ARE THERE ANY LINKS AMONG PSYCHOPATHOLOGICAL SYMPTOMS, MUSICAL PREFERENCES AND VERBAL WORKING MEMORY IN FEMALE ADULTS?

Vaitsa Giannouli\textsuperscript{1(A,B,C,D,E,F)}, Stanislava Stoyanova\textsuperscript{2(A,B,C,D,E,F)}

\textsuperscript{1}Bulgarian Academy of Sciences, Sofia, Bulgaria
\textsuperscript{2}Department of Psychology, South-West University „Neofit Rilski”, Blagoevgrad, Bulgaria

SUMMARY

The question ‘Do psychopathology dimensions correlate with musical preferences in healthy individuals?’ still remains poorly investigated. Additionally, verbal working memory, psychopathology and music preferences have not been examined together. Participants consisted of ninety-three young women without a previous or current psychiatric diagnosis. All participants were examined with the Forward Digit Span Task, and completed a psychopathology symptom instrument along with a musical preferences question.

Results revealed that the Global Score Index, Somatization, Hostility and Depression correlated in a statistically significant way with musical preferences in female adults. Hostility and Depression predicted classical music preferences. Depression, Obsessive/Compulsive, Somatization and Hostility predicted a pop preference, while Somatization and Psychoticism predicted a rock preference. No significant correlations were found between the above variables and verbal working memory, except for a significant correlation between age and the span of the working memory. Certain psychopathology dimensions do not influence cognition in the form of the verbal working memory in women, but can predict a specific choice of music genres.

Conclusions: Findings suggest that music listening preferences may represent a field of inner experiences that could reveal easy-to-obtain information about the mental health of women who have not an official psychiatric diagnosis, but may be at risk of developing psychological problems due to high self-reported symptoms of psychopathology.

Keywords: working memory, psychopathology, music, adults, women
BACKGROUND

Musical preferences and psychopathology are an important topic that has attracted recently a lot of interest in the scientific community (Bragazzi et al., 2015; Giannouli, 2011; Rentfrow & Gosling, 2003). Understanding the links between psychopathological symptoms and musical behavior is an important yet underdeveloped topic in the field. A research approach is by measuring musical preferences for specific musical excerpts or generally for musical genres. For example, there are several genre-based measures, such as Rentfrow and Gosling’s (2003) Short-Test of Music Preferences (STOMP) and STOMP-R, while the area of music preference research has begun to move beyond genre-based methods, and have shown the value of excerpt and attribute-based approaches (Greenberg et al., 2016; Rentfrow et al., 2011).

Musical preference has been considered as a potential predictor of depression based on the findings of a six-month longitudinal study in adolescents (Miranda & Claes, 2008), which found that listening to soul music could be a predictor of lower depression levels in adolescent girls, thus having a possible positive effect on their mood. In other studies, musical tastes and preferences for rock and roll, punk, heavy metal and gothic music have been linked with peculiar behaviors (such as a worshiping of the musician, vicarious listening/ release) and suicidal tendencies (Stack et al, 1994 and Lacourse et al., 2001), while blues music has been associated with an increased risk of committing suicide (Stack, 2000), even though some scholars have criticized these claimed correlations (Lester & Whipple, 1996).

Although cognition, and more specifically, verbal learning and memory are negatively influenced when severe psychopathological symptoms are present (Manglam & Das, 2013), the hypothesized link between psychopathological expression and music listening preferences has largely ignored the cognitive factor (as only cognitive styles have been investigated so far; Greenberg et al., 2015). In addition to that, listening to specific genres of music (e.g., classical music) is claimed to improve verbal memory encoding (Ferreri et al., 2013; Giannouli, 2017; Giannouli et al., 2018; Giannouli, Kargopoulos & Tsolaki, 2010), but the simultaneous influence of psychopathology and music preferences on cognition has not been investigated in detail so far.

Therefore, the main hypothesis of this study was to test if there is a positive relationship between high scores in psychopathology symptoms, specific music genres linked with negative aspects of emotions (e.g., hostility in rock music), and low scores in memory performance in a sample of Greek female participants, given that emotions and psychopathological symptoms are more prevalent in women compared to men in Greece (Skapinakis et al., 2013).

MATERIAL AND METHODS

Ninety-three young female non-musician participants from Northern Greece ($M_{\text{age}} = 21.89$, $SD_{\text{age}} = 1.97$; $M_{\text{years of education}} = 14.79$, $SD_{\text{years of education}} = .891$) participated in this study. The population was made up solely of young female participants,
because, based on prior research in Greece, for young women a high completion rate of questionnaires is expected (Giannouli, 2013). This study was conducted using a convenience sample of female students recruited at various locations of a university campus. Eligibility for the study involved all participants who (a) were aged 18 years and older, (b) had an adequate educational level (being university students), and (c) had read, understood and signed the consent form.

