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# The effects of listening to music on positive affect and negative affect, after acute stress exposure.

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UNIVERSITY OF THE
WITWATERSRAND,
JOHANNESBURG

**The effects of listening to music on positive affect and negative affect, after acute stress exposure.**

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A research project submitted in partial fulfilment of the requirements for the degree Master of Arts by coursework and research report in the field of Organisational Psychology in the Faculty of Humanities, University of the Witwatersrand, Johannesburg.

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## Abstract

In today's world, the negative effects from daily acute stressors have become more and more of a concern impacting the general health and well-being of individuals across the world. The aim of the current study was to see whether listening to music had an effect on positive affect and negative affect, after acute stress exposure. Previous literature has shown that there is a mixture of findings within the research, with some research studies finding evidence suggesting listening to music may help with stress recovery; however, other research studies have found evidence suggesting it may be too soon to conclude that listening to music helps with stress recovery due to the non-significant results. A quantitative longitudinal experiment with elements of between and within groups design was conducted to investigate whether listening to music would increase positive affect and decrease negative affect, following acute stress exposure. Participants underwent a stress induction task and were randomly assigned to one of the three listening conditions (self-selected music group, researcher-selected music group, and an ambient sound group). Participants self-reported positive affect and negative affect levels were recorded after both the stressor task (time 1) and the listening condition (time 2). Two mixed model ANOVAs were run to see whether listening to music increased participants positive affect and decreased their negative affect, after acute stress exposure. The results from the mixed-model ANOVAs were non-significant indicating insufficient evidence to support this hypothesis. Further research on this important topic is required in order to help clarify the current conflicting results found in the literature.



*Keywords:* Listening to music, music playlists, acute stress exposure, positive affect, negative affect.

## Declaration

I, Dane Jordan Mertsch, declare that this research report is my own, unaided work. It is submitted for the Masters of Arts in Organisational Psychology degree at the University of the Witwatersrand, Johannesburg. It has not been submitted for any other degree or examination at this or any other university.

**Signed:** 

**Date:** 15/03/2024

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## List of Abbreviations

ANOVA = Analysis of Variance

APA = American Psychological Association

CCDU = Counselling and Careers Development Unit

CWB = Counterproductive Work Behaviour (CWB)

GAD-7 = Generalised Anxiety Disorder Questionnaire

HR = Human Resources

IOP = Industrial / Organisational Psychology

M = Mean

Max = Maximum

Min = Minimum

NA = Negative Affect

OCB = Organisational Citizenship Behaviour

PA = Positive Affect

PANAS = Positive and Negative Affect Schedule

PASAT = Paced Auditory Serial Addition Test

POMS = Profile of Moods Scores

SD = Standard Deviation

SPSS = Statistical Package for Social Sciences

STAI = State Trait Anxiety Inventory

TSST = Trier Social Stress Test

Wits = University of the Witwatersrand

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# Chapter 1: Literature Review

## 1.1 Chapter Overview

The literature review chapter will begin by introducing the topic and discussing its relevance before exploring and defining positive affect and negative affect. Next, current literature on listening to music and stress recovery will be discussed in detail, covering both literature that found evidence suggesting listening to music might be an effective stress recovery strategy in helping cope with acute stress exposures and literature that did not find supporting evidence. Thereafter, the literature on musical characteristics and whether these have an impact on the stress recovery process will be reviewed and discussed. Lastly, this topic's importance will be examined from an organisational perspective, and the chapter will conclude with the research aims, rationale of the study, research questions, and hypotheses.

## 1.2 Introduction

The negative effects of daily stressors have existed for decades and are increasingly becoming more of a concern, especially among young people (Lupien et al., 2009). In order to promote a healthy recovery from stress, effective stress recovery strategies are needed to maintain psychological and physiological well-being. Recuperation from stress has been introduced into the literature as a way to help cope with the effects and consequences of daily stress exposures (Adiasto et al., 2022). Stress recovery mechanisms that are effective daily help stop the reoccurrence of inflated stress responses that, if not attended to, have the potential to develop into psychological and physiological disorders (Adiasto et al., 2022). Examples include depression, cardiovascular disease, and burnout (Adiasto et al., 2022).

When referring to the term stress, it was first integrated into medical discussions back in the 1930s by Hans Selye and was described as a nonspecific reaction of the human body to any type of demand (Tan & Yip, 2018). Lazarus and Folkman expanded on this definition and suggested that stress arises due to an imbalance between the perceived resources an individual has and environmental demands, which are not sufficient to cope with the demands (de la Torre-Luque, 2017). In order

to cope with these demands that arise from an imbalance between an individual's perceived resources and environmental demands, effective stress recovery strategies and interventions are necessary. The current study focuses on short term stress exposures (acute stress), which can be described as being present in everyday life, are shorter in duration and have different impacts on people's health and general well-being (Adiasto et al., 2022). Whereas on the other hand, chronic stress is much longer in duration and is a consistent sense of feeling pressured (Mariotti, 2015). Common examples of acute stress exposures include daily job demands, lack of support in the workplace, work deadlines and arguments, and public speaking (Goh et al., 2015). Examples of acute stress exposures, specifically in the South African context, are traffic, work arguments and deadlines, and writing tests and exams.

Internal and external approaches to help deal with stressful situations have been identified as being effective, however research has found that this depends on individual circumstances (Keil, 2004). More recently, a few strategies have been suggested as being effective in coping with acute stress exposure, such as listening to music (Adiasto et al., 2023). Many studies have suggested that music listening can have health benefits due to stress-reducing effects (Thoma et al., 2013). For example, some studies have found that listening to music helped reduce stress-related responses which included lower levels of self-reported anxiety (da le Torre-Luque et al., 2017). Furthermore, survey studies have suggested that affect regulation functions of listening to music have been associated with higher levels of well-being and that affect regulation has often been considered to be one of the most important functions of listening to music (Groarke & Hogan, 2019; Groarke et al., 2019). As technology has advanced, listening to music has become more readily available, allowing people to access music through Apps/online platforms such as YouTube Music, Spotify, and Apple Music (Adiasto et al., 2022). Spotify and YouTube offer both free and paid services, which makes them readily available to individuals who have access to any device that can connect to the internet such as phones, laptops, tablets, and more.

The majority of research carried out on this specific topic has occurred in medical or therapeutic contexts (Adiasto et al., 2022). That was one of the main reasons why Adiasto et al's. (2022) meta-analysis excluded any studies carried out in medical or

therapeutic contexts. Their search of the literature started with 3124 potential studies to be included, however, the final sample of studies included in their meta-analysis was only 14, showing the lack of experimental research conducted outside of medical and therapeutic contexts that fit their criteria to be included (Adiasto et al., 2022). This was one of the main reasons why the current study aimed to investigate the psychological outcomes of positive affect and negative affect and listening to music, after acute stress exposure in a different context to a medical or therapeutic setting. Previous research on this topic has suggested that engaging in music listening may be a useful strategy when it comes to dealing with acute stress exposures. However, the exact properties that underpin the effects of listening to music on recovering from stress still need to be explored in further detail (Adiasto et al., 2022). Furthermore, there is still much-needed research on what music works best with regard to listening to music and coping with stress. There are a few factors/characteristics which need to be explored with regard to which music is best, such as genre, instrumental music, lyrical music, self-selected music, experimenter-selected music, fast tempo, and slow tempo (Adiasto et al., 2022). With regards to participants selecting their own playlists, there are a number of additional variables that influence the stress recovery process that should be acknowledged, such as individual music preferences, the state of being in control, and familiarity (Helsing et al., 2016). All these additional variables may have an effect in the efficacy of self-selected music playlists on the stress recovery process.

In order to help cope with exposure to stressors, subsequent stress-related responses drive an individual to recover (de la Torre-Luque et al., 2017). This response includes the mobilisation of physiological systems, such as the nervous system, endocrine system, and immune system, as well as feelings of nervousness and anxiety (de la Torre-Luque et al., 2017). From a psychological perspective, recovering from exposures to stress is typically experienced when the demands and unpleasant states reduce and there is a return to the level of stress the individual was experiencing beforehand (Sonnentag et al., 2022; Adiasto et al., 2022). This is often reflected by an individual portraying a lower degree of self-reported anxiety, stress, and negative affect and a higher degree of positive affect and relaxation (Sonnentag et al., 2022; Adiasto et al., 2022). This means that effective stress recovery takes place when an individual has lower self-reported levels of anxiety,

stress, and negative affect and higher levels of relaxation and positive affect. However, when an individual has consistent, ruminative thoughts about a stressor, this can impact and delay the recovery from stress because of physiological activation that occurs during the stress response (Adiasto et al., 2022). Research has supported this claim as participants who reported higher levels of ruminative thoughts after exposure to a stressor task portrayed poorer heart rate and cortisol recovery compared to participants who did not (Adiasto et al., 2022). The current study aimed to add to the current literature in a small manner by focusing specifically on whether listening to music can help increase an individual's positive affect and decrease their negative affect in order to help cope with exposures to daily acute stressors.

### 1.3 Organisational Perspective

Due to the prevalence of acute stress exposure, stress management strategies, interventions, and programmes have become increasingly more important (Tran et al., 2020). Given the importance of stress recovery strategies that are efficient and effective, research on how to promote effective stress recovery has significantly increased over the years (Sonnentag et al., 2022). Having strategies in place that are able to help individuals cope with exposures to daily acute stressors, are important for overall well-being. Additionally, research has suggested the continuous and prolonged subjection to stressors or by not dealing with stressors effectively has been identified as a cause for burnout in the workplace (Almén et al., 2020). This is particularly important from an organisational perspective as the workplace is considered to be one of the greatest contributors of stress in people's daily lives (Carr et al., 2011).

Due to the workplace being one of the greatest causes of stress, employees view their health and well-being as principal factors of their job (Tetrick & Winslow, 2015). Furthermore, employee health is increasingly becoming a key business factor, both from a cost and from an asset perspective (Kirsten, 2010). Employees who are healthy, both mentally and physically, are more productive and efficient in the organisation, which results in less absenteeism and more profit (Grawitch et al., 2006). This demonstrates the significance of having strategies in place to promote a healthy and productive workforce from an organisation's perspective.

This also highlights the pressure and responsibility that is placed on practitioners working in the field of Industrial/Organisational Psychology (IOP) and Human Resources (HR) in different organisations. Managers in these fields within organisations are expected to constantly develop and implement procedures and policies to help protect their employee's health and general working conditions (Tran et al., 2020). It places constant pressures on these individuals to identify factors underlying the occurrence of stress and potential behaviour responses of employees in order to develop effective and efficient strategies/interventions to deal with it (Tran et al., 2020). Employees experience stressful experiences all the time, such as working conditions, expectations, and interpersonal interactions, whereby HR is the general function within organisations that are tasked with dealing with these scenarios (Hargrove et al., 2016). IOP and HR professionals are key strategic players in organisations today, who are tasked with helping manage workplace stress by reducing negative stress, optimising positive stress, and finding alternative solutions (Hargrove et al., 2016).

Organisations may have strategies and interventions in place that help employees deal with stress, such as stress coping workshops and support structures (Carr et al., 2011). However, these interventions and strategies could be expensive and cost the organisation a proportion of its annual budget. Therefore, from an organisational perspective, there would be benefits towards having a low-cost and easily accessible stress management strategy to help deal with exposures to daily acute stressors. Listening to music could serve as a low-cost and easily accessible strategy that organisations could implement to help employees cope with daily acute stressors.

Furthermore, this is relevant in the South African context because of all the stressors that South Africans are exposed to on a daily basis, such as, HIV/AIDS, lack of access to basic goods and services, loadshedding, water cuts, workplace demands, and the rising cost of living (Reid & Vogel, 2006). Additionally, heightened stress levels within South African organisations sometimes happen due to the absence of high-level human resources, managers, and professionals that are under constant pressure (Oosthuizen & Van Lill, 2008). If significant results are found from this research study, this may have implications for Industrial/Organisational Psychologists and Human Resource professionals within organisations in South Africa, as this research could be interesting and assist with their current stress

management strategies that are in place. A potential strategy would be that organisations suggest to their employees to listen to music in order to help increase their positive emotions and decrease their negative emotions following exposure to daily stressors. Besides suggesting to their employees to listen to music, organisations could implement strategies or interventions whereby employees could enjoy listening to music during their workday to help increase their positive emotions and overall well-being.

However, it must be noted that the results from this study are not enough to comprehensively suggest that listening to music may help increase positive affect and decrease negative affect after acute stress exposures because there are still mixed results in the literature. However, if significant results are found, further research should be carried out on listening to music and acute stress exposure in organisations within South Africa to see whether similar results are found.

### 1.4 Positive Affect

Looking at the concept of listening to music on recuperating from stress from a theoretical perspective, listening to music is believed to assist stress recovery through positive emotional experiences (Esch & Stefano, 2004; Adiasto et al., 2023). This perspective is supported in evidence that positive affect activates the area of the brain that controls an individual's pleasure and reward centre, releasing hormones which include dopamine and serotonin (Esch & Stefano, 2004; Adiasto et al., 2023). This means that these hormones assist with regulating the physiological and psychological load reactions that form part of the stress response.

