"Headphones are the new wall:"

Background music and creativity in the workplace

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ABSTRACT

Open floor office planning is commonly used to improve socialization and employee relationships. However, this socialization and common noises (e.g., discussions) can distract people during work, which leads to them using entertainment media like music to limit distractions. Specifically, people listen to music via headphones to focus and hide from their surroundings. Knowing of such media use at work, academics questioned how it affects cognitive tasks (i.e., processing and remembering information). One of such tasks is creativity, understood as developing new and valuable ideas. Creative ideas can enhance innovation, thus increasing companies' market competitiveness. Hence, creativity is often encouraged to keep up with the constantly changing industries. Previous research shows that music genres have different effects on cognitive tasks. One of the oldest and most researched music genres is classical music, while popular modern music genres, such as dance/electronic/house music remains underresearched. Both genres have similarities as they have limited to no lyrics and are composed using musical variations. This led to the research question: What is the difference in the effects of background music on creativity in the work environment between classical and dance/electronic/house music genres? A quasi-experiment was conducted in a Dutch company on a sample of 66 people, measuring creativity and external factors based on music stimuli and a survey. Statistical analysis was used to analyze the results. The results showed that people indeed use personal media to limit distractions. Yet, the experiment resulted in no background music effects on participants' creativity in work environments. Though the research did not produce significant results, the lack of difference between music genres' effects indicates that people perform similarly when exposed to either of the music genres. Still, when preferred music differed from the listened one, participants tended to score worse on creativity. Thus, music preferences were identified as one of the external factors influencing the relationship between music and creativity, alongside the personality trait agreeableness. All in all, the key conclusion of this research is that people use entertainment media in their lives, but this media use is personal and may differ based on some of the external factors. As this thesis presents new findings, it is concluded that not everything is known about background music's effects on creativity, requiring further research.

KEYWORDS: *Creativity*, *Background music, Work environment, Personal media, Entertainment media*

Word Count: 19 339 words

Preface

What a journey it has been. This thesis not only marks the end of my Master's program but also the end of my student years. For the last five years, so much has changed for me, from moving to the Netherlands to living in different cities and countries and meeting so many new interesting people while also losing some. I have grown as a person, developing myself, learning to be strong, as well as expressing my feeling better.

In the process of my research, many have wondered how I even got to the point of writing about music and personal media at work. However, to me, the reason is rather obvious. I have been studying music since I was 3 years old, which is definitely one of my main life passions. Therefore, I am definitely the kind of person who always listens to music during work and all other different activities. Without surprise, I was always curious about how it may affect me, which led to my thesis topic of background music effects in the workplace.

While it has been an independent project of mine, there are so many people who I have to thank for making it come to life. First and foremost, my supervisor Jeroen Jansz, who not only helped me in my academic process but has always been a great emotional support whenever nerves took over rational thinking. Next, I want to thank my great colleagues at Riscure and the whole company for supporting my experiment, participating in it, and being genuinely curious about my results. The special thanks here go to Santi, Jetse, Ruben, Kirill, and Hanna, as the office and writing the thesis would be much more boring and difficult without them and their support.

Nonetheless, the main contributors and support have been my loving family, who has enabled me to live abroad, study, and always know that there is a shoulder I can fall on when something goes wrong. My parents, sister, brother, and our extended family of friends in Saint-Petersburg always believe in me and even listen to hours of music to support my thesis and passion. Just as friends are important to my parents, my friends have been my rock as well. Here, I want to highlight my two friends in Russia: Daniil and Kirill, for our friendship and idiotic jokes that bring a smile to my face even when we are kilometers apart. In building my support system in the Netherlands, Pajamas have been there for me throughout the whole Premaster and Master, becoming my best friends while always challenging me academically and encouraging me to perform at my full potential. Lastly, but far not least, I want to thank my group of friends, "DK (House of Culture)" for bringing the laughs and parties throughout all five years, and especially Dr. Makars Siskins, who has helped me a lot in my studies over the years.

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List of Abbreviations

CRAT	Compound Remote Associate Tasks
DEH	Dance/Electronic/House
OCEAN	Openness to experience, Conscientiousness, Extraversion, Agreeableness, Neuroticism
PA	Power Analysis
RQ	Research Question
TIPI	Ten-Item Personality Inventory
WFH	Working From Home

1. Introduction

"Headphones are the new wall" (Tierney, 2012, as cited in Newman, 2016, p. 168). In today's world, there is a visible tendency toward open floor planning organization of workplaces (Newman, 2016). As a result, many people use personal media like listening to music to compensate for missing walls and reduce noises and distractions that may appear in work environments (Newman, 2016). Subsequently, people build up music walls both in the workplace and home offices, which became especially popular during the Covid-19 pandemic (Galanti et al., 2021). In other words, people use personal audio media as entertainment and a means of increasing focus on tasks.

Following this, the question arises of how this media use affects employees at work. Music has multiple known effects, including altering emotions and affecting cognitive tasks like creativity (Huang & Shih, 2011). Therefore, it is assumed that music can positively affect creativity, leading to innovative, new, and valuable ideas (Martens, 2011). However, various music and work types can have different effects (Huang & Shih, 2011). To illustrate, when listening to music, a person may adjust their work pace to fit the music's rhythm (Huang & Shih, 2011; Newman, 2016). This is exceptionally noticeable when people work on monotonous or repetitive tasks, as they work faster and more efficiently (Newman, 2016). Some tasks are supported by music, however, not all music is beneficial to cognitive tasks. For instance, music with lyrics disrupts the person's work as it lures attention to the composition's lyrics (Newman, 2016; Shih et al., 2016).

Previous research into background music highlighted that classical music positively influences employees' productivity and focus, resulting in the so-called "Mozart effect" (Lesiuk, 2005, p. 177; Newman, 2016). In other words, this 'Mozart effect' can improve one's cognitive tasks during work. However, although classical music is still rather popular, other newer music genres have appeared in society, leading to further research into background music effects (Newman, 2016; Stolova et al., 2010). According to statistics, dance/electronic/house (DEH) is among the top three most popular music genres (Richter, 2018). While other music genres often have lyrics, the DEH music genre usually has limited to no lyrics (Hiller, n.d.). Although originating in different epochs, both classical music and DEH seem to have a high positive influence as background music, as both these genres often do not use lyrics and focus on the compositions' rhythm and pitch to drive the listener.

Although there has been extensive research into the effects of music on cognitive tasks, including creativity, there is still little research into whether entertainment media use, for example, background music, affects creativity in the work environment. Furthermore, it is often considered that people listen to different music, but how the effects of background music differ across modern and old music genres is still underresearched. Thus, this research posed the following research question (RQ):

What is the difference in the effects of background music on creativity in the work environment between classical and dance/electronic/house (DEH) music genres?

Additionally, multiple external effects may influence the relationship between background music and creativity (Tierney et al., 1999; Amabile et al., 1996; Neuman et al., 2016). Such factors could be one's personality traits, personal background, and music preferences (Tierney et al., 1999; Amabile et al., 1996; Neuman et al., 2016). Previous research has found that people with different personality traits may perform differently with the background music, for instance, it has been found in previous research that extraverts work better with background music than introverts (Boer & Abubakar, 2014; Küssner, 2017). Furthermore, younger generations and females may be more creative on average than others, therefore performing better on creativity tasks when listening to music than others (Baer & Kaufman, 2008). Additionally, one's music preferences are also an external factor influencing music's effects on creativity (Lesiuk, 2005; Shih et al., 2016). More specifically, depending on the similarity of music listened to in regular life and work may influence the effects of background music as well as whether the person generally listens to music (Lesiuk, 2005; Shih et al., 2016). Therefore, a sub-question was created to identify the effects of other external factors on the relation between background music and creativity:

To what extent do a) personality factors, b) personal music preferences, and c) gender and age moderate the effects of background music on creativity in the work environment?

First and foremost, this research increases further understanding of people's entertainment media use in the work environment (El-Aouar et al., 2016; Newman, 2016). More specifically, this research contributes to the scientific landscape of background music effects, as its relationship to cognitive tasks of employees, specifically creativity, is currently underresearched. That is especially applicable to the DEH music genre due to its newness compared to classical music, which has been investigated more extensively in previous research (Lesiuk, 2005; Richter, 2018). Therefore, this research can fill the gap in the differentiating music effects on creativity between music genres. Furthermore, this research assesses the external factors that may play a role in the influence of music on a person (i.e., personality traits, personal music preferences, gender, and age) (Boer & Abubakar, 2014; Neuman et al., 2016; Shih et al., 2016). Here, previous research mainly focused on one out of five personality traits (i.e., extraversion), while this research considers all personality traits (i.e., openness to experience, conscientiousness, extraversion, agreeableness, neuroticism) as influencing factors (Küssner, 2017). Thus, studying all personality traits as external factors influencing the effects of background music on cognitive tasks further expands the understanding of music's influence on a person.

On a societal level, research into music in the workplace and creativity may be useful to organizations, especially those aiming to encourage employee creativity. The ubiquitous use of personal media, such as music, enables people to create a personalized atmosphere around them and intensify their focus on work (Huang & Shih, 2011; Newman, 2016). This way, these organizations

may consider the findings of this research in helping their employees during creative tasks. In turn, these creative ideas drive social innovation and innovation within an organization (Amabile et al., 1996; Kaufman, 2012). Innovation is known to support society and potentially lead to changes that improve these societies and companies, respectively (Amabile et al., 1996; Kaufman, 2012).

       This thesis comprises five chapters: introduction, theoretical framework, methodology, results and findings, and conclusion. First, the theoretical framework investigates existing research in order to understand what has already been found in the area of music effects and creativity. As a result, multiple principal studies formed this thesis's theoretical core, leading to the formulation of hypotheses. Following the evaluated theoretical framework, the methodology chapter explains the use of a quasi-experiment in this research as well as the sampling procedure. In other words, it explains why the experiment within a technical organization was conducted. Next, the result and analysis section examines and describes the results of the conducted experiment. This way, it discusses how these results contradict the previous research and which of the external factors appear to influence the relationship between background music and creativity. Lastly, the conclusion answers the research question, considers the limitations of the research, and suggests potential future research that could further deepen the understanding of background music's effects.

2. Theoretical Framework

As any research starts with an analysis of the currently existing theory, this theoretical framework chapter examines previous academic research into various topics related to the posed research question. This way, the chapter first investigates previous research on the effects of background music on people, creativity, and modern workplaces, as well as into various external factors that may influence music's effects on employees.

Workplaces nowadays have more open floor planning, which aims to create a friendlier and more open work environment, encouraging social engagement among employees (Newman, 2016). However, the lack of walls may often result in increased distracting sounds and noises for employees (Newman, 2016). Therefore, many employees use personal media like listening to music via headphones to tune down ongoing office conversations and minimize noise (Newman, 2016). Thus, it is argued that listening to background music during work may influence the listener's work performance in various ways (El-Aouar et al., 2016; Huang & Shih, 2011; Shih et al., 2016; Threadgold et al., 2019).

2.1. Effects of background music

Overall, background music refers to playing any sounds or music genres while actively participating in other activities (El-Aouar et al., 2016; Huang & Shih, 2011; Newman, 2016; Threadgold et al., 2019). In other words, when listening to music in the background, one is not actively listening to it but rather passively as the focus mainly falls on other tasks (Huang & Shih, 2011; Newman, 2016; Threadgold et al., 2019).

Much of the research about background music effects' focuses specifically on the listener's cognitive processes (Huang & Shih, 2011; Newman, 2016; Threadgold et al., 2019). Within the cognitive psychology field, cognitive processes include "attention, memory, perception, thinking, reasoning, problem-solving, decision making, language, knowledge representation, mental imagery, and motivation and concept formation" (Gale Encyclopedia of Psychology, 2018, para 1). In other words, cognitive processes, often called tasks, involve understanding and knowing information, which can be summarized as information processing (Gale Encyclopedia of Psychology, 2018a; Gale Encyclopedia of Psychology, 2018b; Groome, 1999). One of the fundamental cognitive tasks is attention, as without paying attention to the information, it cannot be processed and remembered (Groome, 1999). Besides attention, there is a wide list of cognitive tasks, including creativity, productivity, and memory (Gale Encyclopedia of Psychology, 2018b; Groome, 1999).

There has been rather extensive previous research into the effects of background music, covering various music genres, listening conditions, and areas of effects (El-Aouar et al., 2016; Huang & Shih, 2011; Newman, 2016; Threadgold et al., 2019). One of the pioneering studies on the effects of background music was conducted by Threadgold et al. in 2019 in the form of three experiments.

All three experiments considered the effects of music on creativity based on Compound Remote Associate Tasks (CRAT), which test the creative potential of people (Threadgold et al., 2019). The first experiment compared CRAT performance between so-called common quiet backgrounds, which may still have background noises (e.g., conversations, typing, eating, and drinking) to music with unfamiliar lyrics (e.g., foreign language) (Threadgold et al., 2019). The second experiment also tested CRAT, but this time between a quiet background and music without lyrics (Threadgold et al., 2019). The last experiment analyzed the effects of fast positive music on creativity (Threadgold et al., 2019). Unlike the first two experiments, the third experiment was based on the comparison between different moods rather than music types (Threadgold et al., 2019). The result of these experiments showed that music, especially with lyrics, may undermine the creative potential, while positive music may improve one's mood (Threadgold et al., 2019). In their findings, Threadgold et al. (2019) note that participants showed a decrease in CRAT performance in some of the experiments.

