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2 Running head: Motivational Music

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9 **The characteristics and effects of motivational music in exercise**  
10 **settings: The possible influence of gender, age, frequency of**  
11 **attendance, and time of attendance**

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14 David-Lee Priest, Costas I. Karageorghis & N.C. Craig Sharp

15 Brunel University, UK

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19 David-Lee Priest, Costas Karageorghis, and Craig Sharp are with the Department of  
20 Sport Sciences, Brunel University, West London.

21 Correspondence concerning this article should be addressed to Dr. Costas

22 Karageorghis, Department of Sport Sciences, Brunel University, Uxbridge UB8 3PH, U.K.

23 Tel. +44 (0)1895-274 000 x5796

24 E-mail: spstceck@brunel.ac.uk

25

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27

## 1 **Abstract**

2 *Background.* The purpose of the present study was to investigate the characteristics and  
3 effects of motivational music in British gymnasia. The secondary purpose was to determine  
4 whether the characteristics and effects of motivational music were invariant in relation to  
5 gender, age, frequency of gymnasium attendance, and the time of day at which exercise  
6 participants attended gymnasia. *Methods.* Participants (n=532) from 29 David-Lloyd exercise  
7 facilities across Britain responded to a questionnaire that was designed to assess music  
8 preferences during exercise via two open-ended questions and one scaled-response item.  
9 *Results.* A content analysis of the questionnaire data yielded 45 analytic properties that were  
10 grouped into the following categories: Specific music factors, general music factors, music  
11 programme factors, delivery factors, televisual factors, personal factors, contextual factors,  
12 and psychophysical response factors. The relative incidence of these analytic properties across  
13 gender groups (male/female), age groups (16-26 yrs., 27-34 yrs., 35-45 yrs., 46+ yrs.),  
14 frequency of attendance groups (low, medium, high), and time of attendance groups (morning,  
15 afternoon, evening) was tested by use of  $\chi^2$  analyses. Of the personal variables tested, age  
16 exerted the greatest influence on musical preference during exercise; older participants  
17 expressed a preference for quieter, slower, and generally less overtly stimulative music.  
18 *Conclusions:* Music programmes that are prescribed to accompany exercise should be varied  
19 in terms of musical idiom and date of release. Such programmes will account for the  
20 preferences of different groups of exercise participants that attend gymnasia at different times  
21 of the day. Further, the music chosen should be characterised by a strong rhythmical  
22 component.  
23 Key terms: preference; rhythm; tempo; volume

24

## 1 Introduction

2 The scope of music psychology has broadened in the past decade to include research  
3 into the effects of music in a wide variety of social contexts.<sup>1</sup> Leisure facilities provide one  
4 such social context and the potential effects of music on the performance and experience of  
5 exercise may influence patterns of exercise adoption and adherence.<sup>2-3</sup> Research into the  
6 psychophysical effects of music in a physical activity context has been characterised by  
7 methodological weaknesses and the lack of study rationales firmly grounded in theory.<sup>4</sup>  
8 Consequently, research findings have been largely equivocal.

9 Four factors are believed to contribute to the motivational qualities of a piece of music:  
10 rhythm response, musicality, cultural impact, and association.<sup>2</sup> Rhythm response relates to  
11 musical rhythm whereas musicality is the response to pitch-related elements such as harmony  
12 and melody. Cultural impact refers to the pervasiveness of the music within society, and  
13 association to the extra-musical associations that a piece of music may carry. The factors  
14 exhibit a hierarchical structure, *i.e.*, rhythm response is the most important, and association  
15 the least important in determining the overall motivational qualities of a musical piece. The  
16 factors were divided into 2 groups: music factors and personal factors. The former denotes  
17 structural elements of the music (rhythm and musicality) whereas the latter comprises aspects  
18 of musical perception, namely cultural impact and association.

19 The term *rhythm response*<sup>2</sup> refers to the innate predisposition of the organism to  
20 synchronise physical movement with the rhythmical elements of music. “The regular and  
21 insistent rhythm of popular music stimulates the [cerebral] ergotropic centre, thus increasing  
22 the work capability of the individual”.<sup>5</sup> Motivational music has been shown to increase  
23 endurance in a cycle ergometer task,<sup>6</sup> reduce perceptions of exertion and improve affect in a  
24 treadmill task,<sup>7</sup> and promote the experience of flow state.<sup>8,9</sup> In addition to possessing

1 motivational qualities, music that accompanies exercise should be functional, *i.e.*, well  
2 coordinated with the task.<sup>10</sup>

3 Research into the psychophysical effects of music in exercise and sport contexts has  
4 been dominated by laboratory-based work.<sup>11</sup> Hence, the rationale underlying the present study  
5 was to strengthen the theoretical base for future research using qualitative methods deployed  
6 in a naturalistic setting. Further, the impact of personal variables such as gender and age on  
7 music preference in exercise settings has not been comprehensively investigated. Moreover,  
8 the methods used in the present study yielded novel findings that may prime future  
9 experimental investigation.

10 There is a precedent for qualitative investigation of the effects of music in sport and  
11 exercise contexts. Gfeller utilised a questionnaire to assess the music preferences of young  
12 adults participating in exercise-to-music classes.<sup>12</sup> The music characteristics that the  
13 participants identified as the most salient include musical style (*e.g.*, rap, jazz, techno, etc.),  
14 rhythm, and extra-musical associations. General music preferences become less contingent on  
15 prominent rhythm as people age; however, this does not apply in the context of exercise.<sup>12</sup>  
16 The preference for different musical idioms is associated with age. For example, classical  
17 music preference has been reported to peak in the 55-64 year old group.<sup>13</sup> Further, certain  
18 music forms play a key symbolic function in establishing the identity of young people within  
19 society.<sup>14</sup>

20 Gfeller found that the music preferences of males and females in the context of exercise  
21 were highly correlated.<sup>12</sup> However, experimental and psychometric researchers have reported  
22 gender differences in music preference.<sup>2,15,16</sup> Female exercise participants reported a greater  
23 response than male exercise participants to the rhythmical elements of music.<sup>2</sup> Conversely,  
24 males exhibited a greater preference than females for music with an exaggerated bass.<sup>15</sup>

1 Moreover, females selected lower volume levels than males when listening to 4 different types  
2 of music.<sup>16</sup> Hence, it is possible that males are more responsive to the stimulative qualities of  
3 music.