Important to note here is that working definitions of affect and emotion vary between researchers, but despite this, a consensus is forming that emotions tend to be a subset of the broader class of affective phenomena (Fredrickson, 2001). From this view, emotions can be described as multicomponent response tendencies that occur over relatively short periods of time (Fredrickson, 2001). Essentially, emotions start with an individual's evaluation of the personal meaning of an antecedent circumstance, with this being either conscious or unconscious, which then starts a constant change of response tendencies which disperse across loosely coupled component systems, for example, cognitive processing, facial expression, and physiological changes (Fredrickson, 2001).

On the other hand, the term affect (a more general concept) can be described as consciously available feelings (Fredrickson, 2001). Even though affect can be seen as present within emotions, it is also found within many other affective phenomena, including physical sensations, moods, attitudes, and affective traits (Fredrickson, 2001). Therefore, there are distinct ways in which affect is different from emotions, which will now be outlined (Fredrickson, 2001). The first distinction between the two is that emotions are usually about a meaningful circumstance which is personal towards the individual, whereas affect is usually free-floating (Fredrickson, 2001; Oatley & Jenkins, 1996; Russell & Feldman Barrett, 1999). Secondly, emotions are usually shorter and implicate the multiple-component systems, whereas affect is often more long in duration and may be important only at the level of subjective experience (Fredrickson, 2001; Ekman, 1994; Rosenberg, 1998; Russell & Feldman Barrett, 1999). Lastly, emotions are usually conceptualised as fitting into distinct lists of emotion families (fear, anger, interest, and joy), whereas affect usually differs along two elements, pleasantness and activation or positive and negative emotional activation, by contrast (Fredrickson, 2001).

Based on her work, Barbara Fredrickson developed the Broaden-and-Build theory of positive emotions, which argues that positive emotional experiences can act against the negative emotions that arise from daily acute stressors, and in doing so, help act against the harmful aspects of stress (Fredrickson, 2001). This theory of positive emotions states that positive emotions encourage novel, exploratory thoughts, and behaviours, and over a period of time, enhance a person's ability to cope with the constant demands or stressors (Tugade & Fredrickson, 2004). This theory was developed to help relate the form and function of a subset of positive emotions such as joy, love, and interest (Fredrickson, 2004). The proposition that underlies this theory is that these positive affect/emotions enlarge an individual's momentary thought-action collection: joy sparks the urge to play, interest ignites the urge to explore, and love ignites a recurring circle of each of these urges within safe, close relationships (Fredrickson, 2004). Furthermore, the enlarge mindsets that develop from these positive emotions are contrasted to the deficient, narrowed mindsets brought upon by negative emotions (Fredrickson, 2004).

The next proposition that underlies this theory speaks to the result of these enlarged mindsets through the making bigger of the individual's momentary thought-

action collection, positive emotions support the finding of novel and creative answers, which help foster an individual's personal resources (Fredrickson, 2004). Importantly, these resources act as reserves that an individual can draw on at a future stage to help with successful coping and survival (Fredrickson, 2004). This is why it was called the Broaden-and-Build theory of positive emotions, as positive emotions help broaden individual's momentary thought-action collection and build their enduring personal resources, which can be drawn upon if need be (Fredrickson, 2004).

Looking at this viewpoint, experiences of positive affect draw out individuals to participate with their environments and get involved in events, which are usually adaptive for the individual (Fredrickson, 2001). As this includes a component of positive affect, emotions that are positive in nature also act as internal signals to approach or continue, as well as share this purpose with a range of other positive affective states (Fredrickson, 2001). Due to this, functional accounts of positive emotions which specifically highlight tendencies to come forward or keep going might only capture the lowest common denominator across all affective states that share a pleasant subjective feel, which would leave additional functions unique to certain positive emotions unexplored (Fredrickson, 2001). Discrete emotion theorists usually join the act of specific emotions to the concept of specific action tendencies, however the action tendencies selected for positive emotions are somewhat vague and underspecified (Fredrickson, 2001). This is problematic because if the action tendencies brought on by positive emotions are vague, their effects on survival may not be important. Like the view centred on generic approach tendencies, the view centred on certain action tendencies brings about an incomplete depiction of the function of positive emotions (Fredrickson, 2001).

Positive affect has also been found in a few studies to have health benefits such as living longer, cardiovascular health, and having better outcomes in chronic diseases (Pressman et al., 2019). Evidence suggests that positive affect short-term states and long-lasting traits have correlations with a variety of health and health-related outcomes (Pressman et al., 2019). This is why the current study is focusing on and examining whether listening to music increases an individual's positive affect after acute stress exposure, as it could play a crucial role in helping individuals cope with exposures to stressors.

Therefore, positive affect in this study will be described as feelings that portray a degree of enjoyable engagement with the environment (Cohen & Pressman, 2005; Cohen & Pressman, 2006). Quite a few studies that define positive affect use the words affect and emotion interchangeably (Cohen & Pressman, 2005; Cohen & Pressman, 2006). The authors state that the notions of affect, emotion, and mood are not persistently applied in the literature, which is the reason for why they are used interchangeably (Cohen & Pressman, 2005). Cohen & Pressman (2006) expand further on this definition and state these feelings can be short or longer in duration, however they highlight that the absence of enjoyable engagement does not specifically indicate negative affect such as anger or depression. In conjunction with the current study's working definition of positive affect, Watson et al. (1988) (the developers of the PANAS measure) briefly defined positive affect as reflecting the degree in which an individual feels enthusiastic, active, and alert. These two working definitions of positive affect appear similar in nature.

Folkman & Moskowitz. (2000) stated that positive affect and negative affect can in fact co-exist when the stress is seen as sever, however this draws on the ongoing discussion about the degree to which positive affect and negative affect are independent constructs. (See work by Feldman Barrett & Russell, 1998, and Russell & Carroll, 1999). Largely, the discussion on this connection between positive affect and negative affect has been concerned predominantly with the momentary experience of affect and if a person can experience positive affect and negative affect at the same time (Folkman & Moskowitz, 2000). However, it must be noted that the connection between positive affect and negative affect at any point in time is not the main concern here. The importance is with the matter of whether positive affect and negative affect can occur simultaneously during a stressful period of time (Folkman & Moskowitz, 2000). These authors argue that this form of existing at the same time is indeed credible and that it may serve as an important function (Folkman & Moskowitz, 2000). The authors expand further, and indicate that over the period of stress, a lot of affect inducing events occur, with the majority of which are likely to produce negative affect (Folkman & Moskowitz, 2000). However, in spite of the overruling stressful circumstances, the activities that give rise to positive affect also take place (Folkman & Moskowitz, 2000).

Previous studies researching the effects of listening to music on positive affect after acute stress exposure found emotional changes in terms of valence and arousal when listening to music in the recovery stage (de la Torre-Luque et al., 2017). Literature suggests that affective experiences involve at least two aspects: valence (ranging from feeling pleasant to unpleasant) and arousal (ranging from feeling quiet to active) (Kuppens et al., 2013). Kuppens et al. (2013) argue that the majority of research converges in terms of indicating that valence and arousal are fundamental to the nature of affect (Kuppens et al., 2013; Carroll et al., 1999). Additionally, they argue that valence and arousal are not the only dimensions of affect but that they are fundamental to describing affect (Kuppens et al., 2013). Thus, de la Torre-Luque et al. (2017) argue that their participants in the experimental group showed lower levels of negative affect and higher levels of positive affect, after listening to music.

A study by Koelsch et al. (2016) found that participants who listened to music portrayed higher levels of positive affect post-stressor compared to the participants who did not listen to music and sat in silence. Their results suggest that participants who listened to music experienced better affect after exposure to the stressor, as their positive affect scores were higher than the positive affect scores of participants who sat in silence (Koelsch et al., 2016). These studies suggest that individuals who listen to music are more likely to recover after experiencing acute stress exposure.

Therefore, based on previous literature, the assumption for the current study was that individuals' positive affect levels would decrease when completing the stressor task in the experiment and secondly, their positive affect levels would increase after listening to music (de la Torre-Luque et al., 2017; de la Torre-Luque, Caparros-Gonzalez et al., 2017; Groarke & Hogan, 2019).

### 1.5 Negative Affect

Research has suggested that individuals with higher levels of negative affect take longer to recover from illness compared to people with higher levels of positive affect (Mayne, 2010). This portrays that people who are more positive are more likely to recover quicker than people whose feelings or emotions are more negative in nature. Literature suggests that individuals with higher levels of negative affect are associated with negative feelings such as fear, guilt, and nervousness, whereas

individuals with lower levels of negative affect are linked with feelings such as calmness and serenity (Kaplan et al., 2009). This research was further supported by Curhan et al. (2014), who suggested that around the world, people with higher levels of negative affect and emotions are associated with poorer subjective health. This illustrates that people with negative emotions around the world see themselves as having poorer health. Research has also shown that negative affect is harmful to a variety of work attitudes which include but are not limited to job satisfaction, organisational commitment, and turnover (Yoon et al., 2022). Furthermore, negative affect has also been found to influence work behaviours (Yoon et al., 2022). This suggests that employees' work behaviour is influenced by whether they are experiencing negative affect or positive affect, which could have an impact on the organisation. Researchers have also found that negative affect is negatively associated with organisational citizenship behaviour (OCB) and is positively associated with counterproductive work behaviour (CWB), occupational behaviour, and withdrawal behaviour (Yoon et al., 2022). This shows how affective experiences are central towards employee well-being and how important they are for organisations.

It is believed that individuals with high negative affect tend to dwell on their failures and shortfalls, which leads to alienation of their fellow employees and managers, and which ultimately leads to more negative interpersonal interactions, lowering their job satisfaction (Brief & Weiss, 2002). In addition, individuals with higher levels of negative affect may react with more extreme emotion when experiencing job events that they deem negative in nature, which once again lowers their overall job satisfaction and effects the organisations productivity and efficiency (Brief & Weiss, 2002). Therefore, finding out whether listening to music helps reduce negative affect after acute stress exposure would be extremely important as it may help reduce individuals' negative feelings and emotions from daily acute stress exposures. In theory, listening to music could be seen as an easily accessible and cost-effective strategy to help people reduce their negative emotions from daily acute stressors.

The working definition of negative affect for the current study will be described as a broad dimension of distress that is perceived as subjective and engagement that is unpleasurable which include a selection of callous emotion states (Watson et al.,

1988). More specifically, negative affect is a construct that is defined by the common difference between fear, anxiety, sadness, anger, and other unpleasant emotions (Watson et al., 1988). As mentioned in the working definition above, examples of negative affect include feelings of sadness, fear, nervousness, and more (Watson et al., 1988). Previous literature on this topic found that individuals reported lower levels of negative affect after listening to music post stressor compared to the control group (Adiasto et al., 2022). Individuals experienced higher levels of negative affect after exposure to the stressor, but after listening to preferred relaxing music, participants negative affect levels decreased (de la Torre-Luque et al., 2017). This suggests that participants' negative emotions increased when exposed to stressful tasks, but after listening to music that they thought was relaxing, their negative emotions decreased. Listening to music has also been found to provide an effective means of regulating negative affect in times of stress, which suggests that listening to music can help reduce negative emotions (Groarke et al., 2019).

Therefore, based on the current literature, the current study assumed that an individual's negative affect levels would increase when completing the stress induction task and, secondly, that their negative affect levels would decrease after listening to music (de la Torre-Luque et al., 2017; de la Torre-Luque, Caparros-Gonzalez et al., 2017; Groarke & Hogan, 2019).

### 1.6 Listening to Music and Recovery From Stress

Quite a few experimental studies have found that listening to music does have an effect on stress recovery after acute stress exposure and have used different forms of stress induction tasks to induce stress in their participants in their studies (de la Torre-Luque et al., 2017; de la Torre-Luque, Caparros-Gonzalez et al., 2017; Groarke et al., 2020; Groarke & Hogan, 2019).

de la Torre-Luque et al. (2017) investigated the effects of listening to preferred relaxing music after acute stress exposure. Their participants were required to select music that they found relaxing (their relaxing music playlist), or participants listened to nothing at all (the control group). The authors used self-report measures for positive affect, negative affect, state anxiety, and state depression (de la Torre-Luque et al., 2017). In their experiment they based their stress induction task off the Trier Social Stress Test (TSST), which consisted of exposing participants to a

psychological related stressor which was then followed by a mental-effort type task, and the Paced Auditory Serial Addition Test (PASAT) (de la Torre-Luque et al., 2017). The rationale behind using this stress induction task was that it allows for moderate to intense levels of induced stress within a controlled environment, as it is challenging, threatening, and uncontrollable (de la Torre-Luque et al., 2017). Their results suggest that the experimental group portrayed lower levels of negative affect, state anxiety, state depression, and greater levels of positive affect in the recovery phase of the experiment (de la Torre-Luque et al., 2017). Their conclusion and generalisation were that interventions that are based on preferred relaxing music allow for promotion of a healthier recovery and improved affective state after exposure to acute stress (de la Torre-Luque et al., 2017).