Nevertheless, this research found that while music may sometimes be distracting, other common noises (e.g., conversations, typing, eating, and drinking) are even more distracting than music (Threadgold et al., 2019). Threadgold et al. (2019), compared to previous research from Mehta et al. (2012), highlighted that their findings are more an anomaly, therefore questioning the generalizability of their results. One of the challenges that could have led to such an anomaly is that CRAT involves verbal problem-solving, which can be considered a rather complicated task requiring extensive attention to process the information and reproduce it in speech (Threadgold et al., 2019). As described by researchers themselves, if participants were faced with easier tasks, they would potentially score better and solve issues faster with the background music (Threadgold et al., 2019). Therefore, although some of the findings suggest that music can be distracting to cognitive tasks, considering the types of experiments and tasks used in the research, it is predicted that background music can still improve creativity (Threadgold et al., 2019).

Huang and Shih did another key study for this thesis in 2011. Huang and Shih (2011) have conducted an experiment (randomized controlled trial) using three musical genres: "popular music," "classical light music," and "traditional Chinese music" (p. 385). This research assumed that music "can help trainees focus, reduce anxiety, and complete job assignments more quickly" (Huang & Shih, 2011, p. 383). In their research, Huang and Shih (2011) tested the effects of background music on the attention of working bachelor students and the role of preferred music genres. Before conducting their analysis, Huang and Shih (2011) assessed the existing theory of music's effects on people. As such, they highlight that music may influence the heartbeat of a listener, adjusting it to fit the tempo as well as reducing anxiety and relieving tension (Huang & Shih, 2011).

Moreover, they highlight that music can have different effects based on types of music and work (Huang & Shih, 2011). The experiments showed that students' attention slightly decreased when exposed to background music (Huang & Shih, 2011). Furthermore, this study discovered that those who "strongly liked or strongly disliked" music selected by researchers scored even lower on the

attention tests (Huang & Shih, 2011). Therefore, they also suggest that when selecting music at work, strongly liked and disliked music should be avoided (Huang & Shih, 2011). Although Huang and Shih (2011) found that the music they used was not beneficial for listeners' attention, especially if listeners strongly liked or disliked it, they also suggest that this result could be different if they chose other types of music for their experiment. Therefore, before conducting this research, it is vital to examine further differences in the effects of music among different types of both work and music.

Besides the effects of background music introduced by Huang and Shih (2011) and Threadgold et al. (2019), other researchers also found that music can improve focus, change a person's heartbeat, grasp the attention, and alter one's mood (El-Aouar et al., 2016; Newman, 2016). More specifically, it is seen that the alteration of the mood, reduction of tension, and overall relaxation of one's emotional state that comes from background music can improve focus and creativity, which are part of cognitive task performance (El-Aouar et al., 2016; Huang & Shih, 2011; Newman, 2016). Some of the other cognitive tasks include productivity, decision-making, and problem-solving (El-Aouar et al., 2016; Huang & Shih, 2011; Newman, 2016).

2.2. Differentiation of music effects

Introduced by previous research like Huang and Shih (2011) and Threadgold et al. (2019), background music may indeed influence listeners' cognitive processing. However, not all music may affect the employees' cognitive tasks similarly. The effects may differ based on music types, features, intensity, genres, and type of work (El-Aouar et al., 2016; Huang & Shih, 2011; Lesiuk, 2005; Newman, 2016; Shih et al., 2016). This section, therefore, examines the differences in background music effects.

2.2.1. Music's intensity and mood

The first factor possibly influencing music's effects is its intensity (Huang & Shih, 2011). The intensity can refer to the musical decisions of the compositor in the music key, pitch, tempo, volume, speed, and rhythm and how they interchange throughout the composition (Huang & Shih, 2011; Newman, 2016; Virtala et al., 2011). The most commonly used keys in western cultures are "major" and "minor" (Virtala et al., 2011, p. 406). From the technical perspective of music production, the techniques used in composing are the same, although the music will still sound differently (Virtala et al., 2011). Triad chords, which are the basis of any key, are composed of three notes and can already highlight the difference between minor and major (e.g., C major and c minor) with the associated happiness and sadness of music (Virtala et al., 2011). Commonly, the major key is associated with the more positive and happy mood of the music, while the minor is the opposite, with sad and sentimental tones (Virtala et al., 2011). Therefore, when choosing the leading key of the music composition between major and minor, composers can also intend the mood of the music composition (Newman,

2016). All of these considerations and choices can differently influence the effects of the music on the listener, as the music can rarely be produced to be neutral (Newman, 2016; Threadgold et al., 2019; Virtala et al., 2011).

Some previous researchers have attempted to develop neutral music, also known as the "Muzak" project (El-Aouar et al., 2016, p. 657). However, recent research shows that the mood of the music often depends on the listener's mood and experience with the music (Threadgold et al., 2019). In other words, the mood of the music is rather a personal choice, it is one that can also be classified between the opposite terms, just like major and minor keys (Newman, 2016; Threadgold et al., 2019). As a result, the music is often perceived as "happy" or "sad" music (Threadgold et al., 2019, p. 875). Of course, not all music is necessarily completely 'sad' or completely 'happy,' but when in need to classify music, these opposites can be applied (Virtala et al., 2011). As suggested from the results of the experiment conducted by Threadgold et al. (2019), while both so-called 'happy' and 'sad' music can relax the listener, happy music is more likely to stimulate creativity and other cognitive tasks than sad music (Threadgold et al., 2019). Newman (2016) discusses the results from different studies that found that happy music appears to have a stronger positive effect as it is more likely to create positive emotions and arousal.

Furthermore, the intensity of the music, which originates from the changes of music keys, tempo, and pitch, can be again classified in opposite terms of "light" or heavy music (Huang & Shih, 2011, p. 385). Previous research shows that 'light music' with smooth transitions is more likely to create a cheerful feeling (Huang & Shih, 2011). Similarly to the effect of happy music, positive emotions created from light music can enhance cognitive task performance (Newman, 2016). Nevertheless, it is vital to take into account that what is light music for one listener may be heavy music for the other (Newman, 2016). Therefore, the perception of music's intensity is very personal and can also differ based on one's mood (Huang & Shih, 2011; Newman, 2016).

2.2.2. Lyrics

Another differentiation is made between music with and without lyrics, as within and between various music genres, lyrics are often a differentiating feature of music compositions and may also indirectly contribute to the intensity of music (Threadgold et al., 2019). Threadgold et al. (2019) and other researchers found that lyrics can be distracting to a listener, especially during the work process (Newman, 2016). The reason behind this distraction is that lyrics may invite one to pay attention to lyrics and their meaning and therefore start to actively listen to music compositions (Newman, 2016; Threadgold et al., 2019). Thus, music without lyrics is more likely to enhance cognitive task performance because it provides fewer distractions (Newman, 2016; Threadgold et al., 2019). Although it can be argued that lyrics are part of the music's intensity, lyrics are not an essential part of the music composition (Threadgold et al., 2019; Virtala et al., 2011). While lyrics can be taken out of the composition to reduce the intensity, melodic lines and music keys are the core of the music

composition and, therefore, have a direct influence on the perception of the composition by a listener (Newman, 2016; Threadgold et al., 2019; Virtala et al., 2011).

2.2.3. Music genres

There has been much research into music effects on people, and much of it focuses on specific music genres (Lesiuk, 2005; Shih et al., 2016). One of the oldest and popular up-to-date music genres is classical music which refers to Western-oriented formal music writing and covers such composition types as opera, symphony, ballet, concerto and other interpretations of these forms (Stolova et al., 2010). As one of the oldest music genres, classical music has been researched extensively (Lesiuk, 2005; Newman, 2016; Shih et al., 2016). For example, some of the most common studies on the effects of classical music have resulted in the establishment of the so-called 'Mozart effect' (Lesiuk, 2005). This effect suggests that classical music can help people concentrate on activities and therefore increase their productivity (Newman, 2016). As effects of Mozart's compositions on cognitive task performances have been replicated in countless different research, it was nevertheless found that the reason why "Mozart makes you smarter" is that it also creates arousal and positive emotions in a listener (Lesiuk, 2005, p. 177). Therefore, over the years, Mozart's music has started to be treated as a scale for happy and light classical music (Lesiuk, 2005; Shih et al., 2016). These findings led to various investments from governments and other institutions into the use of classical background music in schools, universities, and workplaces (Lesiuk, 2005; Shih et al., 2016).

However, as Mozart's music is widely known, it can be distracting to cognitive tasks, as Threadgold et al. (2019) found familiar music to be distracting. Therefore, various research focuses on other classical music that can still be defined as light (Huang & Shih, 2011; Threadgold et al., 2019). For example, Tchaikovsky was known to be inspired by Mozart, which makes their music style quite similar (Mason, 1947; Stolova et al., 2010). As a result, Tchaikovsky's music is often light, with both happy and sad tones (Stolova et al., 2010). Although Tchaikovsky is still known worldwide, it is much less known than Mozart in Western Europe, so there is a smaller chance of distractions (Mason, 1947; Stolova et al., 2010).

While classical music has been around for years, newer genres have appeared over time (Newman, 2016). Every new genre has attracted research to recreate studies of music effects on people in diverse conditions (Newman, 2016; Threadgold et al., 2019). The popularity of music genres shifts yearly and may vary in different places of the world (Newman, 2016; Richter, 2018). In recent years, the DEH music genre, which covers three genres: dance, electronic, and house, has been popular (Richter, 2018). This music genre has been developed rather recently, and although it has gained popularity quickly, it still remains an underresearched music genre in the academic field of music effects (Newman, 2016; Richter, 2018).

Comparing music genres to the classical ones, some may appear to have similarities, while others are more different than similar (Hiller, n.d.; Richter, 2018). Unlike some music genres, classical and DEH music genres have a few similarities (Hiller, n.d.). Specifically, one of the similar features between classical music and DEH compositions is that both usually have limited to no lyrics (Hiller, n.d.). As for other features of music composition that were mentioned before, both classical and DEH music compositions can be of minor or major key, therefore appealing to different moods of listeners (Stolova et al., 2010; Vogl & Knees, 2017). Furthermore, in most classical music compositions (except operas and romances), lyrics are often limited as well as in the DEH music genre, which means that compositors usually play with volume, pitch, and music key changes when creating new compositions (Stolova et al., 2010; Vogl & Knees, 2017). Therefore, as these music genres are seen to be similar in how they are produced, it is assumed that the effects of these music genres are similar as well.

2.2.4. Type of work

Furthermore, it is found that music may affect various work activities differently (El-Aouar et al., 2016; Huang & Shih, 2011; Newman, 2016). Various occupations may involve diverse tasks differentiating on the required information processing (i.e., cognitive processes) and effort for their completion (El-Aouar et al., 2016; Huang & Shih, 2011). For example, some tasks involve monotonous activity, others require visual and listening tasks, and some involve other activities (El-Aouar et al., 2016). This way, when working on monotony tasks, music can increase efficiency as employees work better with music on these tasks rather than on other tasks (Huang & Shih, 2011; Newman, 2016). The reason for that is the fit of one's work pace to the rhythm of music (Huang & Shih, 2011). Moreover, these tasks usually require less thinking but rather a repetition of the same activity, which makes music more complementary than distracting (Newman, 2016). Thinking itself and information processes can also take on different forms of "automatic and controlled processing" (Groome, 1999, p. 10). Here, automatic processing is what often happens during monotony tasks, as the task takes place subconsciously (Groome, 1999; Newman, 2016). On the other hand, most other cognitive tasks like creativity are part of controlled processing as one has to consciously process the information to come up with creative solutions (Groome, 1999; Newman, 2016).

It is further suggested by Threadgold et al. (2019) that background music effects on creativity may influence different work tasks in different ways. The highest positive influence happens in relation to spatial tasks (Threadgold et al., 2019). Spatial tasks refer to three-dimensional activities like drawing, assembling products, and organizing items (Threadgold et al., 2019). These tasks are influenced the most as background music improves one's emotional state, which directly relates to spatial tasks (Küssner, 2017; Thompson et al., 2001; Threadgold et al., 2019).

2.3. Modern work environments

Personal media, especially background music, is often an essential part of the office environments and work dynamics which can be a subject to change from company to company (Lesiuk, 2005; Schepers & van den Berg, 2007). As mentioned before, the tendency is toward open offices, which can limit employees' autonomy over personal space (Newman, 2016). Nevertheless, many prefer working in such open spaces, as socialization possibilities are often crucial "breeding grounds for new creative talent" and overall work-related problem-solving (Galanti et al., 2021; Schepers & van den Berg, 2007, p. 409).

Problem-solving often results in creative solutions that lead to innovative competitiveness that is vital in all industries, while in some, potentially a bit more than in others (Lesiuk, 2005). For instance, technology industries like IT change rapidly, which requires organizations to find creative solutions to stay competitive with software, hardware, and other technological designs (Lesiuk, 2005). Creativity may also not be stimulated in all environments. As Schepers and van den Berg (2007) found, organizational culture strongly influences employees' creative potential. This way, it is found that employees in companies with the most possibilities for knowledge sharing perceive their work environments as creative (Schepers & van den Berg, 2007).

Moreover, these companies tend to have "warm and open" work environments that encourage employee creativity (Martens, 2011; Schepers & van den Berg, 2007, p. 409). It is often seen that knowledge sharing is a vital component of the organizational cultures of IT companies, as well as the support of friendly and related environments (Lesiuk, 2005; Schepers & van den Berg, 2007; Riscure, n.d.). Considering that work environments can indeed influence creative potential, this research concentrates on the work environments where creativity is enhanced rather than limited, as considering the differences in music effects in both environments is beyond the scope of this research.

Although the physical environment can potentially affect employees' creativity, it is not an independent factor in this research, as it may overrule music's effect on creativity. Furthermore, in recent years, and especially with the Covid-19 pandemic, many people started "working from home (WFH)" (Galanti et al., 2021, p. 426). This way, people would recreate their office space at home. Even with the relaxed Covid-19 situation and health regulations, many people continue WFH, which makes it complicated to access and assess all the work environments in research (Galanti et al., 2021). Although it could be expected that such an office would have fewer distractions, it, in fact, has the same number of distractions, if not more (Galanti et al., 2021). Therefore, even at home, people may use music to limit distracting noises from their family and neighbors and outside noises (Newman, 2016). Nevertheless, the focus of this research is on the media use in the work environment, therefore, following the previous research and the scientific parsimony, the physical differences of the home offices are not considered as an independent factor in this research.

