

# Effects of background music on concentration of workers

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**Abstract.** *Objective:* Background music is a common element in daily living and the workplace. Determination of whether background music affects human work concentration is a relevant concern. Studies have found background music influences human behavior, and this study attempts to understand how background music and listener fondness for types of music affects worker concentration.

*Methods:* This study analyzes how different types of background music – and how listeners' degree of preference for the background music – can affect listener concentration in attention testing through Randomized Controlled Trial (RCT).

*Participants:* Data were collected from 89 workers. The participants ranged in age between 19 and 28 years old, with an average age of 24 years old.

*Results:* We conclude background music influenced listener attention. This influence has more to do with listener fondness for the music than with type of music. Compared to situations without background music, the likelihood of background music affecting test-taker attention performance is likely to increase with the degree to which the test-taker likes or dislikes the music.

*Conclusions:* It is important not to select music that workers strongly like or dislike when making a selection of background music to avoid negatively affecting worker concentration.

**Keywords:** Background music, work environment, worker concentration, attention performance

## 1. Introduction

Numerous investigations have studied the various workplace factors from considerations of hardware equipment to how air quality influences human work performance [16]. However, few documented studies have examined how stimuli such as music and sounds can influence the task performance of individ-

uals. Background music is very popular in hotels, restaurants, offices, banks, shops, and hospitals [11]. Some therapists have indicated appropriate usage of background music can help increase the effectiveness of therapy [13,20]. This study examines whether background music affects the behavior or attention of individuals in work environments, and whether music helps stimulate improved work performance. Scheufele introduced background music into a job-training group for chronic psychotic patients and found background music can help trainees focus, reduce anxiety, and complete job assignments more quickly [19]. Another investigation concluded when employees work while listening to music, their work performance and morale

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improve, and their satisfaction with the company increases [17]. Ravaja and Kallinen found background music stimulus increased the interest of some newspaper readers and helped them concentrate on reading; yet the same stimulus negatively affected some other participants [18].

At numerous job sites, such as stores and hospitals, people listen to music of many types including popular music, while working. Numerous psychologists and management specialists studied the possible effects of music on human behavior in the workplace [2,12,22]. Background music can alter human behavior [17].

With regard to the rhythm of background music, Szabo demonstrated individuals engaged in exercise pick up pace to match music with a faster tempo, and slow pace to match music with a slower tempo [21]. Music tempo may influence the heartbeat of listeners. Edworthy and Waring found when background music has fast tempo, listeners performing exercise will experience faster heartbeat; the same effect is observed in the case of background music with loud volume. These phenomena may indirectly influence work performance [7]. According to one survey of 24 graduate students, fast-tempo background music can increase work efficiency [15].

One study of group therapy demonstrated different types of background music – classical music, popular music, traditional Chinese music, and no music at all – influenced the occurrence of frequency of inappropriate behaviors of patients with psychosis [20]. Evans and Johnson studied typewriting effectiveness and found background noise in the office can affect worker typing efficiency [8]. Furnham concluded the influence of background music on work efficiency varies according to type of music and work [9]. Furnham and Allass compared the effects of background music with and without lyrics, and found instrumental music can improve the reading comprehension performance of listeners, whereas songs with lyrics tend to distract listeners [10].

Furnham and Strbac found in a cognitive test, participants performed best in silence, background music was second best for performance, and background noise was lowest results. Compared to silence, both background music and background noise can negatively impact work performance [11]. However, precisely which factors cause background music to positively influence work performance and which factors do the opposite is unclear and deserves further study. No previous study has explored the effects of appreciation of background music on worker concentration.

Researchers conducted cognitive tests while examining the possible influence of background music on participant cognitive testing scores [4,11]. This investigation examines the influence of background music on participant scores in attention tests. This work attempts to gain a preliminary understanding of the possible influence of background music on individual focus and attention during task performance with a Randomized Controlled Trial (RCT). This study follows previous studies in examining the influence of background music on participant performance in cognitive testing [4,11]. Using “attention” as the research index, this work gauges test-taker preference for background music while analyzing how type of background music influences attention.

This study examines the following hypotheses:

**Hypothesize 1:** Compared to the absence of background music, background music may influence attention test scores.

**Hypothesize 2:** Compared to the absence of background music, background music becomes more likely to affect attention test scores when the participant strongly likes or dislikes that background music.

## 2. Method

This pilot study used a Randomized Controlled Trial (RCT).

### 2.1. Research participants

Eighty-nine voluntary workers (52 females and 37 males) enrolled in the on-job bachelor's degree program of a university in Taipei city. The participants ranged in age between 19 and 28 years old, with an average age of 24 years old.

### 2.2. Research equipment

- A. “Chu’s Attention Test” is a standard evaluation tool frequently used in occupational therapy in China [3]. This test is used to predict attention level in community services. The written test includes over 100 questions, each of which requires the test taker to view a series of scrambled codes, search for the “\*” sign among these codes, and count the occurrences of “\*” for the test duration of 1 minutes. The final score is obtained by deducting “Number of wrong answers” from “Total number of answers.”

Table 1  
Attention test score of four groups with different kinds of background music

|  | N  | Mean   | Std. deviation |
|--|----|--------|----------------|
| Group One (no background music)        | 23 | 104.87 | 11.99          |
| Group Two (popular songs)              | 22 | 93.91  | 31.97          |
| Group Three (classical light music)    | 20 | 98.20  | 24.38          |
| Group Four (traditional Chinese music) | 24 | 96.96  | 25.40          |

B. Background Music: The researchers prepared samples of three types of music of 10 minute segments each.

- Popular music: Five best-selling popular songs from the previous year.
- Classical light music: Five excerpts from the music of Pachelbel, Bach, and other composers.
- Traditional Chinese music: Five short pieces of instrumental music.