Similarly, de la Torre-Luque, Caparros-Gonzalez et al. (2017) investigated acute stress recovery through listening to relaxing music. Participants either experienced listening to relaxing music (experimental group), which was created through a process of validation by means of a focus group to gain expert knowledge and through agreement between musicians, or participants listened to no music at all (control group) (de la Torre-Luque, Caparros-Gonzalez et al., 2017). This study used the PASAT, however only the first series of numbers were used instead of three (de la Torre-Luque, Caparros-Gonzalez et al., 2017). The authors used self-report measures of state anxiety in their experiment. They found that listening to relaxing music helps promote a more adaptive emotional regulation after coping with acute stress exposure (de la Torre-Luque, Caparros-Gonzalez et al., 2017).

Research conducted by Groarke et al. (2019) investigated whether listening to music regulates negative affect in a stressful situation. In their study, listening to music consisted of three conditions: self-selected music, researcher-selected music, and silence (Groarke et al., 2019). Participants were required to send through their self-selected music playlists for a social situation and a stressful situation. The psychological measure that was used in their study was self-reported anxiety. In their study, they used an adapted version of the TSST (speech preparation and an arithmetic challenge). From their post hoc tests, they found a significant difference between self-selected music and silence, with a large effect size d = .92 (Groarke et al., 2019). Additionally, they found a significant difference between the researcher-selected music condition and silence, with a large effect size d = .83 (Groarke et al.,

2019). Therefore, the authors found evidence suggesting that a single brief session of listening to music reduced subjective feelings of anxiety due to a stressful situation (Groarke et al., 2019).

In addition, Groarke & Hogan (2019) conducted a study investigating whether listening to self-chosen music regulates induced negative affect in younger and older adults. In this study, participants were either allocated to listen to their selected music choice for a stressful situation (experimental group) or listen to a radio documentary on Charles Darwin (active control group) (Groarke & Hogan, 2019). In the study, the authors measured subjective affect. These authors made us of an adapted version of the TSST to induce mild/moderate stress amongst participants (which had two phases). Their results suggested that self-selected music listening would be more effective than listening to a radio documentary in regulating induced negative affect (Groarke & Hogan, 2019). The authors found that personal music listening offers additional advantages for regulating negative affect caused by the prospect of a stressful challenge, and this effect was the same for both younger and older adults (Groarke & Hogan, 2019).

Therefore, all these studies mentioned above suggest that listening to music can help with the stress recovery process and that listening to music could serve as a low-cost and effective stress recovery strategy following acute stress exposure. However, a few experimental studies included in the meta-analysis have found differing results and suggest that listening to music may not help individuals with stress recovery and that music listening might not be an effective stress recovery strategy following acute stress exposure (Fallon et al., 2020; Radstaak et al., 2014).

A study conducted by Fallon et al. (2020) on stress reduction from a musical intervention had mixed results. In this study there were three groups: control group, music listening group (pre-determined music), and a music improvision group (play the xylophone). These authors used a modified version of the TSST, which include three sections (their dream job, verbally describe their dream job qualifications with two research assistants, and to verbally subtract 13 from 1022 over and over again as fast as possible) (Fallon et al., 2020). The authors found that there were significant differences between the music-listening group and the silence group (Fallon et al., 2020). However, they found that the music listening intervention did not

have differential effects on participants' current mood compared to the participants in the control group, which was measured by a current mood scale (Fallon et al., 2020). This suggests that were no significant differences in participants' current mood when comparing the experimental groups and the control group.

Radstaak et al. (2014) found that individuals who listened to happy or relaxing music reported higher positive affect levels, post stressor compared to participants who did not listen to music. Their study made use of four groups: self-selected relaxing music, self-selected happy music, audiobooks, or silence (Radstaak et al., 2014). In their study, stress was induced through a mental arithmetic task with harassment (Radstaak et al., 2014). However, their results suggested that there were no significant differences in post-stressor negative affect (Radstaak et al., 2014; Adiasto et al., 2022). This suggests that there were no differences in individuals negative affect following acute stress exposure regardless of which recovery condition they were in.

Scheufele et al. (2000) conducted a study on the effects of progressive relaxation and classical music on measurements of attention, relaxation, and stress responses. These authors had two groups in their study (progressive relaxation music or attention control / silence). In their study the stress induction task consisted of a five-minute speech task that was to be videotaped at the completion of a fifteen-minute speech preparation period (Scheufele et al., 2000). Their results suggested that no significant differences in post-stressor Profile of Moods Scores (POMS) between experimental groups, with higher POMS scores indicating higher positive affect.

As can be seen, there is definitely a mixture of findings in the literature on listening to music and coping with acute stress exposures, which was further highlighted by a recent meta-analysis. Adiasto et al. (2022) conducted a recent systematic review with meta-analysis of experimental studies on music listening and stress recovery in healthy individuals. They state that a lot of studies suggest that listening to music could be a useful strategy for helping cope with stress and that music listening might be a promising method to promote effective stress recovery for exposures to daily acute stressors (Adiasto et al., 2022). These authors wanted to test this claim and clarify the existing literature by conducting a systematic review with meta-analysis of

randomised, controlled experimental studies investigating the effects of listening to music and stress recovery in healthy individuals (Adiasto et al., 2022).

The authors ran a random-effects meta-regression with robust variance estimation which yielded a non-significant cumulative effect of listening to music and stress recovery (Adiasto et al., 2022). They state that the effects of listening to music on recovering from exposures to stress appeared to change according to musical genre, who chooses the music, tempo, and type of stress recovery outcome (Adiasto et al., 2022). Therefore, these authors suggest that no conclusive remarks can be made about the effects of listening to music on acute stress recovery in healthy individuals and that it may be too early to firmly claim that the concept of listening to music is beneficial for coping.

This is why there is a need for more research to attempt to help clarify whether listening to music could be a useful and cost-effective strategy by increasing individuals' positive feelings and decreasing their negative feelings after acute stress exposure. Furthermore, finding out whether different music playlists (such as self-selected music playlists) have the greatest effect on increasing positive affect and reducing negative affect after acute stress exposure could help individuals cope with their emotions better as they would be able to listen to music that they find de-stressing.

### 1.7 Musical Characteristics

The current literature suggests that there are ongoing discussions on whether musical characteristics such as genre, tempo, vocal or instrumental, key, and mode have an impact on stress recovery (Adiasto et al., 2022). Understanding how various factors associated with listening to music can impact the stress recovery process, could help individuals select music that has been found to work best in coping with acute stress exposures, which would increase effectiveness (Jiang et al., 2016).

Jiang et al. (2016) suggests that music has properties that induce arousal and valence, which in turn are partially mediated by an individual's music preference, familiarity, and musical background. They argue that low-arousal music is suspected to be better than high-arousal music in bringing down tension and anxiety (Jiang et al., 2016). Furthermore, they state that high-pleasure music tends to bring down

stress better than low-pleasure music and that music listening is a non-invasive intervention/strategy, which can be utilised to help alleviate stress because of its close correlation with emotion/affect (Jiang et al., 2016). Interestingly, they found that the most a crucial factor in assisting in bringing down stress was the degree of liking for music and not the degree of familiarity with music (Jiang et al., 2016). However, they do state that other studies have found no association between arousal, familiarity, music training, and stress reduction, which suggest the relationships among these different factors requires further research (Jiang et al., 2016). Unfortunately, due to a sizeable proportion of research studies not reporting the specific songs that participants selected for their self-selected music playlists, it is difficult to conclusively examine this heterogeneity (Adiasto et al., 2023). This is why the current study requested all participants self-selected music playlists to determine similarities and differences which were included in the write up.

In the current literature, it is still inconclusive whether musical characteristics play a role in the stress debate, and that there is a need for further research on this topic to help clarify this (Adiasto et al., 2022). Furthermore, research suggests that audio features and characteristics of songs that people select in order to recover from stress most likely vary (Adiasto et al., 2023). Adiasto et al's. (2022) meta-analysis attempts to identify, among other things, which music works best and whether there were any potential moderating effects between the relationship between music listening and stress recovery, such as classical genres vs other genres, instrumental vs lyrical music, self-selected music vs experimenter selected music, and between fast and slow tempo.

Firstly, their results suggest that the effect of listening to music on stress recovery may differ across different musical genres (Adiasto et al., 2022). However, their review is brief, as it was difficult to elaborate further on these differences because of the minimal literature available. Secondly, they discovered that the effects of listening to music on stress recovery did not differ between music that had vocals and music that did not have vocals (Adiasto et al., 2022). Thirdly, their results suggest that there may be differences in magnitude between the effect of self-selected music, researcher-selected music, and pseudo-selected music (which is music selected by participants from an experimenter-defined list) on stress recovery (Adiasto et al., 2022). This is one of the reasons why the current study is exploring if

there are differences between music playlists. Lastly, their research investigated if there were differences between music that had a fast tempo and music that had a slow tempo. They found that there may be differences in magnitude based on musical tempo (Adiasto et al., 2022). However, as with the other three characteristics, they state that little can be said about these differences at this moment in time due to the lack of literature available on this topic.

Therefore, it is too early to conclude whether musical characteristics have a part in alleviating stress and further highlights the need for more research on this topic. The third research question of the current study explored what musical characteristics do self-selected de-stressing music playlists display, which was identified through receiving the music playlists that participants listen to in order to relax before participating in the experiment.

### 1.8 Research Aims

Therefore, the current study aims to determine whether listening to music has an effect on the psychological outcomes of positive affect and negative affect, after acute stress exposure. There is a mixture of findings in the literature on whether listening to music has an effect on stress recovery after acute stress exposure, and determining if there is an effect could suggest that listening to music might be a useful strategy in helping increase positive affect and decrease negative affect, after acute stress exposure. The second aim is to see whether self-selected music playlists have the greatest effect on positive affect and negative affect, after acute stress exposure. The focus is on self-selected music playlists as it links to a number of influencing variables that could play a part in increasing positive affect and decreasing negative affect more than the other two groups in the study.

### 1.9 Rationale

The rationale for conducting this study was based on the following. Firstly, there is a mixture of findings within the literature on whether listening to music has an effect on psychological outcomes, after acute stress exposure. This was confirmed by Adiasto et al. (2022), who conducted a systematic review with meta-analysis of experimental studies on music listening and stress recovery. Their study aimed to clarify the current literature and carried out a random-effects meta-regression with

robust variance estimation which resulted in a non-significant cumulative effect of music listening on stress recovery, $g$ = 0.15, 95% CI [-0.21,0.52], $t(13) = 0.92$, p = 0.374 (Adiasto et al., 2022). The authors concluded that no conclusive remarks can currently be made about the effects of music listening on short-term stress recovery, and there is a need for further research on this topic (Adiasto et al., 2022). Secondly, there is hardly any research that has been done on different music playlists, especially self-constructed playlists, researcher-selected/established playlists, and ambient sound playlists, which this study aimed to add to the literature on.

Thirdly, this research aimed to add to the literature in a South African context, as the findings in the current literature may be different when using a South African population and that little research has been carried out on the area of music listening and acute stress exposure in a South African context. Fourthly, the findings from this study could help provide a low-cost, easily accessible stress management strategy for not only students but for employees in an organisational context. From an organisational perspective, an easily accessible stress management strategy that is effective, is a crucial factor in promoting health and well-being for everyone in the organisation.

### 1.10 Research Questions

1. To what extent does listening to music have an effect on positive affect and negative affect, after acute stress exposure?

2. Do self-selected music playlists have the greatest effect on positive affect and negative affect, after acute stress exposure?

3. What musical characteristics (e.g., genre, vocal/instrumental, tempo, key, mode) do self-selected de-stressing music playlists display?

### 1.11 Hypotheses

The first hypothesis is that listening to music does have an effect on positive affect and negative affect, after acute stress exposure.

The second hypothesis is that self-selected music playlists will have the greatest effect on positive affect and negative affect, after acute stress exposure.

## 1.12 Conclusion

This draws an end to Chapter 1. In this chapter, the topic was introduced, and its importance was discussed. Thereafter, the literature on positive affect and negative affect was covered and explained in the context of the current study. Then, the current literature on listening to music and the stress recovery process was discussed in detail before looking at the literature on musical characteristics and whether this has an impact on the stress recovery process. Towards the end of the chapter, the importance of this topic was looked at from an organisational perspective and the research aims, rationale, research questions, and hypotheses were provided. The focus of the research study will now turn towards Chapter 2, the methods section.

# Chapter 2: Methods

## 2.1 Chapter Overview

The methods chapter will begin by describing the research design of the study before moving onto the participants and sampling strategy that was used. Having discussed this, all the measures and materials that were used in the study will be identified and described before explaining the procedure that was followed. The methods chapter will conclude by providing an overview of the data analyses used and the ethical considerations of the study.

## 2.2 Research Design

This study was a quantitative longitudinal experiment with elements of between and within groups design that investigated whether listening to music had an effect on positive affect and negative affect, after acute stress exposure. Data was collected at two time points in the study, post stress induction task (Time 1), and post listening to audio (Time 2).

## 2.3 Participants and Sampling

The study used non-probability sampling through the use of volunteer sampling, and purposive sampling. These sampling techniques allowed the researcher the best chance to attain a suitable sample size for the study. The researcher received the relevant permission from the University's Registrar, course coordinators, and lecturers before speaking to students and outlining the study. The researcher initially targeted part-time Wits plus psychology students currently attending the University of the Witwatersrand. Part-time Wits plus consists of individuals who are studying part-time in the evenings. The researcher spoke to the part-time Wits plus psychology students before their lectures began in the evening and explained the study to them. Part-time Wits plus students were targeted because they are slightly older students with a history of past or current employment. Furthermore, ethical concerns were accounted for, and the researcher did not want to subject vulnerable volunteers to a stress induction procedure, which is why this group was identified.