4 It is probable that Gfeller's findings were influenced by the structure of the  
5 questionnaire that she used; this may have prompted the responses of the participants.<sup>12</sup> For  
6 example, questions such as, "do you think the music takes your mind off any part of the  
7 physical activity?" (p. 33) resulted in a 91% positive response (*i.e.*, yes it does). Similarly high  
8 percentages were found in response to the other questions. Six college athletes were  
9 interviewed to investigate the use of music as part of a pre-competition routine.<sup>17</sup> It was  
10 concluded that the phenomenon of musical response within sport represents a complex  
11 reaction that includes musical and personal variables. In addition, the relationship a person has  
12 to music in the sport setting was reported to be highly individual and possibly unique.

13 The primary purpose of the present study was to investigate the effects and  
14 characteristics of motivational music in exercise settings using a qualitative mode of inquiry.  
15 The secondary purpose was to investigate the association of personal variables with music  
16 preferences in gymnasia. A questionnaire was designed to assess the music preferences of a  
17 large sample of members from 29 health clubs. The data were content-analysed to assess  
18 preference themes. Subsequently, non-parametric statistical analyses were used to test the  
19 association of age, gender, frequency of gymnasium attendance, and time of attendance (*i.e.*,  
20 morning, evening) with the frequency counts that emerged from the content analysis of music  
21 preference in the exercise setting.

22

## 1 **Materials and Methods**

### 2 *Participants*

3       The sample comprised 532 volunteers who were members of 29 David-Lloyd Leisure  
4 health clubs in England and Scotland. There were 307 females (57.9%) and 223 males  
5 (42.1%); 2 of the participants did not indicate their gender. The age of the participants ranged  
6 from 12 to 79 yrs ( $M = 34.9$ ,  $SD = 12.3$  yrs); 7 of the participants did not report their age. The  
7 participants all engaged in gymnasium-based exercise programmes, which comprised of a  
8 combination of cardio-vascular and resistance training.

### 9 *Instrumentation*

10       A questionnaire was prepared by the authors in consultation with senior managers of  
11 David-Lloyd Leisure and sport and exercise psychology researchers at Brunel University.  
12 Participants were asked to report which David-Lloyd Leisure health club they attended and  
13 their age and gender. In addition, the participants reported their frequency and time of  
14 attendance to the facility. These questions were open-ended with no response set provided.  
15 With reference to music, participants were asked to assess the importance of music to them  
16 while they exercised in the gymnasium. This response was rendered on a 7-point Likert-type  
17 scale anchored by 1 (not at all important) and 7 (extremely important). Two open-ended  
18 questions were used to assess the participants' music preferences in the gymnasium setting.  
19 First, participants were prompted to comment on the current music programme being  
20 delivered at their facility. Second, participants were asked to suggest how the selection of  
21 music could be improved. The questionnaire was purposefully brief so as to render it  
22 unobtrusive during administration.

23

## 1 *Procedures*

2           Confederates of the researchers, who were recruited from among health club staff and  
3 thoroughly briefed, administered the questionnaire. Participants were approached while they  
4 were in the gymnasium area. However, the research confederates were under instructions to  
5 approach the participants at a time when the completion of the questionnaire would not  
6 intrude upon their exercise routine. Having obtained informed consent, the research  
7 confederates explained to participants that the questionnaire would be used to accumulate  
8 feedback, which would be used in formulating a new music policy for the health club. The  
9 participants were given an opportunity to question the research confederates. In order to  
10 preserve the participants' anonymity, their names were not recorded. Subsequently, the  
11 research confederate withdrew and the participants completed the questionnaire at their  
12 convenience before returning it to the gymnasium reception desk.

## 13 *Data Analyses*

### 14 Content Analysis

15           First, the data from the questionnaires were entered onto a Microsoft Excel 2000  
16 spreadsheet to facilitate analysis. The responses to the open-ended questions were broken  
17 down into meaning units, *i.e.*, bracketed statements that are indivisible and contain sufficient  
18 information to be interpreted on their own.<sup>18</sup> Following this, the meaning units were grouped  
19 into properties according to common features. For example, meaning units referring to the  
20 rhythmical elements of music were grouped into a 'rhythm' property. Finally, properties were  
21 further grouped to form categories at a higher level of abstraction. For example, the 'rhythm'  
22 and 'melody' properties constituted part of the 'specific music factors' category. The  
23 framework for the analysis of the qualitative data was drawn from a review of relevant  
24 texts.<sup>19,20</sup>

1 In order to further the trustworthiness of the qualitative data analysis<sup>21</sup> a reliability  
2 check, also known as an external audit,<sup>22</sup> was undertaken. The 2<sup>nd</sup> author analysed a  
3 subsection of the data containing 300 meaning units (approximately one quarter of the data).  
4 The 2<sup>nd</sup> author classified 94.62% of the property codes in agreement with the analysis  
5 conducted by the 1<sup>st</sup> author. The discrepant codes were then highlighted and discussed  
6 individually in order to resolve any residual incongruence between the coding of the 2 authors.  
7 At this point, it was deemed unnecessary to re-code the data as the 1<sup>st</sup> author had justified his  
8 decisions in undertaking the original analysis.

## 9 STATISTICAL ANALYSES

10 The association of personal variables with the frequencies of the properties that resulted  
11 from the content analysis was examined using a series of  $\chi^2$  tests. The gender variable had 2  
12 levels (male and female). The age variable was split into 4 levels (16-26 yrs, 27-34 yrs, 35-45  
13 yrs, & over 45 yrs). The frequency of attendance variable was split into 3 levels (1-2 times per  
14 week, 2-4 times per week, > 4 times per week).

15  $\chi^2$  tests were only undertaken when the total frequencies numbered at least 20.<sup>23</sup>  $\chi^2$   
16 analyses were also performed in order to ascertain whether the frequency of attendance and  
17 time of day variables were associated with age or gender. Thus, when the pattern of results  
18 suggested that the influence of either time or frequency of attendance was attributable to age  
19 or gender, double classification  $\chi^2$  tests were carried out. To ensure adequate cases in each cell  
20 for the double classification tests<sup>23</sup> the age variable was condensed into young (16-34 yrs) and  
21 old (35+ yrs) participants. Although the data resulting from the participants' ratings of the  
22 perceived importance of music during exercise were at interval level, a parametric analysis  
23 was not possible given that the data exhibited a leptokurtic distribution (kurt. = 2.24). Further,  
24 the variances between the different levels of each independent variable were unequal.<sup>23</sup>  
25 Hence, further  $\chi^2$  analyses were undertaken to investigate the extent to which the independent



1 variables were associated with the perceived importance of music during exercise. The  
2 perceived importance variable was split into levels according to the seven points on the  
3 Likert-type scale used to assess this response. However, the first three points on the scale (1 -  
4 3) were collapsed into one level owing to the low number of responses.