C. Tool for statistical analysis: The SPSS15.0 statistics software.

### 2.3. Research procedure

Step one: Eighty-nine volunteers were randomly divided into four groups. The age and sex of the four groups has no difference by ANOVA analysis.

Step two: Chu's Attention Test was administered to all four groups. The 23 participants in Group One were tested in a quiet environment. The 22 Group Two participants were tested in an environment with a background of pop music. The 20 Group Three participants were tested in an environment with classical light music. The 24 Group Four participants were tested in an environment with traditional Chinese music.

Step three: Following the test, participants belonging to groups Two, Three, and Four were asked to assess the background music using a Likert Scale ranging from 1 to 5, where 1 indicates strongly dislike, 2 denotes dislike, 3 denotes neither like nor dislike, 4 denotes like, and 5 denotes strongly like.

Step four: ANOVA was applied to analyze both how different types of background music can influence attention test performance; and how participant preference for background music can influence attention test score.

## 3. Results

### 3.1. Attention test scores and the type of background music

The attention test results indicate test takers exposed to background music tend to score lower than those

without such exposure (see Table 1). The average attention test score for Group One (no background music) was 104.9. Group Two (popular songs) had an average score of 98.2, while Group Three (classical light music) had an average score of 93.9, and Group Four (traditional Chinese music) had an average score of 96.9. However, ANOVA analysis showed no significant difference between the three background-music groups and the no-music group.

### 3.2. Attention test scores and degree of liking for background music

Participants in groups Two, Three and Four were asked to rate level of liking for the background music on a scale ranging from 1 to 5. Compared to Group One (no background music), participants assigning extreme scores to the background music (either strongly liked or strongly disliked) tended to exhibit lower attention test scores (see Table 2). The difference between these subjects with strong feelings regarding the background music and those in the no background music group was statistically significant ( $\text{sig.} = 0.028; 0.005$ ).

## 4. Discussion

This study demonstrates background music influences attention test scores, but its influence is not statistically significant. Furthermore, compared to no background music, the more a test taker likes or dislikes background music, the more likely this music is to influence his/her attention test score. This second finding supports Hypothesis 2.

### 4.1. Using Occupational Form and Occupational Performance to observe the influence of music on human attention

Why background music should influence the attention test scores of listeners is a key question. Music can be attributed to a certain occupational form using the frame of reference related to occupational form and occupational performance. This theory maintains that

Table 2  
Preference level for background music and Attention test score

| Preference level for background music | N  | Mean   | Std. deviation | The difference between background and no background music. Sig. |
|---------------------------------------|----|--------|----------------|---|
| 1 point – dislike very much           | 6  | 73.83  | 25.92          | 0.028   |
| 2 point – dislike                     | 3  | 114.33 | 17.95          | 0.980   |
| 3 point – feel passably               | 20 | 104.75 | 26.88          | 1.000   |
| 4 point – like                        | 21 | 105.48 | 15.52          | 1.000   |
| 5 point – like very much              | 16 | 78.81  | 29.63          | 0.005   |

occupational performance changes with occupational form [14]; therefore, a theoretical explanation exists for why changes in background noise and music influence human behaviors. As scholars have pointed out, music likely influences listener degree of alertness and behavior [5]. One study found background music alleviates restlessness and distraction in psychiatric patients and enables daily living activities to proceed more smoothly [6]. Background music can be seen as a part of occupational form and can influence attention. Our observations can be explained by theory.

#### 4.2. Using the findings of this research to provide preliminary interpretation of the conflicting findings obtained by previous studies

Background music is widely used in locations such as hotels, restaurants, offices, banks, stores and hospitals [1]. This study assesses participant liking for background music, and then analyzes the influence of background music on participant attention test score. No previous study has adopted this approach. This study found strong test-taker like or dislike for background music has negative and statistically significant effect on attention test scores. This phenomenon occurs because people naturally tend to pay more attention to background music that they strongly like or dislike. Consequently, attention is drawn in by the background music, effecting ability to focus on work. Some previous studies found background music is likely to help people improve work efficiency [17,19]. However, other studies indicated background music may adversely influence work performance [11,18]. Given these contradictory research results, a careful exploration of test-taker preference for background music may make it possible to explain the differences in the studies. This research gathered data from a sample of 89 individuals to examine the influence of worker fondness for background music on attention, and replication of the study using a larger sample will make it possible to arrive at a stronger conclusion.

## 5. Conclusion

Background music has been used widely in numerous kinds of work environments [1]. This study using “attention” as the research index concluded listener attention was influenced by background music perception when doing a task. However, this phenomenon was related to listener feelings regarding the background music rather than the type of music selected by the researchers. This study found that comparative to a situation with no background music, the influence of background music on listener attention test score increases with the intensity of listener feelings regarding the background music. Thus, when selecting background music for work environments, such as offices, factories, and therapy rooms, it is important to avoid music that workers strongly like or dislike. Avoiding such music can help avoid unduly impacting listener attention and, consequently, work performance. This investigation gathered data from a sample pool comprising of just 89 individuals. Subsequent study of the influence of background music in work environments should utilize more attention test tools and a larger number of test samples. Further studies should examine additional music types and worker fondness for a wider variety of music in order to produce stronger and more diversified results.

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