2.4. Creativity

There is a wide variety of existing cognitive tasks, including those influenced by background music (Threadgold et al., 2019). Some of such cognitive tasks are productivity, creativity, and problem-solving (Threadgold et al., 2019). Because this research focuses on creativity's effects, it is vital first to define creativity. Creativity is a vital part of society, as many companies and social institutions are built on creative input (Amabile et al., 1996; Kaufman, 2012).

2.4.1. Group vs. Individual creativity

Creativity is often viewed as either a group or individual activity, especially in regard to workplace creativity (Amabile et al., 1996; Schepers & van den Berg, 2007; Tierney et al., 1999). The idea of viewing creativity in a workplace as an individual activity appeared rather recently, as at first, it was mostly assessed as influenced by a group or a leader (Tierney et al., 1999). Here, it is suggested that in both group and individual creativity, a leader and stimulating work environment can enable people's creative potential, therefore, encouraging the development of new and novel solutions (Tierney et al., 1999). While people indeed often participate in creative activities as a group, the focus in recent years has fallen on individual creativity (Schepers & van den Berg, 2007). Creativity is mostly viewed as an individual activity because of the difference between personalities, personal creative potential, and creative self-efficacy (Amabile et al., 1996; Beghetto, 2006; Schepers & van den Berg, 2007; Tierney et al., 1999).

It can be drawn from the previous research into group and workplace creativity that the work environment and leaders can indeed enhance or limit the creative potential of individuals (Schepers & van den Berg, 2007). Nevertheless, in the work environment, employees mostly use music as personal entertainment media, and this media use is an individual activity (Newman, 2016). Therefore, this research focused on individual creativity.

2.4.2. Various definitions of creativity

Creativity is a well-researched and defined concept (Amabile et al., 1996). Nevertheless, it is a dynamic concept that is often reshaped based on the industry and area of society being researched (Kaufman, 2012; Schepers & van den Berg, 2007). To clarify, the definition of creativity overall remains the same, however, additional specifications can be added or taken out to accommodate the specific domain. In their research, Kaufman (2012) suggests that divided creativity into multiple domains, including "science, interpersonal relationships, writing, art" (Kaufman, 2012, p. 299). In the end, their research concluded that when starting creativity research, one needs to select the creativity from five broad groups: "Self/Everyday, Scholarly, Performance (encompassing writing and music), Mechanical/Scientific, and Artistic" (Kaufman, 2012, p. 304). As this thesis aims to access creativity

in the workplace, especially in spatial tasks, this research will focus on self/everyday creativity during work.

Research into creativity started a long time ago, and in 1996 Amabile et al. conducted extensive research resulting in a key definition of creativity used in academic research, which then got reshaped and reformed depending on the research at hand (Amabile et al., 1996; Martens, 2011). Amabile et al. (1996) described creativity as "the production of novel and useful ideas in any domain" (p. 1155). Their research was based on almost ten thousand workers in various companies from industries like IT, medicine, engineering, and banking and focused on testing the effects of the social environment on creativity (Amabile et al., 1996). To test this, Amabile et al. (1996) used an instrument known as "KEYS: Assessing the Climate of Creativity" (p. 1155). They further explain that "KEYS and the model underlying its focus on individuals' perceptions and the influence of those perceptions on the creativity of their work" were the focus of their research (Amabile et al., 1996. p. 1157). Amabile et al.'s research was based on over twelve thousand cases derived from participants of various industries (Amabile et al., 1996).

Although Amabile et al.'s (1999) creativity definition was created a while ago, it has been reflected on by more recent researchers like Martens in 2011. Their study focused on the relationship between a physical working space and an employee's creativity (Martens, 2011). An in-depth analysis of existing research was executed to assess these relations, and ten interviews with creative leaders of multiple organizations were conducted (Martens, 2011). In their analysis, the creativity definition supported the previously suggested one (Amabile et al., 1996; Martens, 2011). In other words, although the first definition was created some time back, it is still considered relevant, with more modern academics defining it as a production of "new and valuable" work, where new is known as "unique, … original," and valuable is "useful, effective, efficient" (Martens, 2011, p. 65).

Furthermore, in their research of teenagers' creativity online, Jansz et al. (2015) focused on everyday creativity. Everyday creativity was defined in their research as "a social process that generally includes mundane activities in order to produce something that is novel and of value to both the creator and, often, a wider social group" (Jansz et al., 2015, p. 144). It can be seen that although not explicitly stated in their research, the definition used for everyday creativity has rooted in the earlier established definition of Amabile et al. (1996; Jansz et al., 2015).

Looking into the research of workplace creativity, and specifically, self/everyday creativity, Schepers and van den Berg (2007) defined creativity in the workplace "as the tendency of employees within an individual work environment to produce novel ideas that are useful in an organization" (p. 408). Here it is seen that the definition originated from definitions introduced by Amabile et al. (1996) and Martens (2001). However, it is reshaped to fit a specific area of society, as suggested by Kaufman (2012). The workplace creativity definition is focused on the process of developing new ideas that contribute to innovation, just like the definitions proposed by previous researchers (Amabile et al., 1996; Martens, 2011; Schepers & van den Berg, 2007). Furthermore, all the definitions described so

far focus on the end-product of a creative process, specifically ideas or solutions, which makes these definitions "goal-oriented" (Tierney et al., 1999, p. 593). Therefore, it can be concluded that although it is suggested that creativity can take on different definitions based on domains and areas of society, it is still generally the same and seems to only adjust to the task at hand (Amabile et al., 1996; Kaufman, 2012; Martens, 2011; Schepers & van den Berg, 2007; Tierney et al., 1999).

2.4.3. Role of Creativity

So far, the various creativity research illustrates that it is a complicated and in-depth concept that can appear in different shapes and forms (Amabile et al., 1996; Beghetto, 2006; Kaufman, 2012; Martens, 2011; Schepers & van den Berg, 2007; Tierney et al., 1999). With such extensive research into creativity, the question is, why does creativity matter? Creativity is the first step toward innovation that plays such a vital role in the modern corporate and business environments to stay competitive (Tierney et al., 1999).

With the quick development of rules and regulations in various industries, creativity works as a strategic mechanism for adjusting to these new conditions, enabling businesses to stay more competitive (Schepers & van den Berg, 2007; Zhou & George, 2001). As music can improve cognitive tasks, including creativity, it can potentially boost businesses' competitiveness. Individual creative initiatives can create new ideas, the implementation of which is considered an innovation that takes companies to the next competitive level (Tierney et al., 1999; Zhou & George, 2001).

2.5. External factors influencing creativity

Current research majorly considers individual creativity because of personal preferences, differences, and beliefs (Amabile et al., 1996; Beghetto, 2006; Schepers & van den Berg, 2007; Tierney et al., 1999). Importantly, background music's effects on creativity are influenced by individuals, their perceptions, and background factors, as established in the previous research of Lesiuk (2005) and Neuman et al. (2016).

In 2005, Lesiuk tested the effects of music on the quality of work of computer information systems developers in the form of an experiment. When assessing the quality of work of participants and how they experienced listening to music, they also considered individual experiences with music as well as individual differences (Lesiuk, 2005). Among the findings of their research, it was concluded that when the experiment condition (listening vs. non-listening to music) fits the personal preferences of a participant, music had a positive effect of reducing tension rather than causing anxiety in an alternative case (Lesiuk, 2005). Furthermore, Lesiuk (2005) found that extroverted people were generally more likely to have a better quality of work when listening to music compared to introverted participants. Concluding from Lesiuk's research (2005), it can be noted that both

personality traits and various personal preferences for listening to music should be considered in the research of background music's effects.

Similarly, Neuman et al. (2016) looked into the role of personality in relation to music in their research of personality and music genres. Neuman et al. (2016) have conducted two studies on the basis of their research. In their research, they tested "a novel methodology for automatic text-based personality analysis" on two different datasets as well as an "automatic classification of music genres" based on lyrics and personality traits (Neuman et al., 2016, p. 1047, 1052). The conducted study illustrated that there is indeed a relationship between personality traits and preferred music genres (Neuman et al., 2016). Therefore, it can be concluded that in this research, it is also needed to consider not only the personality traits of music listeners but also their preferred music genres.

Nevertheless, as the research was based on lyrics, which appear to a different extent in various music genres, this connection between music genres and personality genres could be considered flawed for this research. More specifically, it can be argued that the research conducted is not generalized to the music genres without lyrics, which are the most positively influencing music on creativity and are majorly considered for this thesis (classical and DEH music genres). Therefore, although this research will consider the importance of personal preferences and personalities, it will not consider the personality divisions proposed by Neuman et al. (2005).

2.5.1. Personality traits

Hence, personality may influence how the employee experiences background music and, therefore, influence how this music affects their work creativity (Neuman et al., 2016). Personality and personality traits have been studied extensively within the field of psychology (Bazzani et al., 2017; Gosling et al., 2003, p. 506; Küssner, 2017; Neuman et al., 2016, p. 1045). As a result, in this field, personality traits are understood as "patterns of thinking, feeling, and behaving" (APA, 2014, as cited in Bazzani et al., 2017, p. 145). Following this definition, many systems and models have been created to measure an individual's "stable features" that may have an influence on various areas of one's life (Bazzani et al., 2017, p. 145; Neuman et al., 2016).

The most influential personality model, created back in the 1990s and extremely relevant to date, is the "Five Factor Model (FFM) of personality," also known as the "Big-Five personality dimensions" (Gosling et al., 2003, p. 506; Neuman et al., 2016, p. 1045). The five factors within the model are "openness to experience," referring to a person's intellectual and mental activities, "conscientiousness," describing goal-oriented and organized behavior, "extraversion," which refers to a person's sociability, "agreeableness," defining person's cooperativeness and trustworthiness, and lastly, "neuroticism" relating to emotional stability and stressfulness (Bazzani et al., 2017; Neuman et al., 2016, p. 1045). This model is also known by its abbreviation "OCEAN" (Bazzani et al., 2017, p. 146).

Looking more specifically into the relation between background music effects and personality traits, it is found that extroverted people benefit from having music in the background, while introverts tend to work better in silence or natural work environment (Boer & Abubakar, 2014; Küssner, 2017). Extraversion appears to be the most researched within OCEAN personality traits (Küssner, 2017). Although there has been no direct correlation found between other personality factors, background music, and creativity, it is vital to consider all five personality factors when assessing the external effects as it may potentially fill in the academic gap (Bazzani et al., 2017; Boer & Abubakar, 2014; Küssner, 2017; Neuman et al., 2016).

Often, researchers attempt to assess OCEAN in relation to various cultures and countries (Boer & Abubakar, 2014; Schmitt et al., 2007). Although a relationship between the Big Five and various models of cultural differences are connected, research also suggests that it is problematic to compare personality traits and cultural differences (Boer & Abubakar, 2014; Schmitt et al., 2007). Some of the reasons for that are globalization and the mix of historically existing cultures with each other (Schmitt et al., 2007). Furthermore, considering the intersectionality of cultural differences, it can be noted that people within the culture do not necessarily identify with it (Schmitt et al., 2007). Therefore, cultural differences should not be a priori connected to personality traits of people, which lead to cultural differences not being considered in this research as an externally influencing factor (Schmitt et al., 2007). Considering these findings from previous studies, for this research, the focus falls on the personality differences rather than cultural differences, as it is assumed that cultures are incorporated differently by everyone, therefore adjusting their personality traits rather than cultural ones.

2.5.2. Personal preferences

Besides personality factors, researchers have looked into the influence of personal music preferences on the effects of background music (Huang & Shih, 2011; Lesiuk, 2005; Newman, 2016; Shih et al., 2016). In regard to personal preferences. Huang's and Shih's (2011) study suggests that cognitive task performance changes drastically when one is exposed to the music they strongly like or dislike. More specifically, in their research, participants had lower attention scores when they were listening to music that perfectly fit or did not fit their personal preferences (Huang & Shih, 2011). Taking into account the effects of favorable and unfavorable music genres, it is assumed that neutral music (neither strongly liked nor strongly disliked) can have a more positive effect on cognitive tasks, including creativity (Huang & Shih, 2011). Similarly, research by Threadgold et al. (2019) proposes that listening to "liked" music improves creative spatial task activities in comparison to quiet environments (p. 875). As a result, the research expects that listening to neutrally liked music is the most beneficial for creative activities (Huang & Shih, 201; Threadgold et al., 2019).

Furthermore, some research found a connection between personal music preferences and the effects of background music based on the emotions developed from listening to music (Lesiuk, 2005;

Newman, 2016; Shih et al., 2016). Emotion-related experiences are extremely personal, as music can develop different emotions for each listener (Lesiuk, 2005). Not only can music enhance personally different emotions, but it also influences different moods (Shih et al., 2016). Although it is seen that emotions and mood created from the music can influence the effects of background music, the emotion developed may differ from day to day as well as "an individual's unique past experiences" and doings of the day (Lesiuk, 2005, p. 174; Newman, 2016). Therefore, emotion and mood may not always be considered in research into music effects, following the parsimony principle, this research did not consider all the potential effects on a person on a given day.

Another consideration that appears in personal music preferences is the approach to listening to music: via headphones or speakers (Newman, 2016). While this can often depend on the specific office environment, it is also seen that there are reasons why some may prefer one over another (Lesiuk, 2005; Newman, 2016). This way, employees often prefer to listen to music in their headphones, as it gives them music choice as well as connects to themselves (Newman, 2016). Furthermore, listening to music alone can help one choose the preferred music and specifically the one that can help them relax (Lesiuk, 2005). On the other hand, people may struggle with hearing problems or dangers, which leads to them listening to music via speakers (Newman, 2016). Listening to music via speakers can also encourage employee socializing (Newman, 2016).