## 5 **Results**

### 6 *Content Analysis*

7

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8 Insert Table I about here

9

10 The results of the content analysis are presented in Table I. The specific music factors relate to  
11 structural components of music such as rhythm, which was referred to by 7.89% of the  
12 sample. A clear preference was demonstrated for up-beat music; for example, a 26-year-old  
13 female exerciser stated that, “music tempo has a significant impact on how hard I push myself.  
14 Up-beat music is best”. There was a general trend for the preference for louder volume  
15 (9.77%) as opposed to quieter volume (4.70%). A 23-year-old female explained that, “the  
16 louder it is the more motivated you are to do more.” With reference to musical idioms, various  
17 types of dance music were touted as especially motivational forms of music (9.77%).

18 Subjective assessments of the overall character of music were resolved around two  
19 poles: Aversion to music that was considered to be bland or boring (3.76%) and preference for  
20 music that was considered to be ‘lively’ or ‘energetic’ (2.82%). A 20-year-old female wrote,  
21 “I find it improves my motivation to carry on with my workout when the music is lively.” In  
22 terms of the overall music programme, by far the most important concern among the  
23 participants was variety (27.44%). In concordance with the marked preference for variety was  
24 an aversion to repetitive music selections (18.80%). It was suggested that variety could be

1 manifested by either utilising music of different eras or different styles. Further, many of the  
2 negative references to the repetition of music suggested that gymnasia provide literally the  
3 same musical selections over a long period of time.

4 In terms of the delivery of music programmes, 14 individuals proposed the provision of  
5 choice for members of gymnasium facilities. More specifically, positive judgments were  
6 passed regarding Cardio-Theatre™, a system that enables users to choose from a variety of  
7 channels that are delivered through personal headphone units. Thirty-five individuals felt that  
8 music television was motivational: “I would rather have MTV than just music as you have  
9 something to watch and keep you interested”.

10 Concerning the personal variable of age, it was felt that the currently available music  
11 selection catered for young gymnasium users but not their older counterparts. Contextual  
12 factors also influenced the type of music that was preferred. The participants stated that they  
13 preferred different music depending on which activity they were partaking of (4.14%). The  
14 motivational effects of music were considered particularly relevant during cardio-vascular as  
15 opposed to resistance exercise. This trend was illustrated by a 40-year-old male “a good  
16 rhythm helps to maintain pace on cardio equipment”. Indeed, references were made on 23  
17 occasions to the conscious synchronisation of movement with music.

18 Twenty-six of the participants (4.89%) wrote that music should be altered in accordance  
19 with the time of day. The reason for this proposed alteration was to account for the different  
20 clientele that were thought to attend the gymnasium at different times. The general trend of  
21 responses suggested that stimulating music (described variously as dance music, loud music,  
22 fast music, or rhythmical music) should be played during the evening, busy, or peak times and  
23 that music delivered during the daytime should comprise a less stimulative (but not sedative)  
24 selection.

25



1 This difference was particularly marked between the oldest (46 yrs +) and youngest (17-26  
2 yrs) age groups.

3 The frequency of attendance was not related to the rated importance of music ( $\chi^2 =$   
4 12.52,  $p > 0.05$ ). However, a non-significant trend revealed increased ratings of importance  
5 for those attending the gymnasium facility more than twice per week. Because more males  
6 than females attended the gymnasias at a high level of frequency (5 times per week or more), a  
7 separate analysis of the association of frequency of attendance and rated importance of music  
8 was undertaken for each gender. The frequency of attendance did not appear to affect the rated  
9 importance of music during exercise for females ( $\chi^2 = 4.63$ ,  $p > 0.05$ ). However, males who  
10 attended frequently rated the importance of the music more highly than males who attended  
11 infrequently ( $\chi^2 = 22.44$ ,  $p < 0.05$ ). The later in the day participants exercised, the more highly  
12 they rated the importance of music during their exercise ( $\chi^2 = 25.20$ ,  $p < 0.05$ ). However, this  
13 relationship was explained by the fact that younger participants attended the facility more in  
14 the evenings than older participants.

15 \_\_\_\_\_  
16 Insert Table III about here  
17 \_\_\_\_\_

18 The association of gender and age with the incidence of properties from the content  
19 analysis is presented in Table III. Gender was not associated with preference for current music  
20 ( $\chi^2 = 3.15$ ,  $p > 0.05$ ), preference for non-current music ( $\chi^2 = 0.83$ ,  $p > 0.05$ ), preference for  
21 dance music ( $\chi^2 = 0.77$ ,  $p > 0.05$ ), preference for rhythm ( $\chi^2 = 1.31$ ,  $p > 0.05$ ), preference for  
22 faster music ( $\chi^2 = 1.69$ ,  $p > 0.05$ ), preference for a varied musical selection ( $\chi^2 = 0.07$ ,  $p >$   
23 0.05), preference for quieter music, ( $\chi^2 = 0.65$ ,  $p > 0.05$ ), or preference for louder music ( $\chi^2 =$   
24 1.19,  $p > 0.05$ ). However, females relayed a greater propensity to feel motivated in response to

1 music ( $\chi^2 = 4.77, p < 0.05$ ).

2 Preferences for current music decreased with age ( $\chi^2 = 20.67, p < 0.05$ ), as did  
 3 preferences for dance music ( $\chi^2 = 23.74, p < 0.05$ ). Preferences for non-current music were  
 4 greater amongst older participants than younger participants and peaked markedly in the 35-  
 5 45-year-old age group ( $\chi^2 = 9.04, p < 0.05$ ). Additionally, older participants exhibited a  
 6 marked preference for quieter music ( $\chi^2 = 50.16, p < 0.05$ ), whereas younger participants  
 7 exhibit a marked preference for louder music ( $\chi^2 = 11.60, p < 0.05$ ). Younger participants  
 8 preferred upbeat music ( $\chi^2 = 11.31, p < 0.05$ ). However, a preference for the rhythmical  
 9 elements of music was expressed regardless of age ( $\chi^2 = 0.99, p > 0.05$ ). Younger participants  
 10 reported a higher incidence of feeling motivated by music ( $\chi^2 = 8.80, p < 0.05$ ). The  
 11 preference for a varied music selection was reported irrespective of age ( $\chi^2 = 2.75, p > 0.05$ ).

