dictate the extent to which they rely on music as a means of background accompaniment, so too may those from individualistic and collectivistic cultures, given the significant disparity identified in this instance. Again, such an exploration is out-with the scope of this study but future research may again seek to address this possibility to further elaborate on the reasons behind this discrepancy.

With regards hypothesis 2, a qualitative analysis revealed five salient themes existent within the self-report responses of participants, which underlie the formation of music preference: *memory recollection, identity expression, diversion, emotion through music* and

instrumentation. Quantitative analyses on the qualitative data revealed no statistically significant differences in the percentage of responses between individualistic and collectivistic samples, in terms of the 5 themes identified. However, as with the investigation into the functions of music listening, this is not to say that both samples reported each of the identified preference themes equally. Those of a collectivistic background more regularly reported themes pertaining to *memory recollection*, *diversion*, *emotions through music*, and *identity expression* in their preference responses, compared to their individualistic counterparts.

Behind *instrumentation*, *identity expression* was the second most salient theme prevalent in the preference responses of both samples. This is an unsurprising result when the body of preceding literature is subjected to close scrutiny. Much research has concerned itself with the proposed relationship between personality and music preference (Rentfrow & Gosling, 2003; 2006). Certainly, at face value the absence of participant responses making specific reference to personality in this study would appear to cast doubt on such work in favour of Brown (2012) who found personality to be less intrinsically related to music preference. Yet, it needs to be considered that intertwined with the concept of personality is the notion of personal identity. This gives weight to Rentfrow & Gosling's (2006) finding that personality is one of the key mechanisms driving music preference through the initiation of conversations which illicit the transmission of information pertaining to the personality of one individual to the next. These findings are also aligned with the work of North & Hargreaves (1999) in suggesting that music serves as a social identity 'badge' which transmits information concerning the values, attitudes, and self-view of individuals to those around them.

It could be suggested that variations in the prevalence of identity expression in the responses of participants from both samples may be accounted for on the basis that those

from a collectivistic background are more actively drawn to music that they can affiliate themselves with at a personal, but also social and cultural level. This is not surprising given their emphasis on shared values and group cohesion. Furthermore, it seems logical in light of the research noting a tendency for individuals to favour music performed by others of a shared race (Killian, 1990; McCrary, 1993; Morrison, 1998) or equally representative of their own cultural heritage (Boer et al., 2013; Brittin, 2014). Conversely, individualistic participants may reject cultural affiliation in favour of those musical features they find appealing at an individual level, such as instrumentation which they reported far more frequently in their preference responses.

It seems premature to conclude that such a theory provides a definitive explanation for this apparent discrepancy in the preference responses of participants, especially when considering literature which found no clear-cut preference amongst participants for music of their own culture in both collectivistic and individualistic samples (Darrow et al., 1987). Other studies also allude to the potential influence of confounding variables not picked up by the scope of this study, such as self-esteem (North et al., 2000; Tarrant et al., 2000) and genre (George et al., 2007; Zweigenhaft, 2008). It may be suggested that future studies elaborate upon the work of this report to include such variables moving forward in order to shed more light on the extent of their influence.

Of the five preference themes identified, four mirrored those manifested within the participant responses from the music function questionnaire; *emotion through music*, *diversion*, *memory recollection* and *identity expression*. This pointed to the likelihood that the functions of music listening held influence over and thus to some extent would be predictive of music preference. Quantitative analyses revealed that of the four themes, only *emotion through music* and *identity expression* were predictive of music preference, and more interestingly only in the collectivistic sample. This stands in stark contrast to the findings of

Schäfer et al. (2012) who identified listening function as much more foretelling of music preference amongst those from an individualistic sample. The reason for this may lie in the unequal sampling of participants by Schäfer et al. (2012), using 62 participants from a collectivistic (Indian) sample compared to 323 participants from an individualistic (German) sample. The present study on the other hand, recruited equal sample sizes and incorporated participants from a wide range of countries under each cultural cluster making the current findings much more robust and generalizable. The lack of predictive power over music preference within the functions of music listening amongst those of an individualistic background suggests their music preference is governed to a lesser extent by how well it fulfils their daily listening needs.

The current results reveal that the emotional functions of music listening can be used to predict music preference responses amongst those of a collectivistic background more so than their individualistic counterparts. This may be attributable to the ability of those from collectivistic cultures to more readily recognise emotion in the music of other cultures as well as their own, as established by Balkwill, Thompson & Matsunaga (2004) who noted the sensitivity of Japanese (collectivistic) participants to the emotional cues within Japanese, Western and Hindustani music. However, the same authors have also demonstrated a similar ability amongst UK (individualistic) participants who were able to detect emotion in unfamiliar Hindustani raga excerpts (Balkwill & Thompson, 1999). Thus it is the recommendation of the current study that future research be focussed on the simultaneous juxtaposition of individualistic and collectivistic cultures, to determine whether or not collectivists are more sensitive to emotion in music and so more likely to draw on it as a functional tool in the formation of music preference, as the present set of results would suggest.