Nevertheless, some people prefer not to listen to music in their everyday lives, which can worsen their experience with background music (Newman, 2016; Shih et al., 2016; Threadgold et al., 2019). While some prefer not to listen to music in their daily lives, others enjoy listening to music only outside work (Shih et al., 2016; Threadgold et al., 2019). For these employees, it can be especially complicated to escape noises and distractions in the office, as they prefer not to listen to music in their headphones as well as may struggle working when music is turned on speakers (Newman, 2016; Shih et al., 2016).

Some may argue that these personal preferences are directly linked and are even part of the personality, connected to personality traits (Shih et al., 2016). For example, researchers like Neuman et al. (2016) attempt to build a connection between personality types and preferred music genres. Nevertheless, it is majorly seen that while music preferences and personality traits may indeed interconnect, in this research, these musical preferences are not necessarily part of the personality traits, as the music preferences do not always depend on the personality (Lesiuk, 2005; Shih et al., 2016).

2.5.3. Background factors

Lastly, the research has found that there are a few background factors of employees that may influence the effects of music in the work environment. One of such factors is the biological sex of the employee (Baer & Kaufman, 2008). Before discussing the relationship between biological sex and creativity, it is vital to define biological sex. At this point in society, for decades, there has been a

discussion on distinguishing the differences between sex and gender, which resulted in a rather extensive debate in both the overall academic landscape as well as between several fields (Johnson & Repta, 2011; Unger, 1979). Most of the studies leaned toward focusing definitions of sex on the physical and anatomical aspects of the person, while gender mainly considers the characteristics developed by an individual "in response to the stimulus functions of biological sex" (Johnson & Repta, 2011; Unger, 1979, p. 1086). As a result, sex, which is also often referred to as biological sex, can be defined as "a biological construct that encapsulates the anatomical, physiological, genetic, and hormonal variation" that can be found among people (Johnson & Repta, 2011, p. 19). Following, "gender builds on biological sex to give meaning to sex differences, categorizing individuals with labels such as woman, man, transsexual, and hijra, among others" (Johnson & Repta, 2011, p. 21).

For a long time, both biological sex and gender were conceptualized as highly binary, with only male and female sex and women and men as gender options (Johnson & Repta, 2011; Unger, 1979). This was also noticeable in different research, like personality studies, as personality traits were also extremely gendered, with most of them associated as either only male or only female (Johnson & Repta, 2011; Moore, 2007). However, with the development of society, not only have people become freer with identifying themselves as practically whomever they want but also both concepts are now seen as much more fluid and dynamic and are often used interchangeably (Johnson & Repta, 2011; Moore, 2007). Therefore, this research focuses on gender and leaves room for participants to self-identify as they want (Johnson & Repta, 2011; Unger, 1979). As gender is also seen as fluid, people should reserve the right to identify their own gender, as that decreases the chances of marginalization of any group (Wood & Eagly, 2015). Furthermore, self-identification in research increases honesty and openness in participants' responses (Wood & Eagly, 2015).

When it comes to the effect of background music on creativity, it is seen that, indeed, the gender of the listener may affect their creativity potential (Baer & Kaufman, 2008). Baer and Kaufman (2008), in their research into the relationship between gender and creativity, do highlight that various biological explanations show that females are more likely to be creative than males. Although females indeed showed to be more creative than males in various experiments, in the self-assessment of creativity, males were more likely to perceive their creative potential as higher than females (Baer & Kaufman, 2008). Furthermore, although there are often less successful creative females than males, it is often the social constructs of professions (i.e., gendered professions) that limit the opportunities for women while supporting men (Baer & Kaufman, 2008; Johnson & Repta, 2011). While multiple differences among genders were found in previous research, this research considers gender as an external factor in the relationship between creativity and background music.

The second background factor that can influence the background music effects is the listener's age (Baer & Kaufman, 2008). It is suggested that the younger one is, the more likely they are to be creative (Baer & Kaufman, 2008; Wu et al., 2005). In their research, Wu et al. (2005) tested participants' creativity in various age groups. Their results showed that creativity could differ

depending on age and based on the tasks at hand (Wu et al., 2005). As a result, in regard to the spatial tasks, which are seen as the most influenced by music, are, in fact, completed more creatively by younger people (Wu et al., 2005).
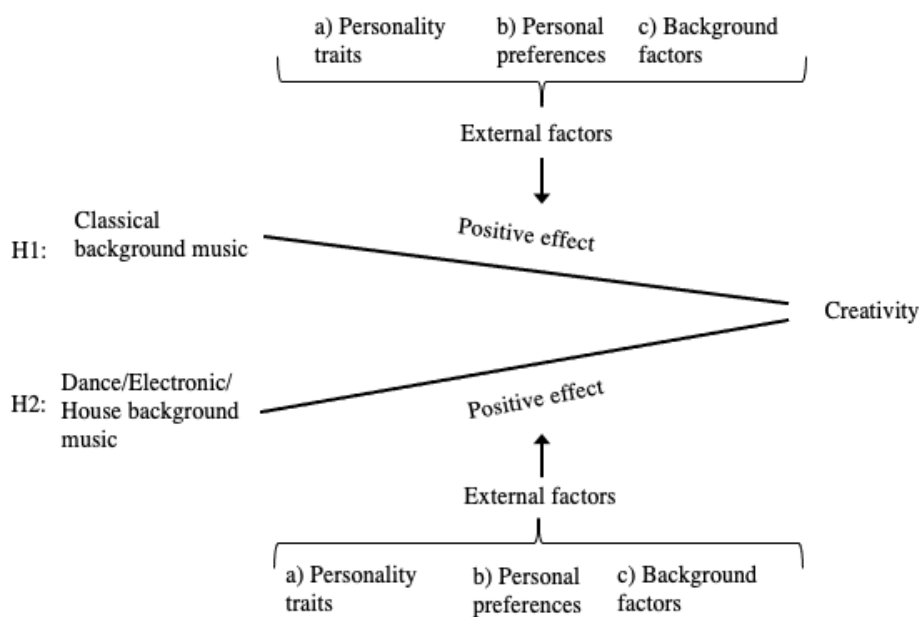
While there could potentially be other background factors that influence the effects of background music on creativity, this research will focus on only age and gender. Nationality and residency of employees are not considered in the research, as one's personality is considered more important than possible cultural differences between people. Furthermore, other background factors have not yet been related to either creativity or background music effects.

2.6. Hypotheses

Following the literature review, eight moderated hypotheses were formulated. According to theory, both classical and DEH music may positively affect employees' creativity in the work environment. However, these effects may be influenced by the listener's personality, music preferences, and background factors (Amabile et al., 1996; Neuman et al., 2016). Therefore, the hypotheses and their model were created (Figure 1).

Figure 1

Hypotheses model

H1a: Classical background music has a positive effect on creativity moderated by personality traits.

H2a: Dance/Electronic/House background music has a positive effect on creativity moderated by personality traits.

H1b: Classical background music has a positive effect on creativity moderated by personal music preferences.

H2b: Dance/Electronic/House background music has a positive effect on creativity moderated by personal music preferences.

H1c: Classical background music has a positive effect on creativity moderated by background factors.

H2c: Dance/Electronic/House background music has a positive effect on creativity moderated by background factors.

3. Methodology

With the extensive previous research into the effects of background music, this research aims to test the formulated hypotheses. Therefore, the method selected for this research is deductive, which means that it "moves from the general to specific" data testing the expected pattern of hypotheses (Babbie, 2011b, p. 23). Considering that the research is deductive, a quantitative research method was selected for this research, which is a commonly used method in deductive research (Babbie, 2011b). Although quantitative research may sometimes be less detailed than qualitative research, quantifying data leads to more explicit observations and better generalization of the data (Babbie, 2011b). For this research, the quantitative research method enables the researcher to make general observations on the effects of background music on listeners based on the extensive previous research conducted by other academics. Furthermore, with fewer and predefined variables in this research (e.g., creativity, personality traits, music preferences, background factors, music), quantitative methods can help ensure the accuracy and objectivity of applying variables and testing relationships between them (Babbie, 2011b).

3.1. Method selection

Much of the previous research on the effects of background music and creativity, like Threadgold et al. (2019), Huang and Shih (2011), Lesiuk (2005), and Baer and Kaufman (2008), involved the application of experimental methods. The RQ of this thesis focused on the differences in effects of classical and DEH background music on creativity in the workplace. The research's population was employees of technical companies, which are known to strive for innovation (Lesiuk, 2005). This population is rather large, so it was hard to observe directly. Furthermore, this research involves a comparison between different music genres, which potentially limits the choices within quantitative methods (Babbie, 2011a). As a result, from a wide variety of quantitative methods, an experiment, specifically a quasi-experiment, was selected (Babbie, 2011a; White & Sabarwal, 2014). Similarly to other quantitative methods, they can cover a broader participant scope (Babbie, 2011a). However, unlike other quantitative methods like survey and content analysis, an experiment can test the effects of one variable on another by applying a manipulation method, in this case, background music, to answer the RQ (White & Sabarwal, 2014). Quasi-experiments are especially useful when applied to research in which groups are compared (White & Sabarwal, 2014). Additionally, not only can a quasi-experiment test the effects between variables, but it also allows the use of multiple variables and moderators, as needed for this research (White & Sabarwal, 2014).

A common quasi-experiment design involves two stages: manipulation of behavior and observation of the effects of this manipulation (Babbie, 2011a). In this research, the behavior manipulation was done by asking participants to listen to music, while the observation of effects was executed with a survey. Quasi-experiments can take on different forms depending on the goal and

settings of the experiments (Babbie, 2011a). For example, an experiment can take place in real-world settings as well as in scientifically manufactured settings (Babbie, 2011a). More specifically, scientifically manufactured experiments are conducted in completely controlled conditions and often occur in the experimental lab or room to avoid any external influencers on the effects tested (Babbie, 2011a). Conversely, real-world experiments are only semi-controlled, as participation usually takes place in non-manufactured environments (Babie, 2011a). The real-life approach to quasi-experiments was selected for this research as this approach has higher chances of replication and accurately represents the actual workplace situation (Babbie, 2011a). Being set in the natural environment ensures the validity and generalizability of the research (Babbie, 2011a). Therefore, the quasi-experiment was set to take place in the participants' work environment, considering both office and home office environments to ensure that the findings would be representative of both cases (Babbie, 2011a).

Differentiating between experiments and control groups is a defining feature of any experimental design (Babbie, 2011a; White & Sabarwal, 2014). In quasi-experiments, experimental groups involve the application of the stimulus (i.e., manipulation), while control groups complete the same experiment without the stimulus (Babbie, 2011a). The purpose of having both experimental and control groups is to enable researchers to identify the effects of the manipulation on participants, as this way, it is possible to see the difference between gathered data with and without the stimulus (Babbie, 2011a; White & Sabarwal, 2014). The quasi-experiment, in this case, consisted of three manipulation conditions: classical music, DEH music, and no music. Because this research is a comparative study, the first two conditions served as the comparison groups, while the last was a control group (White & Sabarwal, 2014). These groups are compared as while they come from very different time periods (i.e., classical is old and DEH is rather new), they are expected to be similar in effects, making it interesting to compare.

One of the main advantages of an experiment is the possibility of testing the effects of background music directly by having participants listen to the music while completing a survey (Babbie, 2011a). This use of manipulation positively contributes to the validity of the conducted research, as the effects are observed in the process of listening to music (Babbie, 2011a). Another advantage of the real-world experiment, like in this case, is reassurance that the findings of the experiments can potentially be replicated in non-experimental settings, leading to increased reliability and validity of experimental studies (Babbie, 2011a). Given the context and scope of the research, another advantage is the ease of conducting the study, as it is normally cheap, fast, and relatively small in the number of participants (Babbie, 2011a). This ease of study replication positively contributes to the experiment's reliability and the generalizability of experimental studies (Babbie, 2011a).

Nevertheless, experiments may also have disadvantages. For example, there are risks that the effects found through the real-world experiment appeared not from the stimulus but from other

external factors that were not controlled by the experiment (Babbie, 2011a; White & Sabarwal, 2014). Still, with sufficient previous experimental research, it is possible to prevent or predict the effects of external effects on the experiment (Babbie, 2011a). To prevent the risk of unknown external factors influencing the effects of background music, some of the theoretically predicted factors were also measured during the experiment. More specifically, personality, personal preferences, gender, and age could all be external influencers on the relation between music and creativity and therefore were measured as moderators in this research. Another disadvantage is that while real-world quasi-experiment aims to create a natural environment, it is still controlled, which means that participants may feel uncomfortable in a controlled setting, or the environment may appear to be non-natural for participants in the end (Babbie, 2011a). In order to limit the controlled feeling of the experiment, participants were given plenty of freedom to select in which of the work environments (office or home) and what time to participate in the experiment.

3.2. Ethical considerations

When conducting research, it is vital to consider the ethics of the research. One of the main ethical risks in the experiment is misleading participants (Babbie, 2011c). More specifically, when introducing and inviting participants to take part in the survey, they are not told the whole purpose of the experiment to avoid bias (Babbie, 2011c). To ensure that participants understand the conditions of voluntary participation in the experiment, informed consent from participants is required (Babbie, 2011c). Therefore, before beginning the survey (the main part of the experiment), participants were asked to give their participation consent to the survey's first question. The research took place among adults, and the researcher followed the rules of ethics and confidentiality, therefore, participants' consent and awareness of the research are considered sufficient to avoid ethical risks.