The pre-screening measure for this study was the *Generalised Anxiety Disorder questionnaire* (GAD-7) with a criterion cut-off point of 10 or above, please refer to section 2.4 below. Due to a large proportion of part-time Wits plus students not meeting the pre-screening requirements to participate in the experiment, more participants were needed which led to the sample expanding. The researcher broadened the sample to not only include part-time Wits plus psychology students, but all psychology students at the University of the Witwatersrand. The same process was followed to recruit the new participants, whereby the researcher first received relevant permission to speak to the classes and after that, students could voluntarily sign up if they wished to participate in the study.

A link was then emailed to the individuals who signed up to participate whereby they were asked to provide their contact information in order to send them the participant information sheet and pre-screening survey. Please refer to Appendix A for the pre-screening questions.

The pre-screening stage asked participants to provide consent to participate in the pre-screening survey and to confirm they were 18 years of age or older. Thereafter, they were asked to state if they were currently attending the University of the Witwatersrand, whether they were taking any medication for stress or anxiety, if they had a serious hearing impairment, complete the General Anxiety Disorder Questionnaire, and to provide their unique identifier code. In the pre-screening stage, participants were asked to create a unique identifier code, using the first letter of their name, the first letter of their surname, and the last four numbers of their student number, for example: GM2476. This was not identifiable by anyone except the researcher.

The study excluded participants who were not currently attending the University of the Witwatersrand, participants who scored too high on the General Anxiety Disorder Questionnaire, participants that were taking any medication for stress or anxiety, participants that were under 18 years of age, and participants that had a serious hearing impairment. Pre-screening was used in this study to protect participants who had an elevated risk profile from participating in the study and to remove potential outliers that would skew the data. These were the only exclusions involved in the study.

The final sample of the study consisted of 30 participants. Of the 30 participants, seven were male, 22 were female, and one participant identified as gender variant. 20 participants were between 18-25 years old, three participants were between 26-35, and seven were over 35 year old. The majority of the final sample were currently studying a bachelor's degree (19 participants), two were studying an honour's degree, and seven were studying their master's degree. Lastly, 18 participants identified as African, five identified as Indian, four identified as Coloured, and three identified as White.

### 2.4 Measures and Materials

The *Generalised Anxiety Disorder Questionnaire (GAD-7)* was used as a pre-screening measure in this experiment. The questionnaire was developed in 2006 by Spitzer, Kroenke, Williams, and Löwe as a tool for screening and gauge of generalised anxiety disorder (Spitzer et al., 2006). The authors found that the scale had excellent internal reliability, $\alpha = .92$ and good test-retest reliability, 0.83 (Spitzer et al., 2006). Furthermore, they found good criterion, factorial and procedural validity based on comparison of scores derived from self-report scales with those from the clinician-administered versions of the same scale (Rutter & Brown, 2017). Therefore, the Generalised Anxiety Disorder Questionnaire can be seen as reliable and valid, which is why it was used as the pre-screening questionnaire for the current study.

The *GAD-7* is a self-report measure which consists of 7-items (Rutter & Brown, 2017). The questionnaire utilizes a 4-point Likert-type scale, 0= not at all, 1= several days, 2= more than half the days, and 3= nearly every day (Rutter & Brown, 2017). Individuals are asked to indicate over the last two weeks how often they have been bothered by certain problems, such as worrying too much about different things, feeling nervous, anxious, or on edge, and if they had trouble relaxing. Scores range from 0-21, with higher scores indicating greater severity of symptoms of anxiety. Williams (2014), recommends a cut-off of 10 or greater when screening for anxiety, which was also used in the current study. Please refer to Appendix A for the Generalised Anxiety Disorder Questionnaire.

A *demographics questionnaire* was created by the researcher for this specific study. The demographics questionnaire consisted of four items: gender, age, demographic group, and current qualification registered for. Demographic group was

included in this study due to past patterns of discrimination and exclusion, including from research, as well as that the researcher has an interest in demographic representativity within the broader conversations of transformation and redress. Furthermore, it related to the concept of WEIRD samples were W stands for White, which relates back to the researchers desire to conduct the study in a South African context. Demographic information allows the researcher to better understand the background characteristics of the participants and to accurately describe the sample (Hughes et al., 2016). The demographics questionnaire was used to describe the sample in the current study (please refer to Appendix B for the demographic questionnaire).

The questionnaire that was used to measure participants positive affect and negative affect in the study was the *Positive and Negative Affect Schedule, PANAS* (Watson et al., 1988). The PANAS questionnaire is one of the most widely used scales to measure affect and has been proven in different contexts, such as measuring affect at this moment in time (Tran, 2013). The ability of the positive and negative affect questionnaire to measure both positive affect and negative affect at that current point in time, is why this scale is applicable and was used in the current study. In the current study, participants self-reported their positive affect and negative affect straight after the stress induction task, and straight after listening to audio.

The questionnaire uses a 5-point Likert-type scale, 1= not at all, 2= a little, 3= moderately, 4= quite a bit, and 5= extremely (Watson et al., 1988). The questionnaire has 10 items that assess positive affect and 10 items that assess negative affect (Watson et al., 1988). Individuals are asked to indicate how they feel for each item at that moment in time. An example of a positive affect item from the questionnaire: interested and excited, and an example of a negative affect item: distressed and upset (Merz et al., 2013). Scores can range from 10-50 for the positive affect items with higher scores indicating higher levels of positive affect and range from 10-50 for the negative affect items with lower scores representing lower levels of negative affect (Watson et al., 1988). Please refer to Appendix C for the PANAS questionnaire.

Previous research that has used the PANAS questionnaire, found that the questionnaire is a reliable and valid measure of affect (Crawford & Henry, 2004). These authors tested the reliability and validity of the PANAS measure and found the reliability of positive affect ranged from .86 to .90 and the reliability of negative affect ranged from .84 to .87 (Crawford & Henry, 2004). These findings indicate excellent levels of reliability.

Watson et al. (1988) the developers of the questionnaire, validated the questionnaire to see whether the PANAS scales adequately capture the underlying mood factors by subjecting ratings on the 60 mood descriptors of 6 large data sets to a principal factor analysis with squared multiple correlations as the communalities estimate. They found two dominant factors in each solution, which together account for two thirds of the common variance, which ranged from 62.8% for in the moment solution to 68.70% for in the general ratings (Watson et al., 1988). Each of the six solutions produced two sets of factor scorings weights which could be used to compute regression estimates of the underlying positive affect and negative affect factors in those data sets (Watson et al., 1988). Furthermore, within each data set, they then correlated these estimated factor scores with the PANAS positive affect and negative affect scales. The analyses showed the expected convergent/divergent pattern: both PANAS scales are thoroughly correlated with their corresponding regression based factor scores in each solution, with convergent correlation ratings ranging from .89 to .95, whereas the discriminant correlations are quite low, ranging from -.02 to -.18 (Watson et al., 1988).

Additionally, they deemed it important to portray the factorial validity of the individual PANAS items (Watson et al., 1988). Their results of all descriptors showed strong primary loadings of .50 and above on the appropriate factor, and the secondary loadings were all acceptably low, demonstrating all the PANAS items are good markers of their corresponding factors (Watson et al., 1988). The validity of the PANAS questionnaire for this type of research was further supported as one of the current studies on music listening and stress recovery used the PANAS questionnaires to assess participants affect (de la Torre-Luque et al., 2017). Therefore, by drawing on a wide variety of literature, old and current, and literature similar to that of the current study, the PANAS measure can be seen as a reliable, valid, and efficient means for measuring affect (Watson et al., 1988).

The stress induction task that was used in this experiment was a variation of the classic *Stroop task*, which was set up through the PsyToolkit software (Stoet, 2010; Stoet, 2017). The Stroop task was used to induce low to moderate levels of stress amongst participants (Bali & Jaggi, 2015). A number of researchers have endorsed the Stroop task as an effective and valid laboratory-based stress induction technique, which was the aim for the current study (Bali & Jaggi, 2015; Renaud & Blondin, 1997).

The task required participants to name the ink colour of a word when there is a mismatch between the ink colour and the word (Stroop, 1935). For example, the word blue written in green ink. Participants need to correctly identify the ink colour by pressing the correct letter on the keyboard of the ink colour within 3 seconds (Stoet, 2017). For example, if the word is blue written in green ink, the participant will push the keyboard button ‘g’, indicating the answer is green. If the participant chooses the right choice, the computer shows the word ‘correct’, but if the participant gets it incorrect or takes longer than three seconds, the computer shows the word ‘wrong’ and moves onto the next item (Stoet, 2017). This task proves challenging for participants as there is a response conflict between the word and ink colour which leads to slow processing (Wickens et al., 2013). There were 75 items in the Stroop task that was used in this study and the process took roughly 5 minutes. Please refer to Appendix D for the Stroop task questions. Furthermore, during the debriefing stage at the end of the experiment, all participants were asked to answer 5 questions about the Stroop task. This was done to help assess the effectiveness of the stress induction task.

The self-selected music playlist, researcher-selected music playlist, and the ambient sound playlist used in the experiment were all set up on Spotify. Spotify is a platform that allows users to listen to music, podcasts, and videos from all around the world (Spotify, 2023). Spotify provides both a free service and paid service and is accessible across a wide variety of devices, such as phones, laptops, computers, tablets, televisions and more (Haupt, 2012). In the experiment, the paid version of Spotify was used, as the researcher had a subscription with Spotify.

In the experiment, all participants used the same PHILIPS, SHP2000 headphones, which were provided by the researcher. The same set of headphones

was used for consistency and standardisation. This headphone has extra soft ear cushions, is adjustable for optimised fit, and has full-sized over-ear shells for excellent sound isolation.

Participants were asked to spend time thinking about the music they would listen to in order to relax. This was done to help with standardisation and ultimately the internal validity of the study, as all participants spent time reflecting on and creating a 'de-stressing' music playlist. Additionally, this was done to provide a lot of interesting data which can be further analysed such as, what musical characteristics do self-selected de-stressing music playlists display, which relates to the third research question of this study. Participants did not know which music condition they were in until they began listening to their allocated audio track during the experiment. Participants sent through their self-selected music playlists during the 'providing a time and date' stage of the study which allowed the researcher to set up their playlists before the participant arrived at the venue.

For participants in the other two groups, their audio track was also set up by the researcher before they arrived at the venue. All the part-time Wits plus students who participated in the experiment were randomly assigned to one of the three groups as they were recruited first. Once the study expanded due to individuals not being able to participate, the psychology students who signed up were randomly assigned to one of the three groups. Random assignment was used to increase the internal validity of the study and to alleviate fears of history effects and selection bias (Lim & In, 2019).

### 2.5 Procedure

The questionnaire was set up on Qualtrics, where participants in the experiment filled out their answers. Furthermore, participants completed all aspects of the experiment on the researchers Dell Laptop. This included completing the demographic questionnaire, Stroop task, listening to audio, PANAS questionnaires, and the questions assessing the quality of the Stroop task.

The part-time Wits plus psychology participants signed up to participate through a link that was distributed to them via an announcement from their lecturers and once the study expanded to include all psychology students, these students signed up by

writing down their information on a piece of paper that the researcher handed to them. Then the participant information sheet (see Appendix E) and the link to the pre-screening questions were emailed to them. Participants created their unique identifier code, for example: TJ1276 in the pre-screening stage and were asked to provide this code in all subsequent surveys they participated in. This included the pre-screening questionnaire, the survey where they selected a time and date to participate in the experiment, and in the survey used in the experiment. This unique identifier code was used to randomly allocate participants to either of the three groups in the experiment.

Participants who scored 10 or above on the Generalised Anxiety Disorder Questionnaire were excluded from participating and were provided with the contact information of the University of the Witwatersrand's Counselling and Careers Development Unit (CCDU) (Williams, 2014). The researcher contacted all the people who did not meet the pre-screening requirements to let them know they would not be able to participate any further and thanked them for their participation. If they satisfied the pre-screening criteria mentioned above, they were emailed and informed that they were allowed to participate in the experiment. In the email they were sent a link which took them to a survey where they would provide a time and date to participate in the experiment as well as provide six songs that they listen to in order to relax.

The experimental process was a one-on-one procedure, which followed how previous studies, such as the fourteen experimental studies in the meta-analysis, carried out their experiments (Adiasto et al., 2022). On the day of the experiment, the participant arrived at the venue, and was greeted by the researcher. Upon arrival, the participant was asked if they had any questions about the study. After this, the participant was asked to read and sign the informed consent form to participate in the study. Once the participant had provided written informed consent, they were shown to their seat, which was a comfortable chair situated at a desk with a laptop with the participant information sheet open on the laptop which they could read again if they wished. They were also required to confirm that they were 18 years of age or older and provide consent to participate in the experiment. Thereafter, they went on to complete the demographics questionnaire on the laptop.

While the participant was completing the demographics questionnaire, the researcher moved to the other side of the venue, so that the participant could answer the questions without the presence of the researcher. Once they had completed the demographics questionnaire, the first part of the experiment began, which was the stress induction task (the Stroop task). The task was computerised and had been set up on the laptop where the participant was sitting. Once the participant was ready to begin, the researcher moved to the other side of the venue, and the participant began the task.