As predicted, the use of music as a vehicle for identity expression was the strongest predictor of music preference, amongst those of a collectivistic background. Given its salience amongst collectivistic responses in both music function and music preference questionnaires, it is hardly surprising that one is capable of predicting the other within cultures that place such significance on the promotion of group identity (Tajfel & Turner, 1979) through upholding social unity and collective goals that enhance the integrity of the group (Hofstede, 2001).

With regards hypothesis 3, results revealed significant cross-cultural differences in the reaction-time of individuals during the Stroop task. Interestingly, each cultural group returned polar opposite results, in that those from a collectivistic background responded significantly slower during exposure to their most preferred track than those from an individualist sample, whereas the opposite was true during exposure to their least preferred track. No significant main effect was found when each independent variable (preference and culture) was examined in isolation, indicating that only the combined influence of the two is capable of impacting reaction-times during this simple cognitive task.

Immediately these results dismiss the concept of the 'Mozart effect' (Rauscher, Shaw & Ky, 1993) in demonstrating that the performance of participants from both samples altered between the two preference conditions without exposure to any of Mozart's work. Instead, it seems more likely that the discrepancy between groups can be explained by variations in cognitive arousal, a theory which the preceding body of literature has used to account for the imbalance between performances during similar tasks (Chabris, 1999; Thompson, Schellenberg & Husain, 2001; Hussain, Thompson & Schellenberg, 2002; Schellenberg, Nakata, Hunter & Tamoto, 2007). Conflicting research has emerged concerning the influence of preferred and non-preferred music on cognitive performance. Some have suggested that liked music improves performance (Schellenberg, 2005), whilst others have

demonstrated a tendency for individuals to perform significantly worse during exposure to music that is liked as opposed to that which is disliked, in both Collectivistic (Taipei) and Individualistic (UK) cultures (Huang & Shih, 2011; Perham & Sykora, 2012).

Ravaja & Kallinen (2004) offered one applicable reason as to why this may be the case when they noted that background music may have contrasting effects on the arousal of individuals, dependent on the sensitivity of their behavioural activation system (BAS). The behavioural activation system refers to one of two hypothetical systems in the brain that control behaviour. It manages an individual's disposition to pursue goals, is motivated by reward and aroused by appealing stimuli, said to cue positive emotions such as happiness which aid cognitive performance (Gray, 1970). Thus, in this instance cultural differences in the sensitivity of the BAS could account for the opposing reaction times of participants, further moderated by the contrast in preference responses as outlined in the earlier analyses. The scope of the current study did not allow the measurement of arousal amongst participants, a further suggestion for future research that may add substance to the work of Ravaja & Kallinen, expanding it cross-culturally.

However, it is also worth recalling the findings of study 1a in which those from the individualistic sample reported the use of music in the background to daily life significantly more than those of the collectivistic sample. It is possible that the more regular use of music in the background has led to those from individualistic cultures modifying their listening habits, becoming more accustomed to carrying out other activities whilst accompanied, presumably, by music they like instead of that which they do not, leading to an improved performance under such conditions. Conversely, perhaps those of a collectivistic background who were seemingly less likely to listen to background music were less skilled in the ability to detract their attention away from their preferred track, instead finding it easier to divert their thoughts away from that which they disfavoured, focussing on the Stroop task at hand.

In considering the results of this study a few limitations are worthy of mention beyond those already addressed. With reference to study 1a the results revealed only one statistically significant difference in the functions of music listening between collectivistic and individualistic samples, namely *background music*. Yet, using the same questionnaire Boer & Fischer (2010) reported more statistically meaningful variations between their groups. This may be accounted for on the basis that, whilst also dividing culture along the collectivistic – individualistic dimension, they broke this categorical variable down further into smaller clusters (i.e. Asian and South American vs. Anglophone Western and Non-Anglophone Western). This enabled them to dig deeper below the surface of each group and assess how entrenched the similarities / differences were. Therefore, perhaps this study reveals one of the limitations in generalising culture along this dimension, neglecting inherent individual differences that, when considered, may still throw up between group contrasts that influence results. Secondly, it is important to note that the effect size resulting from the analysis of variance conducted in study 2 is statistically small, suggesting that a similar result may not be as distinguishable were the test re-run with, for example, a larger number of participants in each sample group.

This study has affirmed previous research illustrating that more similarities than differences exist in the functions of music listening between individualistic and collectivistic cultures. These functions of music are more predictive of music preference amongst those of a collectivistic background, particularly in regards to the expression of identity. Finally, both music preference and cultural background possess a combined ability to influence the cognitive performance of individuals, yet the effect of such interference seems to vary at a cross-cultural level. At present this appears to be the first formal attempt made to investigate the influence of music preference and cultural diversity on task performance during musical exposure at a comparative level. Yet, whilst the above conclusions have been drawn, this

investigation has unveiled a plethora of new directions for future research to exploit in an attempt to further investigate the interconnectedness of music function, music preference and cognitive performance, which could be expected to yield significant implications concerning the most effective listening practices.

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