Besides informed consent, there are other ethical considerations in quantitative research, for instance, the role of the quantitative researcher (Babbie, 2011c). Unlike in qualitative research, in quantitative the role of the researcher is not as explicit (Babbie, 2011c). Nevertheless, the researcher must remain objective throughout the research to ensure its truthfulness (Babbie, 2011c). This way, it is vital that the researcher creates the hypotheses based on the existing theory and does not manipulate participants' thoughts and answers (Babbie, 2011c). Furthermore, the collected data should not be manipulated after the research takes place and not adjusted to fit the hypotheses. In order to ensure the objectivity of the researcher, extensive research into the existing literature on creativity and background music was conducted to create the hypotheses for this study. Next, the full purpose of the research was omitted in the invitation to experiment, limiting the bias of potential participants. Moreover, the researcher did not discuss their experiment responses with participants until the analysis was conducted and the findings were concluded. Lastly, to ensure the objectivity of data, it was directly downloaded from the Qualtrics software, where data gathering took place.

3.3. Sample and Sampling Procedure

The research's population was employees of technical companies. Due to the research's feasibility and access to the target audience, non-probability sampling procedures were selected. Non-probability sampling refers to the methods that rely on research participants' availability and specific criteria (Babbie, 2011c). Although probability sampling of a random selection of research participants is more common and often considered better in social research, non-probability techniques are as useful and provide valid and reliable results (Babbie, 2011c).

The participants were selected through convenience and snowball non-probability sampling (Babbie, 2011c). Convenience sampling was selected as one of the methods, as volunteers from the researcher's network could join the experiment (Babbie, 2011c). Following this, these volunteers were able to encourage their colleagues to also participate through snowball sampling, therefore expanding the participation (Babbie, 2011c). Furthermore, these sampling techniques were feasible for the research's scope and ensured voluntary participation. In order to ensure validity and generalizability of the experiment's results, the sample size was set at a minimum of 20 people per condition and 20 people for the control group (Babbie, 2011c). As a result, the overall sample of the experiment was developed to be over 60 people to be considered valid.

In order to ensure that all the participants were part of similar work environments, specifically where creativity is not limited but encouraged, sampling was focused on one company (Babbie, 2011c; Schepers & van den Berg, 2007). The invitation was first sent within the Dutch company Riscure, where the researcher works as a part-time employee. Riscure works in the device security industry and has an open-floor workplace that encourages engagement, potentially creating many distractions for some employees (Martens, 2011; Riscure, n.d.; Schepers & van den Berg, 2007). Creativity is known to be encouraged at Riscure based on the experience of the researcher and the company's core values, one of which is "maximizing (y)our creative potential" (Riscure, n.d., para 3).

3.4. Experiment design

The experiment aimed to test participants' creativity on spatial tasks while listening to the music selected by the researcher. This way, after participants signed up for the experiment and received the instructions, they listened to classical, DEH music, or no music (depending on their assigned group) and answered questions about themselves as well as spatial problem-solving tasks, which assessed their creativity.

The first step of preparing the experiment was conceptualizing and operationalizing the main variables. These operationalized variables were used to create a questionnaire. The next step was identifying the stimulus, more specifically, the music used in the experiment. To ensure that the music

selected fit the study's purpose, the manipulation check took place. When the stimulus and questionnaire were created, the invitation to the target audience was sent. First, participants registered were asked to participate in a pilot test. After the pilot test, the necessary improvements were made and began. After the experiment was concluded, the data was cleaned and analyzed.

3.4.1. Operationalization

Before starting the questionnaire design, the main concept had to be operationalized. As this research was rooted in the previous research, many different theories and definitions have been brought up in the Theoretical Framework chapter. Therefore, it was vital to identify the conceptual focus of this research as well as how these concepts were measured in the questionnaire (Babbie, 2011b). The main concepts that were operationalized were creativity, personality, music preferences, and background factors. For each variable, a definition, indicator, category of measure, and scale were defined.

Creativity for this research is defined as the process of creating new and innovative ideas and solutions, and it is measured on the level of creativity on spatial tasks (Amabile et al., 1996). The next variable was personality which, based on previous research, was defined as personality traits unique to each person. There are five commonly used personality traits OCEAN that served as indicators. Music preferences were defined as the way one listens to music in everyday life. Indicators of music preferences were preferred music genres, frequency of listening to music in everyday life, frequency of listening to music at work, and listening source. Lastly, background factors were defined as factors that one is born with and identifies themselves as. Here, background factors were self-identified gender and the actual age of participants.

Table 1

Operationalization of key concepts

Variable	Definition	Indicator	Category of measure	Scale
Creativity	The process of creating new and innovative ideas and solutions	Level of creativity	Ordinal	3-point-Likert Scale
Personality	Personality traits that are unique to each person.	1. Openness to experience 2. Conscientiousness 3. Extraversion 4. Agreeableness 5. Neuroticism	Ordinal	5-point-Likert Scale

Music Preferences	The way one listens to music in everyday life	1. Preferred music genres 2. Frequency of listening to music in everyday life 3. Frequency of listening to music at work 4. Listening source	1. Nominal 2. Ordinal 3. Ordinal 4. Nominal	1. 12 music genres 2. 5-point-Likert Scale 3. 5-point-Likert Scale 3. 3 source options
Background factors	Demographic factors that one is born with and identifies themselves as	1. Self-identified gender 2. Age	1. Nominal 2. Ordinal	1. 4 options 2. 6 age groups

3.4.2. Questionnaire

The survey, filled in while listening to music, consisted of 4 parts and was created on the Qualtrics software. Qualtrics software was used to ensure the consistent gathering of data and safe research data storage. First, the participant answered some questions about themselves. They were asked to identify their age and gender as part of the background factors. Secondly, the participants self-reflected on their personality based on the previously validated by other researchers "Ten-Item Personality Inventory (TIPI)" (Gosling et al., 2003, p. 525). TIPI is a short measure of the personality based on the Big-Five personality dimensions described in the Theory chapter (Gosling et al., 2003; Neuman et al., 2016). Thirdly, participants were asked a few questions about their everyday engagement with music and their music preferences. Here, they first indicated the frequency of listening to music on a daily basis and at work as well as preferred music genre and source of listening (i.e., headphones or speakers).

The next section of the survey covered questions testing employees' creativity. This section consisted of two types of questions: open and closed. Although creativity has been extensively researched before, none of the existing scales were suitable for this research, as they did not assess creativity on spatial tasks. Therefore, the researcher created both the questions measuring creativity and the scales. In order to ensure that questions would indeed measure creativity, two sources of inspiration were used: academic and non-academic. First, existing academic scales of self-measuring of creativity and creative actions, such as scales described by Zhou and George (2001), Kaufman (2012), and Schepers and van den Berg (2007), were used to understand who a creative person is and what ideas are considered new and innovative. Therefore, these scales were used to come up with answers for close questions as well as served as the basis for open questions' assessment of creative and non-creative answers.

Furthermore, various non-academic questionnaires could be used to devise several spatial tasks that could be measured. Examples of such non-scientific questionnaires are from BuzzFeed,

Lifehack, and HowStuffWorks websites (Lobanova, 2018; Schwandt, n.d.; McGlocthlin, n.d.). As these questionnaires are not scientific, they were not used for creating scales or measures but only to deepen the researcher's understanding of what kind of spatial tasks may require creative solutions in the office. The result of investigating these non-academic surveys was the creation of such creativity tasks as coming up with the topic of a blog post, improving an intranet, and a way to present a project in a workplace.

Both open and closed questions asked participants to solve a problem, such as a spatial problem in their office, as the literature suggests, music affects spatial tasks the most (Küssner, 2017; Thompson et al., 2001; Threadgold et al., 2019). For closed questions tasks, the participant was presented with a choice of three predetermined answers that were different for each question. The researcher assigned all the answers into three categories: non-creative, semi-creative, and creative. The first question asked the participants to come up with a way to spend Friday evening with colleagues in the office, choosing from regular drinks to themed parties. Next, the participants were asked to choose a preferred way of presenting a project, from a speech to a short video. Following, participants were offered to choose a method of improving the company's intranet. The last closed question task was to organize the tables and chairs in the canteen for drinks in the office. For the last closed question, a photo stimuli was used to provide participants with a visual explanation of the problem (see Figure 2).

Figure 2

Office Canteen photo stimuli
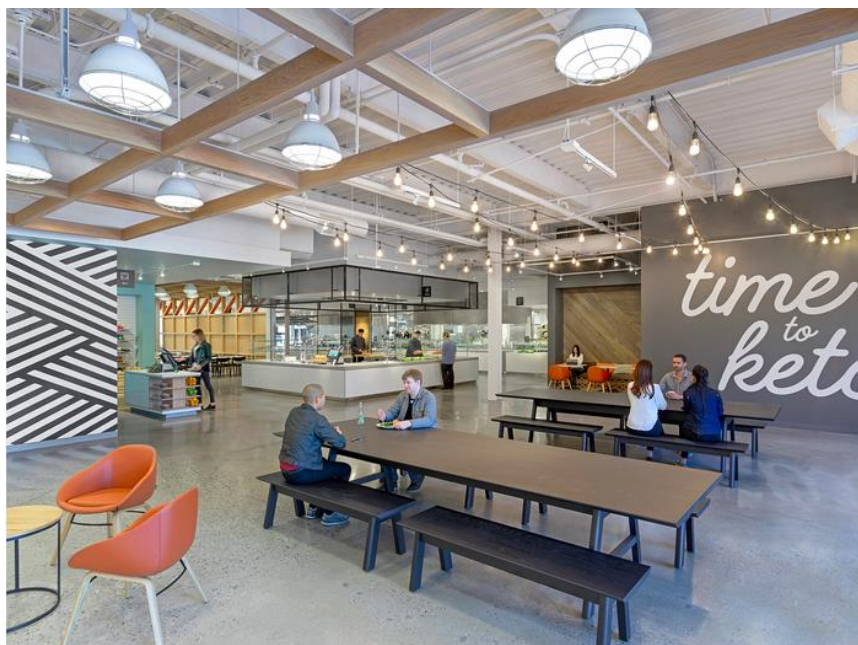
Note. Rico. (n.d.). The State of the Office: Social Areas. Pinterest. https://pin.it/4Ng7nwz

As there was potential that employees had an even more creative idea, participants were offered to answer open questions by filling in a short answer in a text box. The first open question asked participants to devise a solution for improving and cleaning up an office that is overfilled with desks and documents. For this question, another photo stimuli was used (see Figure 3).

Figure 3

Overfilled With Desks and Papers Office photo stimuli

Note. Landau, P. (2014, Sep 29). Open-plan offices can be bad for your health. The Guardian, https://www.theguardian.com/money/work-blog/2014/sep/29/open-plan-office-health-productivity

The next open question asked participants to develop the blog post topic they would write if given a chance. With the last open question, participants were asked to repurpose an empty room in the office.

People tend to spend different amounts of time on problem-solving tasks; therefore, the time limit was not set to give participants the freedom and space to come up with the best solutions. Lastly, the participants were asked to self-reflect on how the music has affected their answering process. The full questionnaire can be found in Appendix A.

3.4.3. Manipulation check selection and testing

Both classical and DEH music have dozens of compositions, therefore, a precise selection of music compositions for background music's manipulation of the independent variable was needed. Firstly, happy music was selected to ensure that it did not create a negative mood (Newman, 2016; Threadgold et al., 2019). Considering the diverse background of potential participants, selecting a music composition that was neither known nor unknown by everyone was not feasible. Furthermore, the intensity of music compositions was judged, as the goal was to find light music that positively influences creativity (Huang & Shih, 2011; Newman, 2016).

As the researcher has long-standing experience and knowledge in classical music, the composition for this condition was selected by her. Although much of background music's research focuses on Mozart's compositions, in Western Europe, specifically in the Netherlands, where Riscure is located, it is highly likely that many people are familiar with Mozart's music (Lesiuk, 2005; Newman, 2016). The familiarity with Mozart's music makes it more likely to be distracting during creative tasks (Threadgold et al., 2019). Therefore, the focus fell on the compositions of Tchaikovsky, known to be inspired by Mozart (Mason, 1947; Stolova et al., 2010). Although Tchaikovsky is still known worldwide, he is much less known than Mozart in Western Europe, so there is a smaller chance that participants will recognize these compositions (Mason, 1947; Stolova et al., 2010). As a result, the complied playlist consisted of nine compositions selected by the researcher from different periods. Before the composition was added to the playlist, it was listened to by the researcher and assessed on its mood and intensity. In other words, the criterion for the music selection was that only happy and light music could be added to the playlist.

As for DEH music, the researcher has less experience with this music genre. Therefore, she reached out to her network via Instagram to ask for recommendations from those who listen to DEH music regularly. Seven people responded to the request and shared various songs based on the criteria of the experiment (i.e., happy and light music). The researcher then reviewed all the songs to ensure they served the process sufficiently. This led to a playlist of 14 compositions. Both playlists lasted around 40 minutes, which should have been sufficient to complete the questionnaire.

In order to ensure that the selected music performs as expected, a manipulation check was conducted. This check aimed to test how people perceive the manipulation of the independent variable (Tye-Williams, 2018). For the manipulation check, the researcher asked 10 people in her network to listen to the created playlists and answer a few questions on how they think the music fits the research and its purpose (Tye-Williams, 2018). Of these ten, eight people participated in the manipulation check, half of which self-identified as male and the other half as female. Additionally, five out of eight participants were aged between 20 and 30, while the other three were between 45 and 60. The goal behind having mixed ages and genders was to ensure that music was perceived as fitting the criteria for all different participants in the experiment (Baer & Kaufman, 2008).