The instructions then informed the participants to begin completing the positive affect and negative affect questionnaire on the laptop. Before the participant began answering the questionnaire, the researcher moved to the other side of the venue, where they were unable to view the participants answers. Once the participant had completed the questionnaire, the survey instructions informed them to put on the headphones which were situated on the desk next to them, open the Spotify App, select the allocated music playlist, and begin listening. For participants in the self-selected music playlist, this was labelled ‘Playlist A’ in the Spotify App, for participants in the researcher-selected music playlist, this was labelled ‘Playlist B’, and for participants in the ambient sound playlist, this was labelled ‘Playlist C’. The researcher-selected music playlist (Playlist B) had Classical songs with no lyrics that were selected by the researcher and the ambient sound playlist had ambient noises (water/river flowing sounds) that were selected by the researcher. Please refer to Appendix O for these playlists).

As the researcher had set up the specific music playlist beforehand, that music playlist was the only one that was available and could be selected. The participant listened to the allocated audio for 10 minutes. The researcher had a timer that started once the participant began listening to their allocated audio and moved to the other side of the venue until the 10 minutes was finished. After the time was up, the researcher instructed the participant to stop listening to the audio, take off their headphones, and complete the PANAS questionnaire on the laptop. Once again, the researcher moved to the other side of the venue. Once the participant had finished answering the questionnaire, their participation in the experiment was complete and they were given a full debriefing and thanked for their participation. During the

debriefing stage, the participant was asked to answer a few questions on the laptop, which helped assess the quality of the Stroop task as a stress induction task.

### 2.6 Data Analysis

Data was collected from participants via the platform Qualtrics. After data collection was completed, the data was exported and analysed on the Statistical Package for Social Sciences (SPSS, version 28). Frequencies, reliabilities, descriptive statistics, assumption testing, mixed model ANOVAs, and post hoc tests were conducted and interpreted to see whether listening to music had an effect on positive affect and negative affect, after acute stress exposure. Mixed model ANOVAs were the primary form of analysis because it is able to contrast the mean differences between groups that have been split on two factors, where one factor is a within-subjects factor and the other factor is a between-subjects factor, which fits the design of the current study well (Laerd Statistics, 2015).

### 2.7 Ethical Considerations

This study applied for and received ethical clearance from the Humanities Research Ethics Committee (Non-medical) through the Department of Psychology at the University of the Witwatersrand, protocol number: MAORG/23/07, refer to Appendix G. Furthermore, the study applied for and received permission from the University's Deputy Registrar to conduct research on the premises of the University of the Witwatersrand and to involve university students as research participants, refer to Appendix H. Potential participants were emailed a participant information sheet, which outlined the important aspects of the study, such as what the study was about, how the study will be carried out, the researchers' details, and the ethical considerations. For example, volunteers who showed interested in the recruitment phase were sent a full participant information sheet which explained voluntary participation, risks and benefits, confidentiality, and anonymity of results and reporting. The participant information sheet was sent to participants during the pre-screening stage of the study which allowed them to read through the sheet in their own time, before deciding to participate.

Participants were presented with an informed consent form upon arrival to the experiment which covered important aspects of the study (refer to Appendix F). Only

participants who signed the consent form were allowed to proceed. Once the participant had completed the experimental part of the study, they were given a full debriefing, and thanked for their participation in the study. Participants were informed that they were allowed to ask for feedback during the experiment and this was also written on the informed consent form. This study posed very limited risks for participants, as the tasks in the experiment were no different to what a university student experiences on a daily basis.

### 2.8 Conclusion

This concludes Chapter 2, the methods section of the research study. In this chapter the research design of the study was provided, and the participants and sampling procedure were identified and discussed. The measures and materials that were used in the study were described in detail, and the procedure that the study followed was explained. Towards the end of the chapter, an overview of the data analyses used in the study was given, and the ethical considerations were provided. The focus of the research study will now shift towards Chapter 3, the results section.

# Chapter 3: Results

## 3.1 Chapter overview

The following chapter presents the statistical results obtained from this research study. This includes information on frequencies, reliabilities, the stress induction task, descriptive statistics, mixed model ANOVAs, and the musical characteristics of self-selected music playlists. All numbers in this section have been rounded off to two decimal places, as recommended by APA guidelines.

## 3.2 Frequencies

The demographic data for the current study are shown in Table 1 below. From the tables below, the majority of participants in the study identified as female (73.3%) with (23.3%) of the study identifying as male. The majority of the sample (67.7%) consisted of participants in the age bracket of 18-25 years old and (23.3%) of the sample being over 35 years old. The majority of the sample identified as African (60%) followed by Indian (16.7%) Coloured (13.3%) and White (10%). The majority of participants were currently registered for a bachelor's degree (63.3%) followed by a master's degree (30%).

**Table 1**
*Demographics*

| | N | % |
|---|---|---|
| Gender | | |
| Male | 7 | 23.3% |
| Female | 22 | 73.3% |
| Gender variant / nonconforming | 1 | 3.3% |
| Age | | |
| 18-25 | 20 | 66.7% |
| 26-35 | 3 | 10.0% |
| Over 35 | 7 | 23.3% |
| Current Qualification registered for | | |
| Bachelor's degree | 19 | 63.3% |
| Honours degree | 2 | 6.7% |
| Master's degree | 9 | 30.0% |
| Demographic group | | |
| White | 3 | 10% |
| African | 18 | 60% |
| Indian | 5 | 13.3% |
| Coloured | 4 | 13.3% |

### 3.3 Reliability

Before running and analysing the measures to follow, the critical assumptions identified for this experiment was the reliability of the Positive Affect and Negative Affect Schedule, and the efficacy of the stress induction task used in the experiment. This is the reason for assessing the reliability of the measures, and the efficacy of the stress induction task before moving onto the descriptive statistics and analyses.

As mentioned in the measures and materials section in Chapter 2, the PANAS questionnaire is one of the most widely used questionnaires to measure affect, which has also been used and tested in different contexts (Tran, 2013). The ability of the PANAS questionnaire to measure affect at the current point in time was why the questionnaire was chosen and used in the current study (Tran, 2013).

The internal consistency reliability for Time 1 positive affect (pre-PA) was $\alpha = .79$ and $\alpha = .92$ for Time 2 positive affect (post-PA), indicating good internal consistency reliability for positive affect at time 1 and excellent internal consistency reliability for positive affect at time 2, please see Appendix I (Table 19 & Table 21). To calculate the internal consistency reliability coefficient for positive affect at Time 1 and Time 2, items 1, 3, 5, 9, 10, 12, 14, 16, 17, and 19, which make up the positive affect portion of the PANAS questionnaire, were used. The internal consistency reliability for Time 1 negative affect (pre-NA) was $\alpha = .67$ and $\alpha = .32$ for Time 2 negative affect (post-NA), indicating acceptable internal consistency reliability for negative affect at time 1 and undesirable internal consistency reliability for negative affect at time 2, please see Appendix I (Table 23 & Table 25). To calculate the internal consistency reliability coefficient for negative affect at Time 1 and Time 2, items 2, 4, 6, 7, 8, 11, 13, 15, 18, and 20, which make up the negative affect portion of the PANAS questionnaire, were used.

There are on-going discussions on the minimum cut-off alpha coefficient for acceptable internal consistency reliability, with cut-offs ranging from .60 to .70 with scores lower than .60 being undesirable (McKennell, 1970). The item-total statistics table were looked at for each scale to see whether removing any items would increase the internal consistency, please see Appendix I (Table 20, Table 22, Table 24, Table 26). The focus however was on the reliability of the Time 2 negative affect scale (post-NA), because of the undesirable internal consistency reliability. After

looking at the item-total statistics table for Time 2 negative affect (post-NA) it was determined that there would be no substantial increase in internal consistency reliability if any items were removed, thus all 10 items were kept. The undesirable internal consistency reliability for negative affect (Time 2) was due to the responses on the negative affect scales bottoming out, especially on the negative affect (Time 2) scores, and the general lack of variance in these scores. The reliability of this scale is a limitation of the study and will be further expanded on in the limitations section in Chapter 4. Therefore, the positive affect scales which make up the PANAS questionnaire can be seen as a suitable measure of current affect and is applicable in the current study, whereas the negative affect scale of the PANAS questionnaire for (Time 1) was acceptable but the negative affect scale of the PANAS questionnaire for (Time 2) was undesirable and unreliable.

### 3.4 Effectiveness of the Stress Induction Task

In order to evaluate the effectiveness of the stress induction task used in the experiment, the questions asked at the end of the procedure will be turned to. All individuals at the end of the experiment were asked to answer five questions about how they felt during the stress induction task, please refer to Table 2 below. This method of evaluation was chosen as it was time effective and straightforward for the participants to complete, as they had already spent approximately 15 - 20 minutes in the experiment.

The same 5-point Likert-type scale that was used in the PANAS questionnaires, was used here (1= not at all, 2= a little, 3= moderately, 4= quite a bit, and 5= extremely). Looking at these statistics which were self-reported by all the participants in Table 5 below and at Figures 1 - 5 below, Question 1 (pressurized) had a mean and median of 3, and 60% of the sample reported moderate or higher levels of feeling pressurised. This suggests a moderate level of feeling pressurized due the mean and median both falling on the mid-point of the scale. Question 2 (agitated) had a mean score of 2.23 and median of 2, suggesting a minimal level of agitation due to both the mean and median falling below the mid-point of the scale. Question 3 (stressed) had a mean of 2.6 and a median of 2, and only 40% of the sample reported moderate or higher experiences of stress, indicating a minimal level of stress as both the mean and median fell below the mid-point of the scale. Question 4

(self-conscious) had the highest mean and median of all the questions of 3.07 and 3 respectively, and 66.7% of the sample reported moderate or higher feelings of self-consciousness, which suggests moderate feelings of stress due to these scores falling close to the mid-point of the stress task scale. Lastly, Question 5 (anxious) had a mean of 2.63 and median of 2.50, and 50% of the sample reported moderate to higher feelings of anxiousness, which indicates a minimal level of anxiousness due to both the mean and median falling below the mid-point of the scale. Therefore, taking all this information into account, there was mixed evidence for the efficacy of the stress-induction procedure for this study.

**Table 2**
*Descriptive Statistics*

| | 1. Pressurized | 2. Agitated | 3. Stressed | 4. Self-conscious | 5. Anxious |
|---|---|---|---|---|---|
| N | 30 | 30 | 30 | 30 | 30 |
| Mean | 3.00 | 2.23 | 2.60 | 3.07 | 2.63 |
| Median | 3.00 | 2.00 | 2.00 | 3.00 | 2.50 |
| Mode | 4 | 1 | 2 | 1 | 1 |
| Std. Deviation | 1.41 | 1.36 | 1.35 | 1.57 | 1.45 |
| Minimum | 1 | 1 | 1 | 1 | 1 |
| Maximum | 5 | 5 | 5 | 5 | 5 |