12 Frequent attendees were more likely to report an aversion to repetitive music selections  
 13 ( $\chi^2 = 7.88, p < 0.05$ ) and a preference for upbeat music ( $\chi^2 = 15.31, p < 0.05$ ). However,  
 14 frequency of attendance was not significantly associated with the incidence of any other  
 15 properties. When both genders and age groups were tested separately, the time of attendance  
 16 was not associated with preference for dance music; this result held for males ( $\chi^2 = 1.70, p >$   
 17  $0.05$ ), females ( $\chi^2 = 0.73, p > 0.05$ ), older participants ( $\chi^2 = 1.29, p > .05$ ), and younger  
 18 participants ( $\chi^2 = 3.059, p > 0.05$ ). The motivation response to music was reported to increase  
 19 throughout the course of the day ( $\chi^2 = 8.62, p < 0.05$ ). However, this result appeared to be  
 20 moderated by age; neither younger ( $\chi^2 = 1.51, p > 0.05$ ) nor older ( $\chi^2 = 0.71, p > 0.05$ )  
 21 participants reported greater motivation in the evening than expected.

22 Those who attended the gymnasium in the evening reported a greater preference for the  
 23 rhythmical elements of music ( $\chi^2 = 22.47, p < 0.05$ ). Further, those who attended the  
 24 gymnasium in the afternoon were particularly averse to the repetition of the music programme

1 ( $\chi^2 = 10.65, p < 0.05$ ). The time of attendance bore no significant relationship with the  
2 preference for upbeat music ( $\chi^2 = 2.45, p > 0.05$ ), preference for a varied music selection ( $\chi^2$   
3 = 1.23,  $p > 0.05$ ), preference for louder volume ( $\chi^2 = 0.51, p > 0.05$ ), or preference for quieter  
4 volume ( $\chi^2 = 1.65, p > 0.05$ ).

## 5 **Discussion**

6       The primary purpose of the present study was to investigate the effects and  
7 characteristics of motivational music in exercise settings. The secondary purpose was to  
8 investigate the possible influence of personal variables on music preferences in such settings.  
9 The mean rating for the importance of music during exercise was 5.84 on a 7-point scale.  
10 Hence, it appears that the ubiquitous presence of music in exercise facilities is, to some extent,  
11 justified. However, it is plausible that this ubiquitous presence of music has conditioned  
12 individuals to regard the music as an important characteristic of the exercise environment.

### 13 *Motivational characteristics of music*

14       The importance that the participants attributed to the rhythmical elements of music  
15 underlines the theoretical importance of rhythm response.<sup>2</sup> However, the present findings  
16 indicate that the rhythmical elements of music elicit an arousal response in addition to a  
17 synchronisation effect. The participants did not refer to the pitch-related musical qualities of  
18 harmony and melody that may also contribute to the motivational qualities of music.<sup>2</sup> The  
19 absence of any reference to such musical factors may have been due to the fact that the  
20 response format did not encourage the participants to provide verbose or subtle descriptions of  
21 their preferences. Further, the sample may have consisted of participants who were naïve to  
22 musical terminology.

23       The present findings indicate that the motivational qualities of music are heightened  
24 when the music is delivered at a high volume. The definition of motivational music draws its

1 lineage from the terms used to describe stimulative music.<sup>2</sup> Hence, if increased volume results  
2 in increased stimulation, then this, in turn, should enhance motivation. The issue of volume is  
3 key to the provision of music within gymnasia; practitioners must achieve a balance between  
4 allowing the music to become obscured by environmental noise<sup>10</sup> and causing short-term  
5 hearing loss.<sup>24</sup>

6 Idiomatic descriptions of music provide an excellent framework for the selection of a  
7 balanced programmes of music that are grounded in the symbolic categories, which lay people  
8 (non-musicians / non-musically trained) use to categorise music. However, musical pieces  
9 should be selected on an individual basis rather than purely because they are thought to be  
10 representative of a desirable idiom.<sup>25</sup> By far the strongest finding in terms of frequency of  
11 response was the preference for a varied music programme. This result suggests that people  
12 are sensitive to the effects of a musical programme as a whole. An ecumenical approach  
13 should be taken to the selection of music in physical activity environments; one that has, as  
14 yet, not been countenanced within the literature. For example, five of the participants made  
15 the suggestion that music should be selected according to thematic principles, *e.g.*, a “disco  
16 night”.

### 17 *Contextual factors*

18 The finding that gymnasium members advocated the provision of musical choice can be  
19 interpreted in the context of self-determination theory<sup>26, 27</sup>. Specifically, the provision of  
20 choice may enhance the sense of autonomy,<sup>28</sup> which is one of the needs underlying intrinsic  
21 motivation. Music appears to serve a particular function in relation to specific activities.  
22 Typically, the participants reported that the rhythmical elements of music facilitated their  
23 performance on cardio-vascular ergometers such as the treadmill or cycle; exercise  
24 participants may require additional motivation to endure the unpleasant physical sensations  
25 they associate with certain pieces of equipment. At equivalent exercise intensity, ratings of

1 perceived exertion were higher for certain pieces of cardio-vascular equipment than others.<sup>29</sup>

## 2 *Gender differences*

3 Females rated the importance of music more highly than the males, so it appears that  
4 music is a more integral aspect of their workout experience. This result permits various  
5 interpretations. For instance, females may require a greater degree of extrinsic motivation to  
6 exercise, or they may be more responsive than males to music in the exercise environment.  
7 Music may function in a 'comfort' role for women in the same way that it does in a working  
8 environment.<sup>30</sup> However, females reported a far higher incidence of being motivated by music  
9 than males, thus implying that music may exert a more potent effect on female exercise  
10 participants.

11 The higher incidence of motivation in response to music may be due to gender  
12 differences in the affective response to music. Although there were an insufficient number of  
13 responses to test the association of gender with affective response, the prevailing trend  
14 indicated that females were more likely to experience enhanced (more positive) affective  
15 states as a result of listening to music during exercise. It has been suggested that females are  
16 more aware of and affected by their mood states.<sup>31</sup> Gender did not affect preference for music  
17 volume, a result that may be related to the exercise context, as other researchers have reported  
18 a general sensitivity of females to louder volume music<sup>32</sup> or a male preference for loud  
19 volumes.<sup>16</sup> In contrast to the previous findings,<sup>2</sup> gender was not associated with preference for  
20 the rhythmical component of music.