3.4.4. Participant invitation and pilot testing

The invitation to employees of Riscure was sent via email and published on the intranet. The invitation included a brief introduction of the research, the researcher's contact details, and a link to a sign-up website where employees could leave their names and contact information. The goal of assessing creativity was not mentioned to avoid participant bias (Babbie, 2011c). In other words, the experiment's goal was omitted from the invitation to ensure that participants were not adjusting their answers to appear more favorable (e.g., more creative) (Babbie, 2011c). The invitation to the experiment also asked volunteers to invite their colleagues to participate in the experiment. The

second invitation was sent out a week after the first with an additional reminder for those already participating in completing the experiment. Furthermore, the researcher also invited her colleagues to participate in the experiment in the face-to-face conversation in the office. Originally it was planned to conduct the experiment for 2 weeks. However, the experiment took around 4 weeks to ensure that everyone had the opportunity to participate.

Previous research suggests that strongly liked or disliked music can negatively influence participants' experiences with music and the experiment. Unfortunately, "perfect[ly] matching" participants to conditions based on their music preferences were expected to be complicated with people having specific and unique music preferences, and beyond this research's scope (White & Sabarwal, 2014, p. 2). Therefore, probability selection was used to assign participants to conditions (Babbie, 2011c). This way, a list of all signed-up participants was created. Then, starting from the first person on the list, all participants were assigned a group number from one to three, where one was classical music, two was DEH music, and three was no music. When new participants signed up, they were added to the bottom of the list and the number assigning continued.

After participants were assigned to conditions, they received an email consisting of experiment instructions, a survey link, and the music of the condition in the form of a link to a YouTube playlist. The instructions first asked them to complete the experiment in their regular work environment in their office or home office. Next, those in the classical or DEH music groups were asked to turn on the playlist before starting the experiment, and it was noted that they should not turn off the music before the experiment was completed. At the same time, the control group participants were asked not to listen to any music while completing the survey.

The experiment was pilot tested on the first 12 participants signed up for the experiment. Besides completing the experiment, these participants were asked to reflect on their experiment experience and suggest improvements (Frey, 2018). Following the pilot, the experiment was improved before conducting the final experiment (Frey, 2018). This way, participants of the pilot test majorly suggested changes to the design and interface of the experiment and instructions with no comments to questions themselves. The only questions or concerns raised by participants on the questions were determined (by them and the researcher) to be caused by the purposeful omission of the study's detailed purpose. In other words, if participants knew the goal of the experiment, the purpose of specific questions would have been clear to pilot participants. After improving the experiment based on the feedback from pilot participants, the experiment instructions were distributed to the rest of the participants, and another invitation to participate was distributed among Riscure employees.

3.4.5. Data clearing and analysis

After the experiment was concluded, the data of 69 participants were exported from Qualtrics. First, the data was cleaned, for example, removing invalid responses. This way, three responses were

considered invalid, as participants admitted to listening to music during the completion while being in the control group. Next, unneeded variables like IP address and completion time were removed, as they were not needed for the analysis. Following, missing values were identified within the data and were replaced with a 0.

The last step in the cleaning process was to convert the open questions' replies for creativity tasks with an ordinal value (from the least creative to the most creative). These were assessed by the researcher based on the inductively created criteria. In other words, looking at the first 10 responses, the researcher identified the pattern within the responses used to assess the rest of the responses. In doing so, the researcher aimed to stay close to the scales of closed questions, identifying common least, medium, and most creative answers. As a result, responses were clustered into three criteria, with sample responses identified in Table 2. Here, for the first open question, the least creative answers covered the reorganization of space. The more creative answer involved mentioning plants and colors, and the most creative one involved all of the previous answers but also suggested adding more floors and creative furniture (see Table 2). When it came to the blog topics in the next question, the least creative topic focused on work-related content, the medium creative involved any hobby of a person, and the most creative usually involved very in-depth social relevant topics that require more research than just it being the hobby (see Table 2). The last question asked participants to choose use for the empty room in the office, where the least creative answers were most convenient for the work, the medium creative was fun-related, and the most creative answers stood out and could involve both convenience and fun (see Table 2). Following the cleaning of the data, the researcher started to immerse herself in it with the use of descriptive statistics, creating additional variables, and testing hypotheses (Privitera, 2015).

Table 2

Sample scales for open creativity questions

Question	Scale	Sample answer
Q18: Imagine that office in the previous photo is your office. The goal is to change the interior of the space to make it more free, friendly, and appealing to work at. Management asked your opinion. How can you improve it?	1 – least creative	"Rotate the desks in such a way as to creating more walk ways between the work spaces. If possible, remove some of the pillars as they make the space more cramped."
	2 – medium creative	"Add more colors, make it a more informal setting, some pop of colors through chairs, painitng, plants."

	3 – most creative	"The Floor's high, so it should be possible to make more levels. This should free up enough space for rest areas. Add more plants and flowers Don't remember exact stuff each employee keeps on their desk, but it looked like an accounting office => more cabinets/shelves would help to hide most of the mess and free up some space."
Q19: You are invited to write a blog post. It can be about any topic at all, not necessarily related to the work. What would you write about? Can you describe it briefly?	1 – least creative	"At the moment I would write about some specific vulnerability and how to exploit it to get other type of "secrets". This to show different implication of the typical vulnerability that end up in the news every once in a while. I would also highlight some specific new methodology used to exploit that vulnerability if any."
	2 – medium creative	"About some strategy on a specific game. I would take a game (computer, board) that I really enjoy playing and would explain the possible strategies to be used on it"
	3 – most creative	"Importance of music education of young children; making it mandatory for all primary schools. Music stimulates the brain in many different ways, with positive

		effects in other subjects at school."
Q20: There is a big spare room in the office. The management asks your opinion on what to do with that room. What would you suggest?	1 – least creative	"Make it a silent room with limited number & reservation for colleagues who will need concentration."
	2 – medium creative	"video game room - place for employees to socialise, play (maybe even old-school) video games, arcade games, etc."
	3 – most creative	"we make a strip bar out of it and every other week we vote for whom has to do a strip act once a month. You can't be voted a second time and it's obviously gender-neutral."

3.5. Validity and Reliability

To ensure validity and reliability, a few steps were taken in the method design of this research. This way, for the validity of the sampling method, a representative company of the organization was selected in the form of a technical IT company in the Netherlands (Babbie, 2011c). Furthermore, randomization was applied where possible, for example, in allocating the participants in the experimental and control groups (Babbie, 2011c). Although non-probability sampling methods that were applied could potentially limit the validity of the sampling, at the same time increases the voluntary and ethical participation, which in this case was found to be more important (Babbie, 2011c).

Moreover, the research used various existing scales, for example, the TIPI scale (Gosling et al., 2003). However, the existing scales were not found for all the concepts. Therefore, a new scale was created. To increase the validity of these scales, previous research and similar scales were used for inspiration and the basis of the creative tasks (Zhou & George, 2001; Kaufman, 2012; Schepers & van den Berg, 2007). Additionally, the experiment's stimuli validity was ensured with the manipulation check on a diverse group of volunteers (Tye-Williams, 2018).

Simultaneously, to ensure the reliability of the research and limit the external effects on the research, some of these external factors like personality, music preferences, gender, and age were measured as moderators. Next, all participants received standardized invitations and instructions, with the only difference of presence or absence of the music requirements (Babbie, 2011a). The

experiment was set in a real-world environment, which means it measured creativity and music effects in the natural setting for the participants. The natural setting also positively contributed to the reliability and generalizability of the research results (Babbie, 2011a). Supporting the freedom and choice of the natural setting, participants could choose whether to participate in the experiment in their office or home workplace.

4. Results and Findings

After the data cleaning, an overall of 66 ($N = 66$) responses was considered valid and used in the further analysis. First, the sample demographics were analyzed using central tendencies, variances, and correlations (Privitera, 2015). The hypotheses created earlier were tested using Analysis of Variances (ANOVA) and Linear Regression (Privitera, 2015). As the hypothesis also involved the use of moderators, the moderation analysis was done through the Linear Regression and Linear Multiple Regression (Privitera, 2015).

4.1. Results

4.1.1. Demographics and descriptive statistics

Among 66 participants ($N = 66$) in the experiment, almost half were between 28 and 37 years old (47.0%). The next most common age group was between 18 and 27 (21.2%), followed by 38 to 47 (19.7%) and 48 to 57 (12.1%) (see Table 3). Moreover, most of the participants ($N = 66$; 68.2%) identified as male, with the rest, 31.8% identifying as female. None of the participants identified as "Other" gender or did not state their gender.

Table 3

Age distribution of participants

Age group	*n*	*%*
18-27 years old	14	21.2
28-37 years old	31	47.0
38-47 years old	13	19.7
48-57 years old	8	12.1

Note. $N = 66$.

Looking into the general music preferences of the sample ($N = 66$), 56.0% of participants listen to music often or all the time on a regular basis, with 37.9% listening to music sometimes and only 6.1% almost never listening to music. No one among the participants indicated that they never listen to music. Considering the daily use of music, fewer people noted that they listen to music during work, with only 36.4% of participants listening to music often or all the time. At the same time, 34.8% of participants listen to music sometimes, and 28.8% of participants never or almost never listen to music while working. Interestingly, there is a strong relationship between people listening to music on an everyday basis and at the workplace, $r (66) = .69$, $p < .001$. This positive relation means that the more one listens to music in their daily lives, the more likely they are to listen to music in their workplace. Furthermore, the majority of participants (71.2%) listen to music via headphones, with only 19.7% of those listening to music at work ($N = 60$) doing so via speakers.

Among the preferred music genres, Pop was the most popular one with 27.3% of participants selecting it, followed by Other music genres not mentioned in the list, as the second most popular

option, selected by 22.7% of participants $N = 66$, and Rock being the third most common preferred music genre (selected by 21.2% of participants). The next most common options selected by 19.7% of participants were Classical music, Instrumental, and No music preference. The rest of the music genres were less popular but still listened to: Alternative (16.7%), Jazz (13.6%), Techno (12.1%), Hip-hop/Rap (10.6%), Country (6.1%), and Hardly ever listen to music (1.5%) (see Table 4).

Table 4

Music genre preferences of participants

Music genres	*n*	*%*
Classical	13	19.7
Rock	14	21.2
Techno	8	12.1
Pop	18	27.3
Country	4	6.1
Instrumental	13	19.7
Jazz	9	13.6
Alternative	11	16.7
Hip-Hop/Rap	7	10.6
No preference	13	19.7
Other	15	22.7
Hardly ever listen to music	1	1.5

Note. $N = 66$.

Investigating the personality traits of participants, first, new variables for each personality trait were created based on the existing scale used in the questionnaire (Gosling et al., 2003). As a result, each new variable (i.e., Openness to Experience, Conscientiousness, Extraversion, Agreeableness, and Emotional Stability, also known as Neuroticism) was an average of two variables measuring this personality trait. Reliability analysis was not conducted for these newly created variables as they were based on the preexisting scale used in the questionnaire and have been proven reliable by previous researchers (Gosling et al., 2003). Based on these newly created variables, each of which was measured on a 5-point-Likert scale, on average, participants self-identified as rather open to experiences, *Mo* = 4.5, *Mdn* = 4, as well as rather diligent, *Mo* = 4, *Mdn* = 4 (see Table 5). At the same time, many participants reported being more introverted than extroverted, *Mo* = 2, *Mdn* = 3, and most reported to be emotionally stable or limited on neuroticism, *Mo* = 4, *Mdn* = 3.5 (see Table

5). Lastly, most of the participants scored on average in the middle (i.e., neither agree nor disagree) on their level of agreeableness, $Mo = 3$, $Mdn = 3.5$ (see Table 5).

Table 5

Central tendencies of Personality Traits

Personality Trait	Mode	Median	SD
Openness to Experience	4.5	4	.70
Conscientiousness	4	4	.82
Extraversion	2	3	1.02
Agreeableness	3	3.5	.70
Emotional Stability	4	3.5	.82

Note. $N = 66$.

In order to assess the overall creativity of participants, a new variable had to be created. First, a Factor Analysis was conducted on the 7 creativity questions (both converted to ordinal open and closed questions). Variables were added to an explanatory Factor Analysis using Principal Components extraction with Direct Oblimin rotation based on Eigenvalues (> 1.00), KMO= .55, χ^2 (N = 66, 21) = 40.45, p <.007. Furthermore, none of the correlations were above .30. Therefore, this Factor Analysis was not considered valid, as two out of three a posteriori conditions, which state that KMO is at least .60, at least one-third of correlations are over .30, and Barlett's Test of Sphericity is significant (Privitera, 2015). As Factor Analysis was not valid for creativity, the next step assessed the reliability of all 7 creativity questions, which resulted in Cronbach's Alpha = .32. However, it also showed that Cronbach's Alpha could be improved if some variables were deleted. As a result, good reliability for creativity was found based on two variables, Cronbach's Alpha = .694. On a small sample size like in this research, two variables are sufficient to measure the overall creativity of participants (Privitera, 2015). Therefore, the two questions that showed to be reliable together were combined into the new variable Overall Creativity. The new variable was measured on the same 3-point scale, where 1 is the minimum creativity score and 3 is the highest creativity score. On average, participants scored rather low on creativity within this new variable, $M = 1.72$, $SD = .71$.

4.1.2. Hypotheses testing

After all the descriptives of variables were analyzed, and new variables were created, hypothesis testing took place. This research was based on an extensive review of the existing literature, which led to the creation of 6 hypotheses. These hypotheses were:

H1a: Classical background music has a positive effect on creativity moderated by personality traits.

H2a: Dance/Electronic/House background music has a positive effect on creativity moderated by personality traits.

H1b: Classical background music has a positive effect on creativity moderated by personal music preferences.

H2b: Dance/Electronic/House background music has a positive effect on creativity moderated by personal music preferences.

H1c: Classical background music has a positive effect on creativity moderated by background factors.

H2c: Dance/Electronic/House background music has a positive effect on creativity moderated by background factors.