**Figure 1**
*Histogram for I felt Pressurised.*

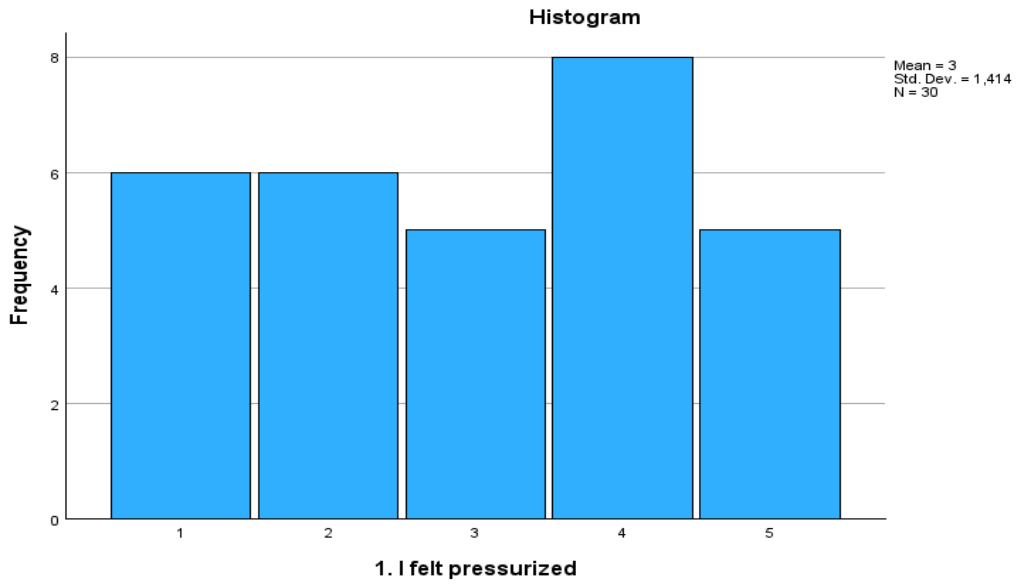


**Figure 2**
*Histogram for I felt Agitated.*

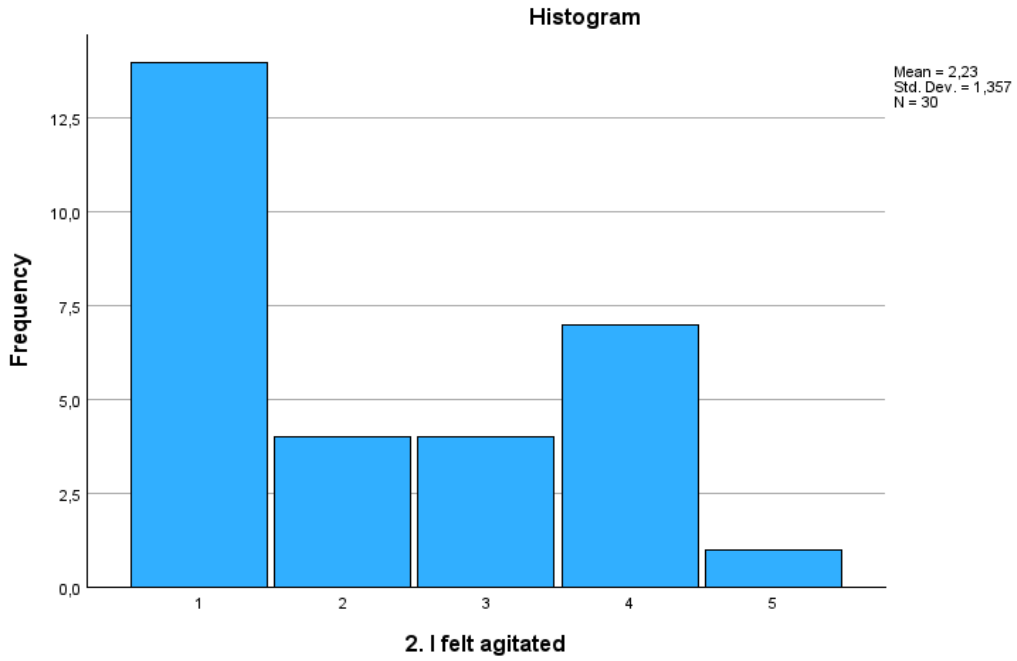



**Figure 3**
*Histogram for I felt Stressed.*

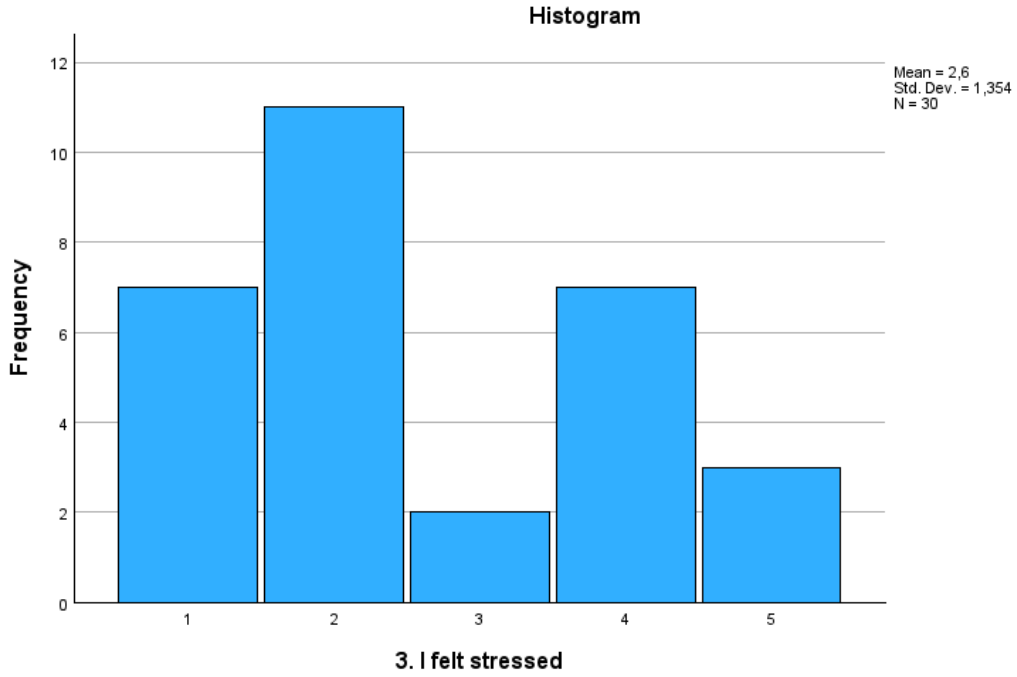


**Figure 4**
*Histogram for I felt Self-Conscious.*

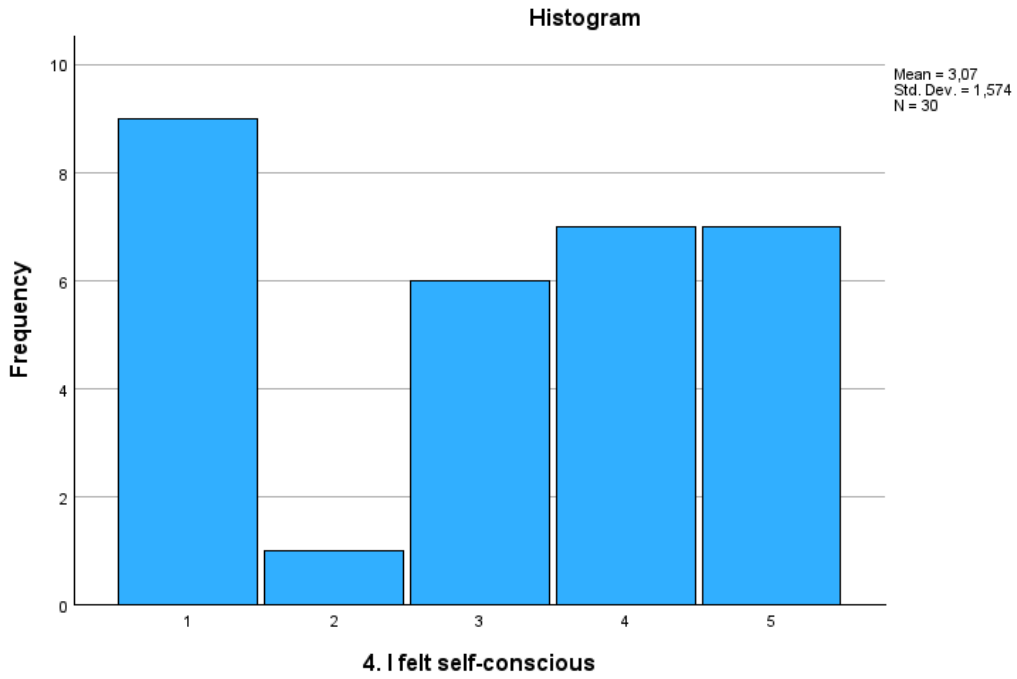
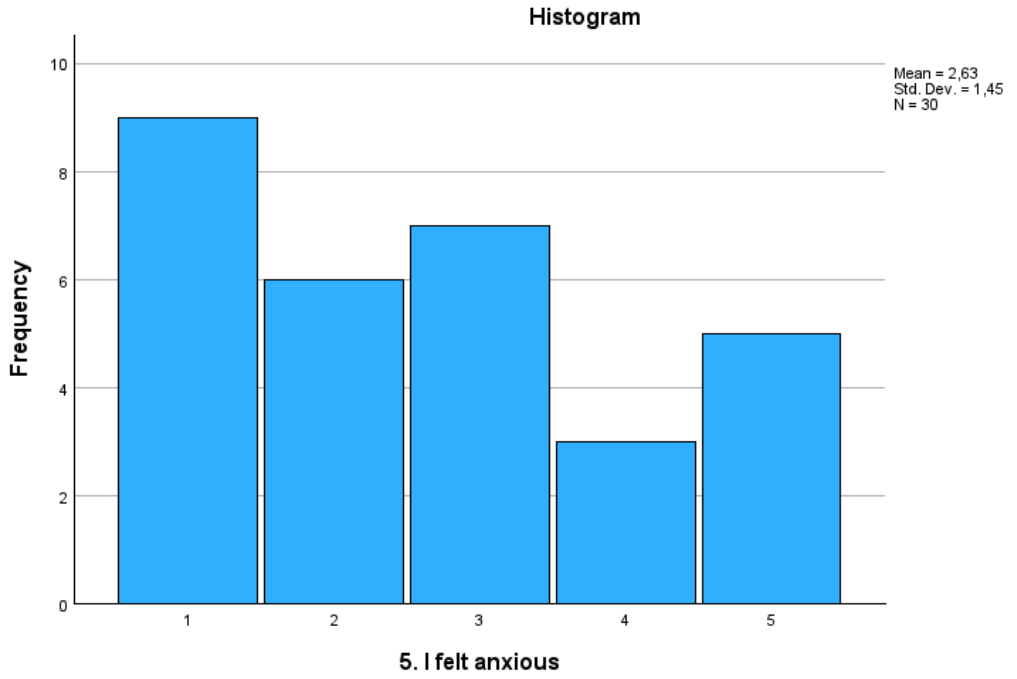



**Figure 5**
*Histogram for I felt Anxious.*



### 3.5 Descriptive Statistics

Tables 3a and 3b & Tables 4a and 4b, as well as Figures 6 – 9 below shows the descriptive statistics of Time 1 positive affect (pre-PA) and Time 2 positive affect (post-PA) by condition, and of Time 1 negative affect (pre-NA) and Time 2 negative affect (post-NA) by condition. Please note that 'post' refers to before the music intervention, and not before the stress induction task. Within these tables and figures the acronyms/keys will be explained, Pre PA = Positive Affect before listening to audio, Post PA = Positive Affect after listening to audio, Pre NA = Negative Affect before listening to audio, Post NA = Negative Affect after listening to audio.

Scores for positive affect are calculated by adding up the 10 positive affect scores and scores for negative affect are calculated by summing up the 10 negative affect scores (Watson et al., 1988). There were no missing data values when calculating these scores. Therefore, scores from the Positive Affect and Negative Affect Schedule (PANAS) can range from 10 - 50 for the positive affect items, with higher score suggesting greater levels of positive affect and lower scores suggesting lower levels of positive affect; and can range from 10 - 50 for the negative affect items with lower scores portraying lower levels of negative affect and higher scores suggesting higher levels of negative affect (Watson et al., 1988). The PANAS questionnaire does not seem to have any cut-off points (Crawford & Henry, 2004; Bowman, 2022). Important to note here is that the theoretical midpoint of each sub-scale of the PANAS measure was 30 because, if a respondent rated 'moderately' on each item in either scale, they would achieve a total score of 30.

Looking at the descriptive statistics in Table 3a below for Time 1 positive affect (pre-PA), the self-selected group had a mean of 35.50 and standard deviation of 6.52, indicating moderately high levels of positive affect and variance within the self-selected group. The researcher group for positive affect (pre-PA) had a mean of 37 and standard deviation of 3.95, which suggests moderately high levels of positive affect and a lower degree of variance within the researcher group. Looking at the ambient group for positive affect (pre-PA), they had a mean of 41 and a standard deviation of 6.34, which indicates moderate to high levels of positive affect and a higher degree of variance within the ambient group. The pre positive affect groups have somewhat similar means and standard deviations.

Looking at the descriptive statistics in Table 3b below for Time 2 positive affect (post-PA), the self-selected group had a mean of 34.8 and standard deviation of 5.98, indicating moderate levels of positive affect and a high degree of variance within this group. The researcher-selected group had a mean of 28.6 and a standard deviation of 9.18, which suggests a slightly above average level of positive affect and a higher degree of variance within the researcher-selected group. The ambient group had a mean of 34.8 and a standard deviation of 12.20, which suggests a moderately high level of positive affect and a much higher level of variance within this group. Looking at the groups within post positive affect, there standard deviations seem to vary quite a bit from each other.

**Table 3a**

*Descriptives for Positive Affect*

| | Condition | | | Statistic | Std. Error |
|---|---|---|---|---|---|
| Pre PA | Self | Mean | | 35.50 | 2.06 |
| | | 95% Confidence Interval for Mean | Lower Bound | 30.84 | |
| | | | Upper Bound | 40.16 | |
| | | 5% Trimmed Mean | | 35.44 | |
| | | Median | | 34.50 | |
| | | Variance | | 42.50 | |
| | | Std. Deviation | | 6.52 | |
| | | Minimum | | 26.00 | |
| | | Maximum | | 46.00 | |
| | | Range | | 20.00 | |
| | | Interquartile Range | | 10.00 | |
| | | Skewness | | .24 | .69 |
| | | Kurtosis | | -.78 | 1.33 |
| | Researcher | Mean | | 37.00 | 1.25 |
| | | 95% Confidence Interval for Mean | Lower Bound | 34.19 | |
| | | | Upper Bound | 39.82 | |
| | | 5% Trimmed Mean | | 37.00 | |
| | | Median | | 35.50 | |
| | | Variance | | 15.56 | |
| | | Std. Deviation | | 3.94 | |
| | | Minimum | | 31.00 | |
| | | Maximum | | 43.00 | |
| | | Range | | 12.00 | |
| | | Interquartile Range | | 7.00 | |
| | | Skewness | | .19 | .69 |
| | | Kurtosis | | -1.29 | 1.33 |
| | Ambient | Mean | | 41.00 | 2.01 |
| | | 95% Confidence Interval for Mean | Lower Bound | 36.46 | |
| | | | Upper Bound | 45.54 | |
| | | 5% Trimmed Mean | | 41.17 | |
| | | Median | | 41.50 | |
| | | Variance | | 40.22 | |
| | | Std. Deviation | | 6.34 | |
| | | Minimum | | 29.00 | |
| | | Maximum | | 50.00 | |
| | | Range | | 21.00 | |
| | | Interquartile Range | | 9.00 | |
| | | Skewness | | -.48 | .69 |
| | | Kurtosis | | -.18 | 1.33 |

Pre PA = Positive Affect before listening to audio.