## 21 *Age Differences*

22 The results of the present study indicate that preferences for musical idioms during  
23 exercise display a similar pattern to those reported in the general music preference literature.  
24 Fourteen of those 17 participants who reported a preference for classical music fell into the 46



1 yrs old and over group; a result which is analogous to findings in the mainstream music  
2 preference literature.<sup>13</sup> Further, the youngest age group (16-26 yrs) preferred current music  
3 and dance music predominantly, whereas those in the 36-45 year-old group expressed the  
4 greatest preference for non-current music. The introduction of unconventional musical idioms  
5 such as classical music into the gymnasium environment would be problematic due to  
6 acoustic factors. There is a possibility that the dynamic range and diversity of timbre in  
7 classical recordings would be obscured by the gymnasium noise pollution.

8       The present findings concur with those of Gfeller<sup>12</sup> in that preference for the rhythmical  
9 elements of music endured with age. Older participants displayed a clear preference for  
10 quieter and slower music. The preference of younger participants for music with a fast tempo  
11 may relate to the intensity of the exercise that they undertake; those who exercise at higher  
12 intensities may prefer music of a faster tempo.<sup>33,11</sup> The number of participants reporting a  
13 motivation response to the music receded with age. This may have been because the music  
14 provided in the chosen gymnasias was selected primarily for younger exercise participants.  
15 Hence, music that is selected specifically for older age groups may promote increased  
16 motivation. An alternative explanation is that older individuals do not seek to be motivated by  
17 the music to the same degree as younger individuals. In addition to reporting that they were  
18 less likely than younger participants to be motivated by music, the older participants felt that  
19 music was less important during exercise.

#### 20 *Time and frequency of attendance*

21       The findings relating to frequency and time of attendance also have implications for the  
22 proprietors of exercise facilities. Higher frequency attendees reported a greater preference for  
23 music with faster tempi. It is probable that those who attend exercise facilities on a frequent  
24 basis exercise at higher intensity levels and thus prefer music with a fast tempo that matches  
25 their exercise heart rate.<sup>33, 11</sup> There were some instances in which the time of attendance was

1 related to responses independently of age or gender. For example, the rhythmical elements of  
2 music were preferred by those using gymnasia in the evening (as opposed to the morning or  
3 the afternoon). Such diurnal differences may reflect larger changes in fatigue and energy  
4 levels during the course of the day.<sup>34, 35</sup>

## 5 **Conclusions**

6 Health club operators may have underestimated the importance of music to those  
7 exercising in gymnasia. Indeed, the tenor of the participants' responses invites the conclusion  
8 that present music content in gymnasia is deficient in numerous aspects and requires more  
9 careful selection. The results of the present study are characterised by opposing preferences,  
10 underlining the problems facing those who select music in gymnasia. In addressing these  
11 problems the authors recommend 2 solutions. First, the music programme should demonstrate  
12 great variety. This aim can most easily be achieved by systematically varying the age (date of  
13 release) and musical idiom of the selections to cater for different tastes. However, the volume,  
14 tempo, and rhythmical components of the music should not be varied to the same extent as  
15 they influence the perceived motivational qualities of musical pieces in a more exacting way.  
16 Second, an effort should be made to carefully account for the preferences of the exercise  
17 participants that attend facilities at different times of the day. The most important personal  
18 variable in any such consideration should be age. For example, slower, quieter, musical  
19 selections that coincide with the idiomatic preferences of older gymnasium attendees may be  
20 appropriate during the morning.

21 The gender of exercise participants may also have a bearing on their music preferences  
22 during exercise. Females appear to find music more important during exercise in addition to  
23 exhibiting a heightened response to its motivational qualities. However, the question of  
24 whether females are more responsive to the rhythmical elements of music appears to warrant

1 further investigation. The present findings suggest that volume is an important feature of the  
2 musical stimulus and a tentative conclusion would be that a louder volume is likely to enhance  
3 motivation to exercise. Further, the nature of tasks being undertaken should receive careful  
4 attention when music is prescribed for exercise; the motivational effects of music appear to be  
5 particularly evident in the case of cardio-vascular exercise.

6 Future research utilising idiographic and qualitative paradigms may better assuage the  
7 semantic difficulties, which impede researchers from accounting for the effects of musical  
8 variables that are not understood by lay individuals. Several avenues for future research follow  
9 from the present findings. Researchers may wish to examine whether the rhythmical  
10 components of music lead to increased arousal, using an experimental manipulation of the  
11 rhythmic properties of a musical selection. The motivational effects of music volume have  
12 received scant attention in the exercise-related music literature. The possible effects of volume  
13 level on the motivational responses to music during exercise may also be tested  
14 experimentally. However, any such design should include age and possibly gender as  
15 independent variables. In addition, the effects of motivational music when used to accompany  
16 different exercise modalities (*i.e.*, resistance training, cardio-vascular work) are ripe for  
17 investigation.

18 Externally valid and quasi-experimental designs may be used by researchers wishing to  
19 evaluate the impact of systematic variation on the motivational effects of a music programme  
20 as a whole. Finally, one of the most promising directions for new research in this field is the  
21 motivational effects of music-television; a stimulus that has received very limited attention  
22 from researchers. The research literature should reflect the prevalence of music television in  
23 gymnasias so that the efficacy of this medium may be assessed. The present study has  
24 highlighted the importance of personal variables in determining the motivational response to  
25 music, possibly providing a rationale for including personal variables in future conceptual

1 frameworks. The evidence presented herein supports the conclusion that the current state of  
2 music provision in gymnasia requires considerable attention.