First, overall creativity scores were compared among three tested groups: classical music, DEH music, and no music. At first inspection, those listening to classical music scored the highest on creativity scores, $M = 1.79$, $SD = .76$, followed by DEH music listeners who scored on average at $M = 1.74$. $SD = .66$, and those not listening to music scored the lowest, $M = 1.64$, $SD = .71$. To test the statistical significance, a one-way ANOVA was run. Overall creativity was a dependent variable, and experimental and controlled groups were independent variables, therefore expected to influence creativity. Unlike it seemed from the first inspection, the test result showed that there is no statistically significant difference between creativity scores among various experimental and control groups, $F_{(2, 63)} = .25$, $p = .783$, $\eta^2 = .008$[1].

Although there were no significant differences among groups found on creativity levels, the moderation effect on creativity still had to be tested by external factors. The results of the linear regression analysis showed that there was overall no moderator influence from all moderators (i.e., personality traits, music preferences, and gender and age), $F_{(23, 42)} = 1.50$, p $= .124$, $R^2 = .45$. Investigating further, some of the moderators still showed a significant effect (i.e., one music genre and one personality trait), while the rest of the moderators were not significant ($p > .05$). First, the jazz music genre had a moderate negative effect, $\beta = -.449$, $p = .014$, meaning that those who prefer listening to jazz music scored lower on creativity. Next, the personality trait agreeableness, which refers to one's cooperativeness and trustworthiness, appears to have a moderating effect on creativity. Statistics showed that those who self-identified as more agreeable scored significantly lower on creativity, $\beta = -.738$, $p = .039$.

If the creativity scores of three groups are compared for each creativity question, a significant difference was found for the first question determined by one-way ANOVA, $F_{(2,63)} = 3.62$, $p =$

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[1] The power analysis (PA) is used to verify whether the sample size was sufficient for the research purpose (Privitera, 2015). However, in such research PA is unnecessary, as the sample size was rather small as well as this sample was spread around three groups (Privitera, 2015). Still, a PA was run resulting in observed power .09. As expected this is below the critical threshold, which means that according to PA the sample size was not big enough. Nevertheless, as mentioned, the power analysis was not necessarily needed in this research, so the low observd power does not prevent the continuation of the analysis (Privitera, 2015).

.032. Here, the Tukey post hoc test revealed that creativity scores were significantly (p = .049) higher for those listening to classical music (1.58 ± .58 creativity score) compared to listeners of DEH music (1.14 ± .36 creativity score) and not significantly different from those completing the experiment without music (1.57 ± .81 creativity score; p = .998). At the same time, there was no significant difference between the creativity scores of those listening to DEH music or no music (p = .067). These statistics show that the question of organizing office drinks (i.e., participants selecting between simply having drinks, playing board games, or having a themed party) was influenced by classical music compared to DEH music, improving employees' creativity. Moving to the rest of the creativity questions, none of them had a significant difference score among the tested groups (all p > .05).

The next open question of the research asked participants to self-reflect on the influence of music on their survey completion. From the sample (N = 66), 45 people reflected on their perception of background music, 20 reported positive effects, 11 negative effects, and 15 reported no influence of music on their survey completion. Most of the participants focused their reflections on how their music influenced their focus and attention to the questions. For example, some say that music helped them "forget about the exterior," "relax and focus way better," "give a calming experience," and "cut (…) [themselves] from the environment." On the other hand, others reported that music was "a bit disturbing" and made them "think longer than usual to summon (…) thoughts." Furthermore, a few participants also stated they were "more relaxed/creative than usual," reflecting on their creativity during the experiment. Some participants also explained what drives them normally to listen to music, saying that it is "a flag saying other people around" that they are trying to focus, especially "in the open space environment" they work at, also that music "provides rhythm and good atmosphere for work."

In summary, the results show that all hypotheses derived from previous research are rejected, as the analysis did not show statistically significant results. Although some differences were found, they were not statistically significant and did not support the hypotheses. In other words, no relation has been found between music and creativity, so the hypotheses predicting music's positive effects are rejected. Nevertheless, the analysis of moderation showed that those who prefer jazz music or self-identify as agreeable potentially found music distracting in creative problem-solving, producing lower creativity results. Therefore, a moderating effect of personal music preferences and personality traits was found. Still, no overall effects of background music on creativity were established. Moreover, one of the creativity questions stood out from the experiment (i.e., the question asks participants to choose a way to organize Friday drinks in the office) as it showed that in this question, music sparked creativity the most among listeners of classical music.

4.2. Discussion of findings

The result of this study shows that music is indeed regularly present in people's lives. Prior studies have noted the importance of music in tuning down office distractions, so one of the interesting findings of this research is that, as expected, a large number of people listen to music during work (Newman, 2016). Music appears to be often present in the office, as employees use it to shield themselves from colleagues and exterior distractions, as described by some participants in a self-reflection question (Newman, 2016). Schepers and van den Berg (2007) suggested that open floor planning and music could encourage socialization and creativity in the workplace. However, this research showed that people majorly listen to music via headphones, which could encourage individual creativity, but limit group creativity through socialization in the office, as proposed by Schepers and van den Berg (2007). Interestingly though, whether music listening socially fuels creativity could also depend on the music being listened to and its likability among listeners. That is because both previous literature and this research illustrated that the preferred music genre showed a chance of influencing creativity potential (Huang & Shih, 2011).

Overall, the conducted research did not demonstrate a direct effect of background music, either classical or DEH, on employees' creativity in the workplace. Although slight differences among the three tested groups showed that, on average, listeners of classical background music were slightly more creative than those listening to DEH music or no music at all, these results were not statistically significant. Compared to previous researchers, Threadgold et al. (2019) found negative effects of music on cognitive tasks, and Huang and Shih (2011) and El-Aouar et al. (2016) found a positive influence. The research reported in this thesis, unlike others, found that music has neither positive nor negative effects on creativity and, therefore, potentially other cognitive tasks. It is somewhat surprising, as not only the theoretical hypotheses of this research expected to find positive effects but also all the previous research found on this topic suggested that music has some influence on people and their cognitive task performance (El-Aouar et al., 2016; Huang & Shih, 2011; Newman, 2016; Threadgold et al., 2019). Therefore, as this finding rather stands out in the field of academic research on background music, it invites us to question what was executed differently in this research that showed such an alternative result to all the previous studies.

One of the explanations for this research to stand out could be that, unlike many previous studies, this research majorly focused on spatial tasks in the work environment. However, some questions were potentially more spatial focused than others. Therefore, it is important to highlight that one creativity question's results deviate from others showing a difference in creativity scores among groups, with classical music stimulating creativity more than DEH music, which supports the so-called 'Mozart effect' (Lesiuk, 2005). The question that stood out in effects from others asked participants to select the way to organize Friday drinks in the office, with colleagues selecting from regular drinks, board games, and themed parties. This finding slightly contradicts previous research,

like the one conducted by Threadgold et al. (2019), which has suggested that music has the highest effect on cognitive tasks regarding spatial problem-solving, as this question, unlike some others, only partly focused on spatial tasks.

In contrast, previous research expected that DEH music would have the same positive effect on creativity as classical music, which was not indicated in this research (Newman, 2016). Additionally, the low creativity scores of DEH music listeners on this specific question further contradict the finding of Threadgold et al. (2019) that suggests that a common office environment is more distracting and, therefore, worse than any music. This additional contradiction is interesting as it shows that not all music, even if following the criteria of happy and light music, positively contributes to cognitive tasks in the workplace compared to regular office distractions. Thus, it can further suggest that classical music is preferred more as background music in the office environment, unlike DEH music.

Although the current study did not show direct effects of background music on creativity, with respect to the moderation effect, personal music preference showed to be influencing cognitive tasks. More specifically, it showed that those who prefer to listen to jazz on a regular basis potentially struggled to come up with creative solutions more than others. This could be from the difference between jazz music and classical and DEH music used in the experiment, as it tends to have less structure and more purposeful frequent changes in tempo and pitch (Merriam-Webster, n.d.). As this research specifically focused on happy and light classical and DEH music, those who prefer jazz music could have found that these music genres do not fit their music preferences, costing them high creativity scores. In previous research, Huang and Shih (2011) in their study showed that the music that is strongly liked or disliked could have a negative influence on cognitive tasks, which further explains why jazz listeners scored lower on creativity, as classical and DEH music was likely strongly disliked by these participants.

Another moderation effect found was for one of the personality traits. According to previous research, personality traits, especially extraversion, were always found to intervene in music's effects on people (Boer & Abubakar, 2014; Küssner, 2017). Similarly, this research showed that the agreeableness personality trait has a moderation effect on creativity and background music, meaning that the more agreeable one is, the more likely they are to score less on creativity. The observed moderation effect could come from the will of agreeable (i.e., trustworthy and cooperative) people to find the most convenient and satisfying to everybody solutions for problems rather than creative ones (Bazzani et al., 2017; Neuman et al., 2016). As there has not been much research into personality traits besides extraversion, it is hard to conclude whether this finding fits previous theoretical frameworks or not.

Unlike personality traits and personal music preferences that had at least some moderation effects, age and gender did not have any moderation effects. As discussed in the theoretical framework, Baer and Kaufman (2008) and Johnson and Repta (2011) predicted that younger

employees and females produce more creative solutions. Nevertheless, results indicate that there is no difference in age and gender regarding creativity. These results may be explained by the modern challenging of social structures that used to and still limit people's opportunities to take on roles originally not expected for their gender or age. As these structures are currently challenged in society, males and females can now take on creative roles more equally than before (Johnson & Repta, 2011; Wood & Eagly, 2015). Just like with gender, a similar situation can be observed with age. Nowadays, older people have more opportunities to be creative and produce creative ideas and solutions (Baer & Kaufman, 2008; Wu et al., 2005). Therefore, this research showed that age does not predetermine the creativity level of people, therefore, people of all ages have the potential to be equally creative.

5. Conclusion

This thesis aimed to investigate the effects of background music on creativity in the work environment. More specifically, the RQ of this research was:

What is the difference in the effects of background music on creativity in the work environment between classical and dance/electronic/house (DEH) music genres?

Besides the RQ, this thesis also investigated a sub-question into external factors influencing the relationship between music and creativity:

To what extent do a) personality factors, b) personal music preferences, and c) gender and age moderate the effects of background music on creativity in the work environment?

This way, the goal of the thesis was to understand further how people use personal entertainment media, like listening to music, through conducting a quasi-experiment in a Dutch organization. In the experiment, participants listened to classical and DEH music while creatively solving tasks. As a result, creativity level was measured and compared between listeners of different music genres and those not listening to music. This research not only measured the differences between groups but also assessed whether external factors were influencing the relationship between music and creativity.

Although this thesis initially theorized that both classical and DEH music genres would have similar positive effects, the conducted experiment did not identify any enhancement or setback in the creativity from background music (Huang & Shih, 2011; Newman, 2016; Threadgold et al., 2019). The results, though, confirmed that people perform similarly on cognitive tasks with either of the tested music genres. It was rather unexpected not to see any influence from background music in the experiment, making this research stand out from existing studies. Nonetheless, just like the results of Threadgold et al. (2019), whose research found negative music effects on cognitive tasks, the unexpected lack of difference between the creativity scores among the three groups suggests that not everything is yet known about music and what can influence its effects.

While this research could not measure all possible external factors, it did consider some of them. First, the theory predicted that one's personality affects their music experience both in regular life and work environments (Boer & Abubakar, 2014). However, previous research focused on the personality trait extraversion, omitting research into other personality traits (Küssner, 2017). Unlike previous research, this study considered all five personality traits as potential external factors. The moderation analysis concluded that the personality trait agreeableness could indeed affect one's music experience and creativity scores. The rest of the personality traits (i.e., openness to experiences, conscientiousness, extraversion, neuroticism) did not moderate music's effects on creativity. Reflecting on the previous research into the relationship between music and personality, the other personality traits are still likely to influence cognitive tasks, although the influence was not identified in this thesis (Boer & Abubakar, 2014; Küssner, 2017).

Additionally, personal music preferences also had the theoretical potential to influence the music experience and creativity of employees (i.e., music genres, frequency, source). Although classical and DEH music genres were seen as rather popular in society, they were not as popular among the research participants, potentially affecting their creativity during the experiment. Previous research concluded that strongly liked or disliked music negatively influences cognitive tasks, which was confirmed in this research by those who prefer the music genre – jazz (Huang & Shih, 2011). In other words, when the preferred music genre is strongly different or similar to the listened one, one can get potentially distracted, negatively influencing cognitive tasks. Although this research only showed this theory on the preferred music genre jazz, it could be interesting to assess further differences among preferred music genres and the effects of those music genres on cognitive tasks. The reason for that is that only classical and DEH music genres were tested in this research, and people can perform differently with other music genres based on their preferred one.

Other music preferences like frequency and source of music use do not influence creativity when one is exposed to background music. Interestingly, there was no influence on the frequency of music listening, especially at work, as if one is not used to listening to music while completing tasks, they could have found it distracting (Shih et al., 2016). In the personal reflection on music effects in the questionnaire, some people indeed noted that they found music disturbing, however, that did not statistically influence their creativity after all. Even though no influencing effect was found from the music source, headphones were the most common source of music listening. However, some people indicated that they prefer listening to music via speakers. Listening to music via speakers can potentially encourage employee socialization and, therefore, group creativity (Tierney et al., 1999). At the same time, the research showed that if someone does not like the music played, they can find it discouraging for creativity, therefore struggling to complete their tasks overall (Shih et al., 2016).

The last external factor assessed in this experiment were background factors: age and gender of participants. Previous research suggested that younger generations and females are more likely to be creative (Baer & Kaufman, 2008; Wu et al., 2005). However, this particular research did not identify these factors as influencing creativity. Nowadays, it appears to be more important what type of work and tasks people do rather than their age or genre, as the society actively challenges the gendered roles and professions as well as potential ageism when it comes to some job tasks (Johnson & Repta, 2011; Moore, 2007).