**Table 3b**

*Descriptive Statistics for Positive Affect*

| | | | | | |
|---|---|---|---|---|---|
| Post PA | Self | Mean | | 34.80 | 1.89 |
| | | 95% Confidence Interval for Mean | Lower Bound | 30.52 | |
| | | | Upper Bound | 39.08 | |
| | | 5% Trimmed Mean | | 34.72 | |
| | | Median | | 35.50 | |
| | | Variance | | 35.73 | |
| | | Std. Deviation | | 5.98 | |
| | | Minimum | | 27.00 | |
| | | Maximum | | 44.00 | |
| | | Range | | 17.00 | |
| | | Interquartile Range | | 9.25 | |
| | | Skewness | | .40 | .69 |
| | | Kurtosis | | -.76 | 1.33 |
| | Researcher | Mean | | 28.60 | 2.90 |
| | | 95% Confidence Interval for Mean | Lower Bound | 22.04 | |
| | | | Upper Bound | 35.16 | |
| | | 5% Trimmed Mean | | 28.72 | |
| | | Median | | 29.00 | |
| | | Variance | | 84.04 | |
| | | Std. Deviation | | 9.17 | |
| | | Minimum | | 13.00 | |
| | | Maximum | | 42.00 | |
| | | Range | | 29.00 | |
| | | Interquartile Range | | 14.25 | |
| | | Skewness | | -.24 | .69 |
| | | Kurtosis | | -.66 | 1.33 |
| | Ambient | Mean | | 34.80 | 3.86 |
| | | 95% Confidence Interval for Mean | Lower Bound | 26.07 | |
| | | | Upper Bound | 43.53 | |
| | | 5% Trimmed Mean | | 35.06 | |
| | | Median | | 35.00 | |
| | | Variance | | 148.84 | |
| | | Std. Deviation | | 12.20 | |
| | | Minimum | | 15.00 | |
| | | Maximum | | 50.00 | |
| | | Range | | 35.00 | |
| | | Interquartile Range | | 17.50 | |
| | | Skewness | | -.52 | .69 |
| | | Kurtosis | | -.49 | 1.33 |

Post PA = Positive Affect after listening to audio.

**Figure 6**
*Pre Positive Affect by Condition*

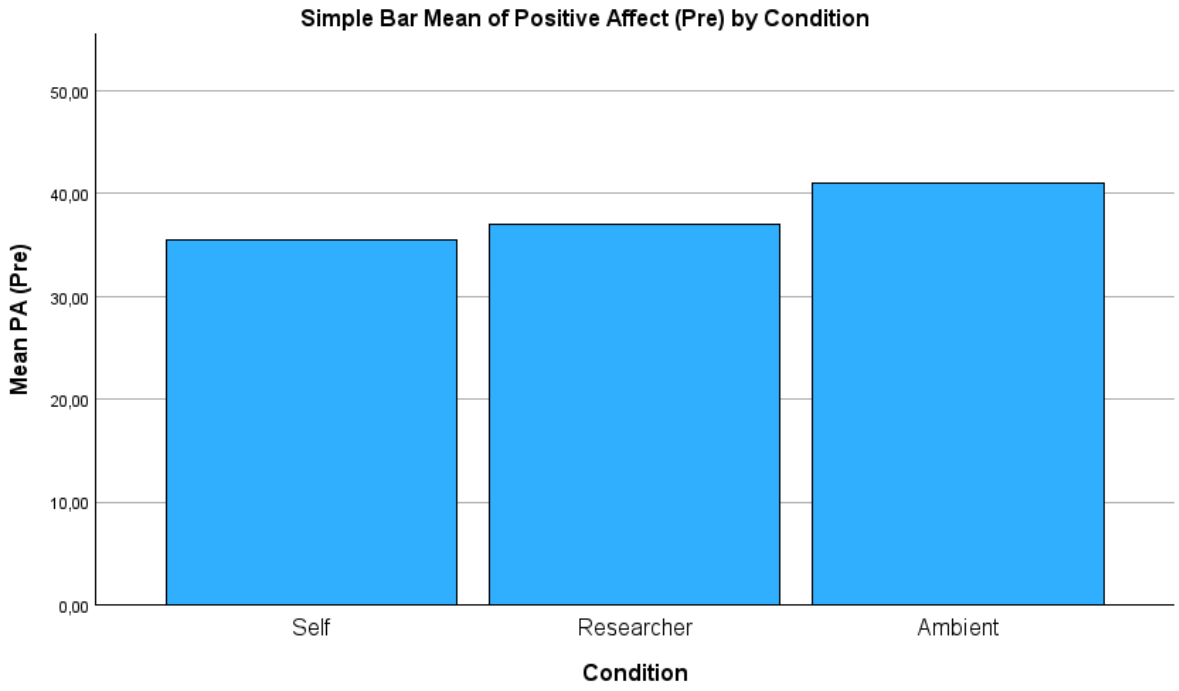
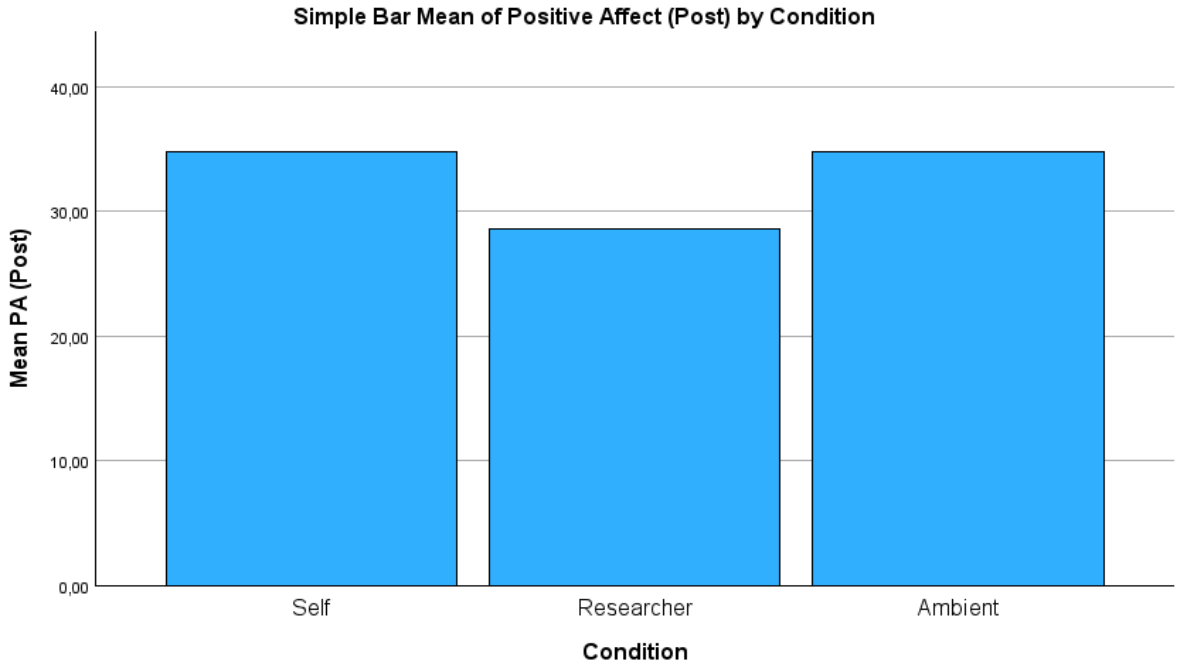



**Figure 7**
*Post Positive Affect by Condition*



Looking at the descriptive statistics in Table 4a below for Time 1 negative affect (pre-NA), the self-selected group had a mean of 16.8 and standard deviation of 4.94, indicating lower levels of negative affect and variance within the self-selected group. The researcher group for negative affect (pre-NA) had a mean of 15 and standard deviation of 2.79, which suggests very low levels of negative affect and a lower degree of variance within the researcher group. Looking at the ambient group for negative affect (pre-NA), they had a mean of 13.9 and a standard deviation of 3.11, which indicates very low levels of negative affect and a slightly higher degree of variance within the ambient group. The pre negative affect groups have somewhat similar means and standard deviations.

Looking at the descriptive statistics in Table 4b below for Time 2 negative affect (post-NA), the self-selected group had a mean of 13.3 and standard deviation of 2, indicating very low levels of negative affect and a lower degree of variance within this group. The researcher-selected group had a mean of 12.5 and a standard deviation of 2.42, which suggests an even lower level of negative affect and a lower degree of variance within the researcher-selected group. The ambient group had a mean of 11.70 and a standard deviation of 1.25, which suggests an extremely low level of negative affect and the lowest degree of variance within this group compared to the others. Looking at the groups within post negative affect, the means and standard deviations seem to be quite similar.

Looking at the standard deviations of the positive affect conditions and the negative affect conditions, one is able to see quite a lot of variability between the two. For example, the highest standard deviation for any condition of negative affect was 4.95 and the lowest was 1.25 compared to the highest standard deviation for any condition of positive affect was 12.20 and the lowest was 3.94. Most of the positive affect conditions had a much higher standard deviation compared to the negative affect conditions, which one must take into consideration when interpreting the results.

**Table 4a**
*Descriptives for Negative Affect*

| | Condition | | | Statistic | Std. Error |
|---|---|---|---|---|---|
| Pre NA | Self | Mean | | 16.80 | 1.56 |
| | | 95% Confidence Interval for Mean | Lower Bound | 13.27 | |
| | | | Upper Bound | 20.33 | |
| | | 5% Trimmed Mean | | 16.50 | |
| | | Median | | 14.50 | |
| | | Variance | | 24.40 | |
| | | Std. Deviation | | 4.94 | |
| | | Minimum | | 12.00 | |
| | | Maximum | | 27.00 | |
| | | Range | | 15.00 | |
| | | Interquartile Range | | 8.25 | |
| | | Skewness | | 1.12 | .69 |
| | | Kurtosis | | .41 | 1.33 |
| | Researcher | Mean | | 15.00 | .88 |
| | | 95% Confidence Interval for Mean | Lower Bound | 13.01 | |
| | | | Upper Bound | 17.00 | |
| | | 5% Trimmed Mean | | 14.89 | |
| | | Median | | 14.50 | |
| | | Variance | | 7.78 | |
| | | Std. Deviation | | 2.79 | |
| | | Minimum | | 12.00 | |
| | | Maximum | | 20.00 | |
| | | Range | | 8.00 | |
| | | Interquartile Range | | 4.00 | |
| | | Skewness | | .77 | .69 |
| | | Kurtosis | | -.45 | 1.33 |
| | Ambient | Mean | | 13.90 | .98 |
| | | 95% Confidence Interval for Mean | Lower Bound | 11.68 | |
| | | | Upper Bound | 16.12 | |
| | | 5% Trimmed Mean | | 13.83 | |
| | | Median | | 13.00 | |
| | | Variance | | 9.66 | |
| | | Std. Deviation | | 3.11 | |
| | | Minimum | | 10.00 | |
| | | Maximum | | 19.00 | |
| | | Range | | 9.00 | |
| | | Interquartile Range | | 4.25 | |
| | | Skewness | | .78 | .69 |
| | | Kurtosis | | -.39 | 1.33 |

Pre NA = Negative Affect before listening to audio.

**Table 4b**
Descriptive for Negative Affect

| | | | | | |
|---|---|---|---|---|---|
| Post NA | Self | Mean | | 13.30 | .63 |
| | | 95% Confidence Interval for Mean | Lower Bound | 11.87 | |
| | | | Upper Bound | 14.73 | |
| | | 5% Trimmed Mean | | 13.33 | |
| | | Median | | 13.50 | |
| | | Variance | | 4.01 | |
| | | Std. Deviation | | 2.00 | |
| | | Minimum | | 10.00 | |
| | | Maximum | | 16.00 | |
| | | Range | | 6.00 | |
| | | Interquartile Range | | 3.25 | |
| | | Skewness | | -.31 | .69 |
| | | Kurtosis | | -1.21 | 1.33 |
| | Researcher | Mean | | 12.50 | .76 |
| | | 95% Confidence Interval for Mean | Lower Bound | 10.77 | |
| | | | Upper Bound | 14.23 | |
| | | 5% Trimmed Mean | | 12.33 | |
| | | Median | | 12.00 | |
| | | Variance | | 5.83 | |
| | | Std. Deviation | | 2.42 | |
| | | Minimum | | 10.00 | |
| | | Maximum | | 18.00 | |
| | | Range | | 8.00 | |
| | | Interquartile Range | | 3.25 | |
| | | Skewness | | 1.33 | .69 |
| | | Kurtosis | | 2.16 | 1.33 |
| | Ambient | Mean | | 11.70 | .40 |
| | | 95% Confidence Interval for Mean | Lower Bound | 10.80 | |
| | | | Upper Bound | 12.60 | |
| | | 5% Trimmed Mean | | 11.67 | |
| | | Median | | 11.00 | |
| | | Variance | | 1.57 | |
| | | Std. Deviation | | 1.25 | |
| | | Minimum | | 10.00 | |
| | | Maximum | | 14.00 | |
| | | Range | | 4.00 | |
| | | Interquartile Range | | 2.00 | |
| | | Skewness | | .71 | .69 |
| | | Kurtosis | | -.49 | 1.33 |

Post NA = Negative Affect after listening to audio.