3

## 1 **References**

- 2 1 Hargreaves DJ, North AC. The functions of music in everyday life: Redefining the social  
3 in music psychology. *Psychol Music* 1999; 7:84-95.
- 4 2 Karageorghis CI, Terry PC, Lane AM. Development and initial validation of an instrument  
5 to assess the motivational qualities of music in exercise and sport: The Brunel Music  
6 Rating Inventory. *J Sports Sci* 1999; 17:713-24.
- 7 3 Schwartz SE, Fernhall B, Plowman SA. Effects of music on exercise performance. *J*  
8 *Cardiopulm Rehab* 1990; 10:312-16.
- 9 4 Karageorghis CI, Terry PC. The psychophysical effects of music in sport and exercise: A  
10 review. *J Sport Behav* 1997; 20:54-68.
- 11 5 Travers PR. Appendix D: Psychological effects of music when used as ergogenic aid.  
12 *Fitness Training* [unpublished manuscript]. Exeter: Saint Luke's College, 1996:48.
- 13 6 Karageorghis CI, Jones J. Effects of synchronous and asynchronous music in cycle  
14 ergometry [Abstract]. *J Sports Sci* 2000; 18:16.
- 15 7 Karageorghis CI, Terry PC. Criterion validity of the Brunel Music Rating Inventory  
16 [Abstract]. *J Sports Sci* 1999; 17:61.
- 17 8 Karageorghis CI, Deeth IP. Effects of motivational and oudeterous asynchronous music on  
18 perceptions of flow [Abstract]. *J Sports Sci* 2002; 20:66-7.
- 19 9 Atkinson G, Wilson D, Eubank, M. Effects of music on pacing strategy during a cycling  
20 time trial. *Percep Mot Skills* In press.
- 21 10 Karageorghis CI, Terry PC. A conceptual model for the prediction of psychophysical  
22 responses to asynchronous music during submaximal exercise. In: *Proceedings of the*  
23 *British Association of Sport Sciences Conference*. Belfast, Northern Ireland, 1995: 90-1.

- 1 11 Karageorghis CI. Affective and psychophysical responses to asynchronous music during  
2 submaximal treadmill running. Doctoral thesis, Brunel University 1998. DSC Shelfmark:  
3 DX198613.
- 4 12 Gfeller K. Musical components and styles preferred by young adults for aerobic fitness  
5 activities. *J Music Therapy* 1988; 25:28-43.
- 6 13 Robinson JP, Fink EL. Beyond mass culture and class culture: Subcultural differences in  
7 the structure of music preferences. In: Ball-Rokeach SJ, Cantor MG, editors. *Media,*  
8 *audience, and social structure.* Newbury Park, California: Sage, 1986:226-39.
- 9 14 Russell PA. Musical tastes and society. In: Hargreaves DJ, North, AC, editors. *The social*  
10 *psychology of music.* Oxford: Oxford University Press, 1997:141-55.
- 11 15 McCown K, Keiser R, Mulhearn S, Williamson D. The role of personality and gender in  
12 preference for exaggerated bass in music. *Person Ind Differ* 1997; 23:543-7.
- 13 16 Kageyama T. Loudness in listening to music with portable headphone stereos. *Percep Mot*  
14 *Skills* 1999; 88:423.
- 15 17 Gluch P. The use of music in preparing for sport performance. *Contemp Thought* 1993;  
16 2:33-53.
- 17 18 Tesch R. *Qualitative Research Analysis Types and Software Tools.* New York: Falmer  
18 Press, 1990.
- 19 19 Marshall C, Rossman GB. *Designing qualitative research.* London: Sage, 1999.
- 20 20 Miles MB, Huberman MA. *Qualitative data analysis: An expanded source book.* London:  
21 Sage, 1994.
- 22 21 Denzin N, Lincoln Y. *Handbook of qualitative research.* London: Sage, 1994.
- 23 22 Lincoln YS, Guba EH. *Naturalistic inquiry.* Newbury Park, California: Sage, 1985.
- 24 23 Vincent WJ. *Statistics in kinesiology.* Champaign, Illinois: Human Kinetics, 1999.

- 1 24 Vittitow M, Windmill IM, Yates JW, Cunningham DR. Effect of simultaneous exercise  
2 and noise exposure (music) on hearing. *Am Acad Audiol J* 1994; 5:343-8.
- 3 25 North AC, Hargreaves DJ. The effect of music on atmosphere and purchase intentions in a  
4 cafeteria. *J Appl Soc Psych* 1998; 28:2254-73.
- 5 26 Deci EL, Ryan RM. *Intrinsic motivation and self-determination in human behavior*. New  
6 York: Plenum, 1985.
- 7 27 Deci EL, Ryan RM. A motivational approach to self: Integration in personality. In:  
8 Dienstbier R, editor. *Nebraska symposium on motivation: Vol 38. Perspectives on*  
9 *motivation*. Lincoln, New England: University of Nebraska Press, 1991:237-88.
- 10 28 Ryan RM, Deci EL. Self-determination theory and the facilitation of intrinsic motivation,  
11 social development, and well-being. *Am Psychologist* 2000; 55:68-78.
- 12 29 Thomas TR, Ziogas G, Smith T, Zhang Q, Londeree BR. Physiological and perceived  
13 exertion responses to six modes of submaximal exercise. *Res Quart Exer Sport* 1995;  
14 66:239-46.
- 15 30 Jones SC, Schumacher TG. Muzak - on functional music and power. *Critical Studies Mass*  
16 *Communication* 1992; 9:156-69.
- 17 31 Rothkopf JS, Blaney PH. Mood congruent memory: The role of affective focus and  
18 gender. *Cognit Emot* 1991; 5:53-64.
- 19 32 Wansink B. Listen to the music - its impact on affect, perceived time passage, and  
20 applause. *Advances Consumer Res* 1992; 19:715-18.
- 21 33 LeBlanc A. Differing results in research on preference for musical tempo. *Percep Mot*  
22 *Skills* 1995; 81:1253-4.
- 23 34 Karageorghis CI, Dimitriou L, Terry PC. Effects of circadian rhythms on mood among  
24 athletes [Abstract]. *J Sports Sci* 1999; 17:56-7.

1 35 Shephard RJ, Shek PN. Interactions between sleep, other body rhythms, immune  
2 responses, and exercise. *Can J Appl Physiol* 1996; 22:95-116.