Using a written structured questionnaire, firstly they were asked about their general demographic characteristics (such as gender, age, self-reported nationality, profession and income), secondly they were asked to answer a single question “Which musical genre do you prefer from among pop, rock and classical music?”, and lastly to fill in the Symptom Checklist-90-R (SCL-90-R) questionnaire in Greek (Donias et al., 1991). The selected method for measuring musical preferences (i.e., with a single multiple choice question instead of a full questionnaire) was based on the need for a clear and brief way of examining music preferences, that would allow for only one straightforward answer and would not be misinterpreted or ignored due to the excessive length of the questionnaires.

SCL-90-R consists of 90 self-report items which assess psychological symptoms and psychological distress (Derogatis, 1983). It was designed to be suitable for use with individuals in the community, as well as individuals with either medical or psychiatric conditions, and in its Greek translation it appears to be both valid and reliable (Donias et al., 1991). The SCL-90-R uses nine primary symptom dimensions and a summary score termed the “Global Severity Index.” On this widely used 90-item self-report instrument, respondents are instructed to indicate for each item “how much that problem has distressed or bothered you during the past seven days including today” on a scale ranging from 0 (not at all) to 4 (extremely) (Derogatis, 1983). The SCL-90-R was chosen in this study as a measure of the different dimensions of psychopathology, because of its high internal consistency. In order to score lengthy tests with missing data, the SCL-90-R guidelines report that corrections for missing data were made by using the actual number of responses (rather than the total possible number of responses) for the denominator in the division of summed scores. For example, if the sum of item values is 120 and the respondent omitted 10 items (out of 90), then the GSI is 120/80 or 1.50. If 15 items were omitted, the GSI is 120/75 or 1.60. Similar adjustments must be made to each of the dimension scores to achieve an adjusted estimate of the SCL-90-R profile.

The participants were also examined immediately after the completion of SCL-90-R with the “Forward Digit Span Task” that examines verbal working memory, which is involved in many everyday tasks. Their mean score for that memory test was \( M = 6.64, \) \( SD = 1.29 \) (min 3 and max 9 recall numbers). Verbal working memory is also considered to be one of the most important elements of intelligence quotient (IQ), thus the digit span task is a common component of many IQ tests, including the widely used Wechsler Adult Intelligence Scale (WAIS) from which the subtest of memory was taken (see Table 1 descriptive statistics).

Statistical computations were made using SPSS 21 and Excel version 2011. Rank correlations were calculated using Spearman’s rho and Kendall’s tau
coefficients, and multiple regression analyses were performed. Values of $p$ less than 0.05 were considered statistically significant.

**RESULTS**

Although the mean scores on all SCL-90-R subscales were low and within the normal range, as expected for a sample of young adults without a diagnosis of psychopathology, rank correlation analysis showed that the Global Score Index, Somatization, Depression and Hostility sub-scales were the main psychopathology dimensions that correlated with musical preferences (see Table 2 coefficients). The second part of Table 2 shows the results of the multiple logistic

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**Table 1. SCL-90-R subscales Means and Standard Deviations (scores with missing values adjustments)**

<table>
<thead>
<tr>
<th>SCL-90-R and subscales</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global Score Index</td>
<td>1.27</td>
<td>.63</td>
</tr>
<tr>
<td>Somatization</td>
<td>1.32</td>
<td>.62</td>
</tr>
<tr>
<td>Obsessive/compulsive</td>
<td>1.35</td>
<td>.63</td>
</tr>
<tr>
<td>Interpersonal sensitivity</td>
<td>1.30</td>
<td>.67</td>
</tr>
<tr>
<td>Depression</td>
<td>1.62</td>
<td>.83</td>
</tr>
<tr>
<td>Anxiety</td>
<td>1.31</td>
<td>.77</td>
</tr>
<tr>
<td>Hostility</td>
<td>1.15</td>
<td>.76</td>
</tr>
<tr>
<td>Phobic anxiety</td>
<td>1.15</td>
<td>.70</td>
</tr>
<tr>
<td>Paranoid ideation</td>
<td>1.16</td>
<td>.70</td>
</tr>
<tr>
<td>Psychoticism</td>
<td>.96</td>
<td>.74</td>
</tr>
</tbody>
</table>

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**Table 2. Coefficients of the rank correlation analysis between SCL-90-R dimensions and musical preferences and regressions regarding the contributions of personality dimensions on classical, pop and rock music preferences**