All in all, this research showed that music's effects could be influenced by external factors such as one's personality and personal music preferences. Therefore, the answer to the sub-question is that not all but some of the factors may affect cognitive tasks when listening to music. Nevertheless, more factors such as one's mood and associations with the music genre might still be affecting cognitive tasks and background music but were not assessed in this research.

Interestingly, the overall creativity scores were rather low, which could potentially indicate that the participating audience in the experiment was not creative to start with. Technical companies

are often in need of creativity and innovation, however, it does not mean that their employees are creative and can be stimulated by entertainment media, such as music (Lesiuk, 2005). Nevertheless, supporting previous studies, one of the key conclusions of this research is that employees indeed listen to music in their regular life and work time (Newman, 2016). This means that people use entertainment media to create their personal atmosphere at work. However, whether that helps people in their self-expression and task completion appears to be very personal. While some people use headphones and music to help them focus and relax, others, in contrast, find it annoying and distracting. The previous researchers that studied background music and this research as well attempt to identify who profits from it and who loses. Still, many findings contradict each other, suggesting that the common general pattern of personal media use's effects like music is potentially becoming more personalized.

5.1. Implications

Taken together, the research findings have implications for both society and academia. The findings of the study contribute to the academic landscape on multiple levels. First, this research deviates from previous studies on music effects as it suggests that background music effects are not always present (Huang & Shih, 2011; Newman, 2016). Further assessment of this research can potentially identify why it produced unexpected results and encourage further replications and repetitions among different audiences, further deepening the understanding of personal media's use. Moreover, this research highlighted other personality traits besides extraversion as external factors, identifying negative moderation effects from personality trait agreeableness. Little to no research has been previously done about this personality trait's effects on music, which therefore fills in the gap in the academic field of background music and may be the start of the further analysis of this and other personality traits in relation to music (Boer & Abubakar, 2014).

Implicating the research findings for society, organizations can find the research into people's personal media use at work relevant to support their employees and help them advance their creativity. The findings have also raised the problem that many people use music and headphones to shield themselves from distractions in the modern office. Nevertheless, the music can be rather distracting for some people, limiting their opportunities to tune down the distractions. Therefore, the organization's management could arrange other options, like quiet spaces where such employees could focus. Moreover, when it comes to listening to music via speakers, organizations should encourage their employees to consider the music preferences (e.g., music genre and music's presence/absence) of everyone exposed to it. Overall, this research showed that organizations should allow and enable personal media use like music at work, as it did not hinder the cognitive tasks, helping those who prefer working with music to focus on their tasks.

5.2. Limitations

Considering the potential limitations of this research, a focus falls on ecological validity, specifically whether the experiment setting matched the real-life work environment. The experiment design implemented steps to match the real-life settings. For example, the participants were asked to complete the experiment in their actual work environment, either in the office or at home. Furthermore, experiment instructions were sent via participants' work email, further ensuring participation in the workspace. Nevertheless, it is possible that the experiment instructions were not followed, and employees completed the experiment not from their work environments.

Following, there is also a risk that employees did not follow other experiment instructions, such as listening to specific music or no music. To illustrate, a few participants shared that they did not follow the instructions precisely, and their responses were eliminated from the dataset. Therefore, most likely, the rest followed the instruction, or they would have informed the researcher too.

This study considered multiple external factors (i.e.personality, personal preferences, gender, and age) that could have influenced the effects of background music on creativity. Nonetheless, it is possible that more external factors were not considered in the analysis. For example, previous research suggested that mood and past experiences with specific music may influence the listening experience and, therefore, creativity (Lesiuk, 2005). The research followed the principle of paranomia, and the scope (i.e., time and resources) of this study was limited, which is why not all possible external factors were considered during the experiment.

Considering the sampling of the research, the focus on one company may be perceived as a weakness in generalizability. This focus was a purposeful decision as it ensured that participants were located in the same warm, open, and creativity-encouraging environment. While this ensured consistency of results, it can also be a limitation for generalizing the findings to other companies that do not fit the internal culture of the tested organization. Additionally, if the target audience was to be expanded to multiple organizations, the sample size should have also been expanded accordingly, potentially increasing the generalizability and reliability of the study.

5.3. Future research

5.3.1. Method

Notwithstanding these limitations, this work offers valuable insights and potential directions for future research. This research on purpose was conducted in a real-life setting to ensure the generalizability and validity of the results. This way, a natural progression of research into background music and creativity is to conduct a similar experiment but under controlled conditions in a lab setting to eliminate potential influencing external factors and identify whether there were non-considered external factors (Babbie, 2016a). If a lab-based experiment is to be conducted, wider

audiences can be invited to participate, as the experiment conditions would be manufactured, therefore, being the same for all participants (Lesiuk, 2005).

Regarding the participating audience of the experiment, it could be valuable to conduct a comparison study among different work environments. The previous research and this study investigated the effects of background music in warm, open, and creative environments, but music can potentially influence people differently in other workplaces (Schepers & van den Berg, 2007).

This research was conducted with quantitative methods to assess music's effects on cognitive tasks. Another approach to understanding these effects could be conducting in-depth qualitative interviews and focus groups. Through these qualitative methods, it can then be better understood how employees themselves experience listening to music during work. It could be valuable because while this research did not indicate the influence of music on creativity, participants reported various effects they experienced during the experiment. Qualitative methods could, therefore, further enhance the understanding of these experiences.

5.3.2. Recommendations

This research has brought up many potential recommendations for future research. First, further analysis needs to consider more external factors influencing the relationship between background music and cognitive tasks. For instance, more research is needed to establish whether one's mood and past experiences with the music/music genre affect the use and effects of personal audio on creativity at work (Lesiuk, 2005; Schepers & van den Berg, 2007).

Besides, a greater focus on personality traits is recommended to determine the extent to which personality influences the relationship between personal media use and cognitive tasks, potentially identifying what type of people benefit from listening to music during work. Previous research into music's effects rarely considers all personality factors besides extraversion, while this research showed that other personality traits should also be considered in analyzing the role of personality in music experience and cognitive tasks. Moreover, while this research focused majorly on spatial tasks, more research should be dedicated to understanding how people conduct other types of work when exposed to music. Knowing what type of work profits from entertainment media like music can support organizations in helping their employees advance in these tasks.

In this experiment, people listened to music via headphones as the focus was on individual creativity and personal media use. However, some participants identified to prefer to listen to music via speakers, so further research is recommended to investigate the background music's effects on group creativity (Amabile et al., 1996; Tierney et al., 1999). Not only analysis of group creativity can be valuable to the scientific understanding of background music and creativity, but also a comparison of the effects of listening to music via headphones and speakers.

The results of this research are only based on classical and DEH music. Future experimental investigations or potentially a repetition of this study should be conducted using other music genres,

comparing music's effects among music genres from this and further research. A deeper understanding of various music genres' effects on cognitive tasks will then increase the understanding of the use of personal entertainment media at work and what music can be the most beneficial for cognitive tasks in work environments (Newman, 2016). Knowing what role personal media plays in encouraging creativity and therefore supporting changing industries and innovation.

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Appendix

Appendix A: Questionnaire

Q1 Dear Participant,

I am Polina Kuzmina and I'm doing a research for my master thesis about the effects of background music in the work environment. You have chosen to participate in this experiment, part of which is filling in this survey. The experiment is both anonymous and confidential. In other words, I will know who participated, but will have no way of identifying your answers.

The survey includes several items asking about your background, personality and music listening behavior. Also, you will be asked to solve a few tasks. Please, try to answer truthfully. There are no correct answers. You responses will be collected and analyzed anonymously and will only be used for this project.

If you have any questions about the questionnaire and/or the research, feel free to reach me at 565785pk@eur.nl or kuzmina@riscure.com. If you wish to be informed about the results of the study there will be an opportunity to leave your email in the end of the questionnaire.

By clicking the consent button, you agree that your participation in the survey is voluntary. You can also terminate you participation any stage of the study for any reason. Thank you for your participation!

- o I consent to participate, start the survey (1)
- o I do not consent, do not start the survey (2)

Skip To: End of Survey If Dear Participant, I am Polina Kuzmina and I'm doing a research for my master thesis about the ef... = I do not consent, do not start the survey

Q2 Are you currently listening to the music (in accordance to instructions that you received)?
- o Yes, classical music (1)
- o Yes, dance/electronic/house (2)
- o No, I am currently not listening to music (3)

Display This Question:

If Are you currently listening to the music (in accordance to instructions that you received)? != No, I am currently not listening to music

Q3 Please make sure that you have music turned on before proceeding further. Please, do not turn off the music until the end of the survey.

Q4 How old are you?
- o Under 18 (1)
- o 18 – 27 (2)
- o 28 – 37 (3)
- o 38 – 47 (4)
- o 48 – 57 (5)
- o 58 and older (6)

Q5 Which gender do you identify as the most?
- o Male (1)
- o Female (2)
- o Non-binary / third gender (3)
- o Prefer not to say (4)

End of Block: Background

Start of Block: Personality

Q6 To what extent do you agree with the following statements about yourself?
I see myself as:

	Strongly disagree (1)	Somewhat disagree (2)	Neither agree nor disagree (3)	Somewhat agree (4)	Strongly agree (5)
Extraverted, enthusiastic (1)	o	o	o	o	o
Critical, quarrelsome. (2)	o	o	o	o	o
Dependable, self-disciplined. (3)	o	o	o	o	o
Anxious, easily upset. (4)	o	o	o	o	o
Open to new experiences, complex. (5)	o	o	o	o	o
Reserved, quiet. (6)	o	o	o	o	o
Sympathetic, warm. (7)	o	o	o	o	o
Disorganized, careless. (8)	o	o	o	o	o
Calm, emotionally stable. (9)	o	o	o	o	o
Conventional, uncreative. (10)	o	o	o	o	o

End of Block: Personality

Start of Block: Personal music preferences

Q7 How often do you listen to music on a regular day (consider your overall music listening habit)?
- o Never (1)
- o Almost never (2)
- o Sometimes (3)
- o Often (4)
- o All the time (5)

Skip To: End of Block If How often do you listen to music on a regular day (consider your overall music listening habit)? = Never

Q8 How often do you listen to music during work?
- o Never (1)
- o Almost never (2)
- o Sometimes (3)
- o Often (4)
- o All the time (5)

Q9 What music genre do you listen to most often?
- o Classical (1)
- o Rock (2)
- o Techno (3)
- o Pop (4)
- o Country (5)
- o Instrumental (6)
- o Jazz (7)
- o Alternative (8)
- o Hip-Hop/Rap (9)
- o No preference, listen to all (10)
- o Other (11)
- o I hardly ever listen to music (12)

Q10 How do you listen to music during work usually?
- o via headphones (any type of headphones including headset and earbuds) (1)
- o via speakers (both when you are in charge of speakers and others) (2)
- o I don't listen to music at work (3)

End of Block: Personal music preferences

Start of Block: Tasks

Q11 The next section will ask you to solve a task. There are no right or wrong answers, choose the answer that you are the most likely choose in real-life.

Q12 It is Thursday. People are discussing about hanging out after work on Friday. You are in charge of organizing it. Which option would you choose?
- o Having drinks in the office cafeteria or in the bar in the city (1)
- o Bringing board games and having drinks while playing (2)
- o Coming up with a theme and creating a theme party (3)

Q13 You are asked to present an update of the project you have been working on. You will have an in-person meeting about it. How would you present the information?
- o Present in speech and have a discussion about it (1)
- o Create a PowerPoint with all the necessary information, including photos and graphs if needed (2)
- o Create a short video that takes the viewer through the whole project progress (3)

Q14 Imagine a situation: the internal website (intranet) is not convenient (information is hard to find). You are asked to share your opinion on how to improve it. How would you improve it?
- o Find a better platform that works better (1)
- o Reorganize the way that people use the platform, creating new categories, division of topics people share, and regulate which topics are shared on the platform (2)
- o Create color coding and categories that are assigned to content when it is created, so that people can see what to expect before opening the content (3)

Q15
Look at the photo. It is used as an example in the next question.

Rico. (n.d.). The state of the office: Social areas. Pinterest. https://pin.it/4Ng7nwz

⤬

Q16 You are having food/drinks in the office with your colleagues. However, all the people do not fit at the table (example see the photo). How do you solve the problem?

- o   Adding chars/benches around one of the tables (1)
- o   Turning the tables around to make one long table (2)
- o   Creating a form of a picnic on the floor, where benches can be used as tables (3)

Q23 To answer the following questions, please, fill in your answer in the box below the question. Again, there are no right or wrong answers.

Q17 Look at another photo. It is used for the next question.

Landau, P. (2014, Sep 29,). Open-plan offices can be bad for your health. The Guardian, https://www.theguardian.com/money/work-blog/2014/sep/29/open-plan-office-health-productivity

Q18 Imagine that office on the previous photo is your office. The goal is to change the interior of the space to make it more free, friendly, and appealing to work at. Management asked your opinion. How can you improve it?

_____

Q19 You are invited to write a blog post. It can be about any topic at all, not necessarily related to the work. What would you write about? Can you describe it briefly?

_____

Q20 There is a big spare room in the office. The management asks your opinion on what to do with that room. What would you suggest?

_____

Q21 How do you think listening to music affected your completion of this survey?

_____

Q22 Do you have any comments/questions?

_____

Appendix B: Music Playlists

Classical music YouTube playlist:

https://www.youtube.com/playlist?list=PL1RSZoDZqVDjZUoPcGiYI8rs8GoJ2Fc8E

DEH music YouTube playlist:

https://www.youtube.com/playlist?list=PL1RSZoDZqVDj_MFi1M3rJ4a6hCB2MLL-3