3



1 Table I. *Content analysis of qualitative data*


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| 3  | <b>Category</b>        | <b>Property</b>                                    | <b>Frequency and</b> |
|----|------------------------|--|----------------------|
| 4  |                        |  | <b>% of sample</b>   |
| 5  |                        |  |                      |
| 6  | General music factors  | Preference for dance music                         | 52 (9.77%)           |
| 7  |                        | Aversion to dance music                            | 9 (1.69%)            |
| 8  |                        | Preference for popular / chart music               | 28 (5.26%)           |
| 9  |                        | Aversion to popular / chart music                  | 18 (3.38%)           |
| 10 |                        | Preference for classical music                     | 18 (3.38%)           |
| 11 |                        | Preference for rock music                          | 15 (2.82%)           |
| 12 |                        | Preference for rap music                           | 6 (1.13%)            |
| 13 |                        | Aversion to rap music                              | 5 (0.94%)            |
| 14 |                        | Preference for jazz music                          | 9 (1.69%)            |
| 15 |                        | Preference for easy listening music                | 5 (0.94%)            |
| 16 |                        | Preference for energetic (or similar term) music   | 15 (2.82%)           |
| 17 |                        | Aversion to dull or bland (or similar terms) music | 20 (3.76%)           |
| 18 |                        | Preference for type of music used in classes       | 12 (2.26%)           |
| 19 |                        | Aversion to type of music used in classes          | 3 (0.56%)            |
| 20 | Specific music factors | Preference for upbeat music                        | 76 (14.29%)          |
| 21 |                        | Preference for downbeat music                      | 4 (0.75%)            |
| 22 |                        | Preference for current music                       | 56 (10.53%)          |
| 23 |                        | Preference for non-current music                   | 32 (6.02%)           |
| 24 |                        |  |                      |

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25 (table continues)

1 Table I. (continued)

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| 3 Category                 | 4 Property   | 5 Frequency and<br>6 % of sample |
|----------------------------|--|----------------------------------|
| 6 Specific music factors   | Preference for rhythmical elements of music                        | 42 (7.89%)                       |
|                            | 7 Preference for prominent beat                                    | 4 (0.75%)                        |
|                            | 8 Preference for less prominent beat                               | 7 (1.32%)                        |
|                            | 9 Preference for loud volume                                       | 52 (9.77%)                       |
|                            | 10 Preference for quiet volume                                     | 25 (4.70%)                       |
| 11 Music programme factors |  |                                  |
|                            | 12 Preference for varied music selection                           | 146 (27.44%)                     |
|                            | 13 Aversion to repetitive music selection                          | 100 (18.80%)                     |
|                            | 14 Preference for radio programming                                | 11 (2.07%)                       |
|                            | 15 Aversion to radio programming                                   | 20 (3.76%)                       |
|                            | 16 Aversion to talking (i.e., news broadcasts, advertisements)     |                                  |
|                            |  | 17 8 (1.50%)                     |
| 18 Delivery factors        | Preference for the provision of cardio-theatre <sup>TM</sup>       | 23 (4.32%)                       |
|                            | 19 Request of provision of choice in music selection               | 14 (2.63%)                       |
|                            | 20 Inadequate acoustics (poor sound quality) in gymnasium facility |                                  |
|                            |  | 21 8 (1.50%)                     |
| 22 Tele-visual factors     | Preference for provision of television in general                  | 7 (1.32%)                        |
|                            | 23 Preference for music television                                 | 35 (6.58%)                       |

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25

(table continues)

1 Table I. (continued)

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| 3 Category                         | Property  | Frequency and<br>% of sample |
|------------------------------------|---|------------------------------|
| 6 Tele-visual factors              | Aversion to music television  | 7 (1.32%)                    |
|                                    | Preference for televised sport  | 3 (.56%)                     |
| 8 Personal factors                 | Influence of age on music preference  | 26 (4.89%)                   |
| 9 Contextual factors               | Interaction between music and type of exercise<br>activity being undertaken | 22 (4.14%)                   |
|                                    | Synchronisation of movement with music tempo<br>or rhythm                   | 23 (4.32%)                   |
|                                    | Differing music preferences depending on the<br>time of day                 | 26 (4.89%)                   |
| 15 Psychophysical response factors | Increased motivation  | 91 (17.11%)                  |
|                                    | Stimulative effects of music  | 13 (2.44%)                   |
|                                    | Sedative effects of music   | 5 (0.94%)                    |
|                                    | Enhanced mood   | 19 (3.57%)                   |
|                                    | Distraction from physical sensations  | 11 (2.07%)                   |

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21

22

23

1 Table II. *Chi-square analysis of the association of sex, age, frequency of attendance and time of attendance with the rated importance of music*  
 2 *during exercise*

| 3  | <hr/>           |              |          |                  |            |          |          |          |          |                                 |
|----|-----------------|--------------|----------|------------------|------------|----------|----------|----------|----------|---------------------------------|
| 4  | <b>Variable</b> | <b>Level</b> | <b>M</b> | <b>Frequency</b> | <b>1-3</b> | <b>4</b> | <b>5</b> | <b>6</b> | <b>7</b> | <b><math>\chi^2_{df}</math></b> |
| 5  | <hr/>           |              |          |                  |            |          |          |          |          |                                 |
| 6  | Sex             | Female       | 6.07     | Expected         | 18.54      | 31.28    | 41.71    | 75.89    | 139.60   | 22.50 <sub>4</sub> *            |
| 7  |                 |              | Observed | 10               | 23         | 36       | 79       | 158      |          |                                 |
| 8  |                 | Male         | 5.53     | Expected         | 13.46      | 22.72    | 30.29    | 55.19    | 101.40   |                                 |
| 9  |                 |              | Observed | 22               | 31         | 36       | 52       | 83       |          |                                 |
| 10 | Age             | 17-26        | 6.25     | Expected         | 8.56       | 14.65    | 19.90    | 35.10    | 65.50    | 88.96 <sub>12</sub> *           |
| 11 |                 |              | Observed | 2                | 8          | 19       | 35       | 80       |          |                                 |
| 12 |                 | 27-35        | 6.19     | Expected         | 8.21       | 14.04    | 19.07    | 33.64    | 62.78    |                                 |
| 13 |                 |              | Observed | 3                | 8          | 16       | 36       | 74       |          |                                 |
| 14 |                 | 36-45        | 5.94     | Expected         | 8.33       | 14.24    | 19.35    | 34.12    | 63.68    |                                 |
| 15 | <hr/>           |              |          |                  |            |          |          |          |          |                                 |

16 \*  $p < .05$

(table continues)