<table>
<thead>
<tr>
<th></th>
<th>Spearman's rho correlation with music preferences</th>
<th>Kendall's Tau correlation with music preferences</th>
<th>Classical Beta</th>
<th>Pop Beta</th>
<th>Rock Beta</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global Score Index</td>
<td>-0.14*</td>
<td>-0.15*</td>
<td>0.05</td>
<td>-0.03</td>
<td>0.03</td>
</tr>
<tr>
<td>Somatization</td>
<td>-0.15*</td>
<td>-0.14**</td>
<td>-0.07</td>
<td>0.37**</td>
<td>-0.39*</td>
</tr>
<tr>
<td>Obsessive/compulsive</td>
<td>-0.09</td>
<td>-0.07</td>
<td>-0.16</td>
<td>0.39**</td>
<td>-0.28</td>
</tr>
<tr>
<td>Interpersonal sensitivity</td>
<td>-0.06</td>
<td>-0.08</td>
<td>0.02</td>
<td>-0.04</td>
<td>0.02</td>
</tr>
<tr>
<td>Depression</td>
<td>-0.21**</td>
<td>-0.19**</td>
<td>0.29*</td>
<td>-0.47*</td>
<td>0.22</td>
</tr>
<tr>
<td>Anxiety</td>
<td>-0.14</td>
<td>-0.04</td>
<td>0.06</td>
<td>-0.33</td>
<td>0.34</td>
</tr>
<tr>
<td>Hostility</td>
<td>-0.24**</td>
<td>-0.18**</td>
<td>0.46**</td>
<td>-0.32**</td>
<td>-0.02</td>
</tr>
<tr>
<td>Phobic anxiety</td>
<td>-0.005</td>
<td>-0.03</td>
<td>-0.05</td>
<td>0.37*</td>
<td>-0.27</td>
</tr>
<tr>
<td>Paranoid ideation</td>
<td>-0.05</td>
<td>-0.08</td>
<td>-0.02</td>
<td>-0.02</td>
<td>0.03</td>
</tr>
<tr>
<td>Psychoticism</td>
<td>-0.06</td>
<td>-0.02</td>
<td>-0.04</td>
<td>-0.29*</td>
<td>0.37*</td>
</tr>
<tr>
<td>Age</td>
<td>-0.07</td>
<td>-0.08</td>
<td>-0.05</td>
<td>0.16</td>
<td>-0.02</td>
</tr>
</tbody>
</table>

* Statistically significant, $p$-value < 0.05
** Statistically significant, $p$-value < 0.01
regression regarding a classical, pop and rock type of music preference and the dimensions of personality that best predict them. Hostility and Depression predicted a classical music preference, Depression, Obsessive/compulsive, Somatization and Hostility predicted a pop preference, and Somatization and Psychoticism predicted a rock music preference. No statistically significant correlations were found between the above variables and verbal working memory \((p > .05)\), except for a statistically significant correlation between age (measured in years) and the span of the working memory \((r = -.22, p < .001)\).

**DISCUSSION**

Higher scores on the SCL-90-R subscales indicate more intense psychopathologic symptoms. Although, the above results reveal that there are a number of statistically significant correlations between psychopathological and musical preferences in healthy (without a current or past psychiatric or other health problem diagnosis) young women, no correlational links were found for verbal working memory performance, psychopathological symptomatology and musical preferences.

An important limitation of this study is the homogeneous sample (all young women), and the fact that all participants were SCL-90-R low scorers, something that reduces the generalizability of the results. In addition, the conceptual and theoretical assumption behind the question “Which musical genre do you prefer from among pop, rock and classical music?” is that people have a preference for only one genre. The question does not take into account that musical preferences are multidimensional, a person may like multiple genres (e.g., both classical and rock music), and that people may have musical preferences beyond the three genres listed in the question.

Future studies should further investigate other cognitive functions in relation to music preferences and psychopathology in larger samples and in the two biological sexes, while samples with high psychopathological symptoms should be also included (Pachalska et al. 2015; 2017). Nevertheless, psychiatrists, psychotherapists and music therapists should be aware of the subjective valence of music and personality traits of individuals, as music preferences may serve as an overlooked source of information regarding psychopathological dimensions (Giannouli & Syrmos, 2016).

**CONCLUSIONS**

Findings suggest that music listening preferences may represent a field of inner experiences that could reveal easy-to-obtain information about the mental health of women who have not an official psychiatric diagnosis, but may be at risk of developing psychological problems due to high self-reported symptoms of psychopathology.
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**Corresponding author:**
Vaitsa Giannouli,
Bulgarian Academy of Sciences, Sofia, Bulgaria.
e-mail: giannouliv@hotmail.com