1 Table II. (continued)

2

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3

| Variable  | Level   | M    | Frequency | 1-3      | 4     | 5     | 6     | 7      | $\chi^2_{df}$         |
|-----------|---------|------|-----------|----------|-------|-------|-------|--------|-----------------------|
| Age       | 36-45   | 5.94 | Observed  | 7        | 12    | 21    | 35    | 65     |                       |
|           | 46+     | 4.67 | Expected  | 5.89     | 10.07 | 13.68 | 24.13 | 45.03  |                       |
|           |         |      | Observed  | 19       | 25    | 16    | 21    | 18     |                       |
| Frequency | Low     | 5.59 | Expected  | 6.09     | 10.65 | 13.69 | 24.73 | 45.84  | 12.52 <sub>12</sub>   |
|           |         |      | Observed  | 11       | 10    | 17    | 25    | 38     |                       |
|           | Medium  | 5.88 | Expected  | 17.90    | 31.32 | 40.27 | 72.71 | 134.80 |                       |
|           |         |      | Observed  | 15       | 29    | 44    | 75    | 134    |                       |
|           | High    | 5.92 | Expected  | 8.02     | 14.03 | 18.03 | 32.56 | 60.36  |                       |
|           |         |      |           | Observed | 6     | 17    | 11    | 30     | 69                    |
| Time      | Morning | 5.52 | Expected  | 7.94     | 13.43 | 17.70 | 30.22 | 53.41  | 25.20 <sub>12</sub> * |

15

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16 \* p < .05

(table continues)

1 Table II. (continued)

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2

3 **Variable** **Level** **M** **Frequency** **1-3** **4** **5** **6** **7**  **$\chi^2$  df**

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4

5 Time Morning 5.52 Observed 11 23 12 23 53

6 Afternoon 5.74 Expected 3.68 6.22 8.20 14.00 24.75

7 Observed 4 4 12 13 24

8 Evening 5.93 Expected 17.71 30.99 39.84 54.78 96.84

9 Observed 11 17 34 63 98

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10

1 Table III. *Analysis of the association of sex and age with the incidence of properties from the content analysis*


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2

| 3 <b>Property</b> | <b>Frequency</b>             | <b>Sex</b>      |             | $\chi^2$ <u>df</u> | <b>Age Group</b>  |              |              |            | $\chi^2$ <u>df</u> |                      |
|-------------------|------------------------------|-----------------|-------------|--------------------|-------------------|--------------|--------------|------------|--------------------|----------------------|
|                   |                              | 4 <b>Female</b> | <b>Male</b> |                    | <b>17-26</b>      | <b>27-35</b> | <b>36-45</b> | <b>46+</b> |                    |                      |
| 5                 |                              |                 |             |                    |                   |              |              |            |                    |                      |
| 6                 | Preference for current music | Expected        | 32.44       | 23.56              | 3.15 <sub>1</sub> | 14.93        | 14.30        | 14.51      | 10.26              | 20.67 <sub>3</sub> * |
| 7                 |                              | Observed        | 39          | 17                 |                   | 28           | 16           | 7          | 3                  |                      |
| 8                 | Preference for non-current   | Expected        | 18.54       | 13.46              | 0.83 <sub>1</sub> | 8.84         | 8.48         | 8.60       | 6.08               | 9.04 <sub>3</sub> *  |
| 9                 | music                        | Observed        | 16          | 16                 |                   | 7            | 6            | 16         | 3                  |                      |
| 10                | Preference for dance music   | Expected        | 30.12       | 21.88              | 0.77 <sub>1</sub> | 13.82        | 13.25        | 13.44      | 9.50               | 23.74 <sub>3</sub> * |
| 11                |                              | Observed        | 27          | 25                 |                   | 28           | 12           | 9          | 1                  |                      |
| 12                | Preference for rhythm        | Expected        | 24.33       | 17.67              | 1.31 <sub>1</sub> | 11.61        | 11.13        | 11.29      | 7.98               | 0.99 <sub>3</sub> *  |
| 13                |                              | Observed        | 28          | 14                 |                   | 12           | 11           | 9          | 10                 |                      |

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14

15 \*  $p < .05$ 

16

(table continues)

1 Table III. (continued)

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| 3 <b>Property</b>              | Frequency | <u>Sex</u>      |             | $\chi^2$ <u>df</u> | <u>Age Group</u> |              |              |            | $\chi^2$ <u>df</u>   |
|--------------------------------|-----------|-----------------|-------------|--------------------|------------------|--------------|--------------|------------|----------------------|
|                                |           | 4 <b>Female</b> | <b>Male</b> |                    | <b>17-26</b>     | <b>27-35</b> | <b>36-45</b> | <b>46+</b> |                      |
| 6 Preference for upbeat music  | Expected  | 43.44           | 31.56       | 1.69 <sub>1</sub>  | 20.73            | 19.87        | 20.15        | 14.25      | 11.31 <sub>3</sub> * |
|                                | Observed  | 49              | 26          |                    | 27               | 27           | 16           | 5          |                      |
| 8 Preference for varied        | Expected  | 83.41           | 60.59       | 0.07 <sub>1</sub>  | 39.53            | 37.89        | 38.42        | 27.17      | 2.75 <sub>3</sub> *  |
| 9 musical selection            | Observed  | 85              | 59          |                    | 47               | 33           | 40           | 23         |                      |
| 10 Preference for loud volume  | Expected  | 30.12           | 21.88       | 1.19 <sub>1</sub>  | 14.37            | 13.77        | 13.97        | 9.88       | 11.60 <sub>3</sub> * |
|                                | Observed  | 43              | 18          |                    | 21               | 19           | 9            | 3          |                      |
| 12 Preference for quiet volume | Expected  | 13.90           | 10.10       | 0.65 <sub>1</sub>  | 6.63             | 6.36         | 6.45         | 4.56       | 50.16 <sub>3</sub> * |
|                                | Observed  | 15              | 9           |                    | 0                | 2            | 4            | 18         |                      |

---

15 \*  $p < .05$ 

(table continues)

16



1 Table III. (continued)

---

2

| 3 <b>Property</b>       | 4 <b>Frequency</b> | 5 <b>Sex</b>    |                | 6 $\chi^2$ <u>df</u>   | 7 <b>Age Group</b> |                 |                 |               | 8 $\chi^2$ <u>df</u>   |
|-------------------------|--------------------|-----------------|----------------|------------------------|--------------------|-----------------|-----------------|---------------|------------------------|
|                         |                    | 9 <b>Female</b> | 10 <b>Male</b> |                        | 11 <b>17-26</b>    | 12 <b>27-35</b> | 13 <b>36-45</b> | 14 <b>46+</b> |                        |
| 15 Increased motivation | 16 Expected        | 17 52.71        | 18 38.29       | 19 4.77 <sub>1</sub> * | 20 24.60           | 21 23.58        | 22 23.91        | 23 16.91      | 24 8.80 <sub>3</sub> * |
|                         | 25 Observed        | 26 63           | 27 28          |                        | 28 33              | 29 29           | 30 16           | 31 11         |                        |

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9 \*  $p < .05$