**Figure 8**
*Pre Negative Affect by Condition*

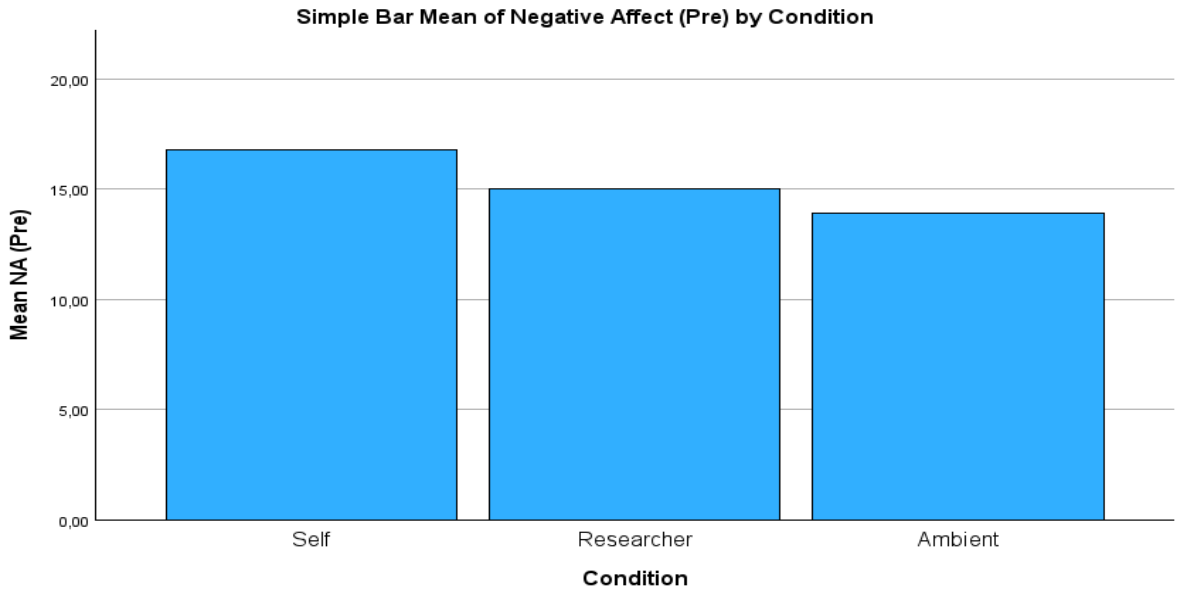
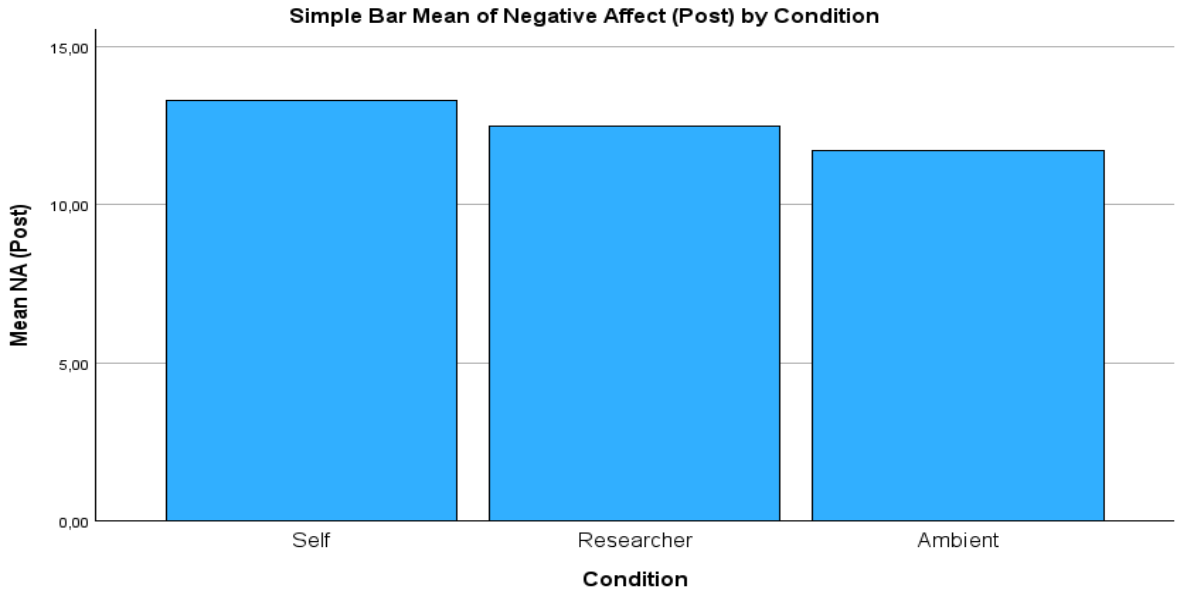



**Figure 9**
*Post Negative Affect by Condition*



Therefore, two mixed model ANOVAs were run in this study as it compares the mean differences between groups that have been split on two factors, where one factor is a within-subjects factor, and the other factor is a between-subjects factor (Laerd Statistics, 2015). In the current study, positive affect and negative affect were the continuous dependent variables; the between-subjects factor was categorical with three categories (condition: self-selected music, researcher-selected music, and ambient sound); and one within-subjects factor that was categorical with at least two categories (time, post stressor task and post listening condition). Furthermore, the research questions/hypotheses for this study predict an interaction between condition and time, which is why these analyses were chosen for this quantitative repeated-measures between groups study.

### 3.6 Assumption Testing for the Positive Affect ANOVA

Acceptable cut-off points for skewness and kurtosis in this study were set between -2 and +2 (Byrne, 2010; Garson, 2012 ; Hair et al., 2010). As can be seen in Tables 3a, 3b, 4a, and 4b above, all of the statistics fell within the acceptable range which support the claim that there were no violations of the normality assumption for the analyses to follow, except for post negative affect in the researcher group with a kurtosis value of 2.16. However, after running the test of normality for all group-level statistics, all significance values under the Shapiro-Wilk column were non-significant indicating no violations of the normality assumption, see Table 5 below.

**Table 5**
*Tests of Normality*

| | | Shapiro-Wilk | | |
|---|---|---|---|---|
| | Condition | Statistic | df | Sig. |
| Pre PA | Self | .97 | 10 | .86 |
| | Researcher | .93 | 10 | .35 |
| | Ambient | .96 | 10 | .79 |
| Post PA | Self | .93 | 10 | .33 |
| | Researcher | .98 | 10 | .98 |
| | Ambient | .93 | 10 | .32 |
| Pre NA | Self | .85 | 10 | .06 |
| | Researcher | .90 | 10 | .23 |
| | Ambient | .89 | 10 | .18 |
| Post NA | Self | .94 | 10 | .50 |
| | Researcher | .88 | 10 | .13 |
| | Ambient | .87 | 10 | .10 |

Pre PA = Positive Affect before listening to audio. Post PA = Positive Affect after listening to audio.
Pre NA = Negative Affect before listening to audio. Post NA = Negative Affect after listening to audio.

There are certain assumptions that must be met before running the mixed model ANOVAs, which will follow the guidelines set out by Laerd Statistics (Laerd Statistics, 2015). The first three assumptions were met as these three assumptions relate to the study's design. This part of the study has a continuous dependent variable (positive affect); one between-subjects factor that is categorical with at least two categories (conditions, with three categories: self-selected music, researcher-selected music, and ambient sound); and one within-subjects factor that is categorical with at least two categories (time, with categories post stressor task and post listening condition). There were no significant outliers as assessed by inspection of a boxplot and examination of studentised residuals for values greater than +-3 (Refer to Appendix J, Figure 14). There were no violations of the normality assumption for positive affect as assessed by the Shapiro-Wilk's test result, $p > .05$ and as assessed by Normal Q-Q plot (Refer to Appendix J, Table 27, and Figure 15 and 16). Despite the wide range of standard deviations already noted in the positive affect scores, there was homogeneity of variance as assessed by Levene's test of homogeneity of variance, $p > .05$ (Refer to Appendix J, Table 28). Lastly, the assumption of sphericity is not applicable in the current study as the within-subjects factor only has two categories, whereby the assumption of sphericity needs to be met if the within-subjects factor has three or more categories (Laerd Statistics, 2015). Therefore, all the assumptions were met, and the first mixed model ANOVA was run.

### 3.7 Mixed Model ANOVA for Positive Affect

The main effect of condition showed that there was no statistically significant difference in overall mean positive affect between conditions, $F(2,27) = 1.54$, $p = .23$, partial $\eta^2 = .10$, see Table 6 below. However, the main effect of time showed a statistically significant difference in mean positive affect at the different time points, $F(1,27) = 10.33$, $p = .00$, partial $\eta^2 = .28$, see Table 7 below. Pairwise comparisons utilising a Bonferroni adjustment suggested a significant difference between the time points with mean positive affect decreasing from time 1, post stressor task ($M = 37.83$, $SE = 1.05$, $p < .01$) to time 2, post listening condition ($M = 32.73$, $SE = 1.73$, $p < .01$), see Table 8 below. The effect size is relatively small, which suggests limited practical significance.

Ultimately, of primary importance to the study, there was no statistically significant interaction between condition and time on positive affect, $F(2,27) = 2.08$, $p = .14$, partial $\eta^2 = .13$, see Table 7 below. Figure 10 and Figure 11 below, shows positive affect differentiated by condition at time 1 (post stressor task) and time 2 (post listening condition). As can be seen, especially in Figure 11, positive affect in the researcher and ambient conditions drops from time 1 to time 2 and diverges from the positive affect scores in the self-selected condition. The main effect for Time, and the non-significant trends in Figures 10 and 11, are contrary to the prediction that positive affect would improve following a music intervention. At the same time, it is evident from Figure 11 that there was a negligible drop in positive affect in the self-selected condition, by comparison to the reductions in positive affect in the researcher and ambient sound conditions.

**Table 6**

*Tests of Between-Subjects Effects*

Measure: PA
Transformed Variable: Average

| Source | Type III Sum of Squares | df | Mean Square | F | Sig. | Partial Eta Squared |
|---|---|---|---|---|---|---|
| Intercept | 74694.82 | 1 | 74694.82 | 883.75 | .00 | .97 |
| Group | 260.63 | 2 | 130.31 | 1.54 | .23 | .10 |
| Error | 2282.05 | 27 | 84.52 | | | |

PA = Positive Affect

**Table 7**

*Tests of Within-Subjects Effects*

Measure: PA

| Source | | Type III Sum of Squares | df | Mean Square | F | Sig. | Partial Eta Squared |
|---|---|---|---|---|---|---|---|
| Time | Sphericity Assumed | 390.15 | 1 | 390.15 | 10.33 | .00 | .28 |
| | Greenhouse-Geisser | 390.15 | 1.00 | 390.15 | 10.33 | .00 | .28 |
| | Huynh-Feldt | 390.15 | 1.00 | 390.15 | 10.33 | .00 | .28 |
| | Lower-bound | 390.15 | 1.00 | 390.15 | 10.33 | .00 | .28 |
| Time * Group | Sphericity Assumed | 157.30 | 2 | 78.65 | 2.08 | .14 | .13 |
| | Greenhouse-Geisser | 157.30 | 2.00 | 78.65 | 2.08 | .14 | .13 |
| | Huynh-Feldt | 157.30 | 2.00 | 78.65 | 2.08 | .14 | .13 |
| | Lower-bound | 157.30 | 2.00 | 78.65 | 2.08 | .14 | .13 |
| Error(Time) | Sphericity Assumed | 1020.05 | 27 | 37.78 | | | |
| | Greenhouse-Geisser | 1020.05 | 27.00 | 37.78 | | | |
| | Huynh-Feldt | 1020.05 | 27.00 | 37.78 | | | |
| | Lower-bound | 1020.05 | 27.00 | 37.78 | | | |

**Table 8**

*Pairwise Comparisons*

Measure: PA

| (I) Time | (J) Time | Mean Difference (I-J) | Std. Error | Sig.[b] | 95% Confidence Interval for Difference[b] | |
|---|---|---|---|---|---|---|
| | | | | | Lower Bound | Upper Bound |
| 1 | 2 | 5.10* | 1.59 | .00 | 1.84 | 8.36 |
| 2 | 1 | -5.10* | 1.59 | .00 | -8.36 | -1.84 |

Based on estimated marginal means

*. The mean difference is significant at the ,05 level.

b. Adjustment for multiple comparisons: Bonferroni.

**Figure 10**
*Bar Graph of Estimated Marginal Means of PA*

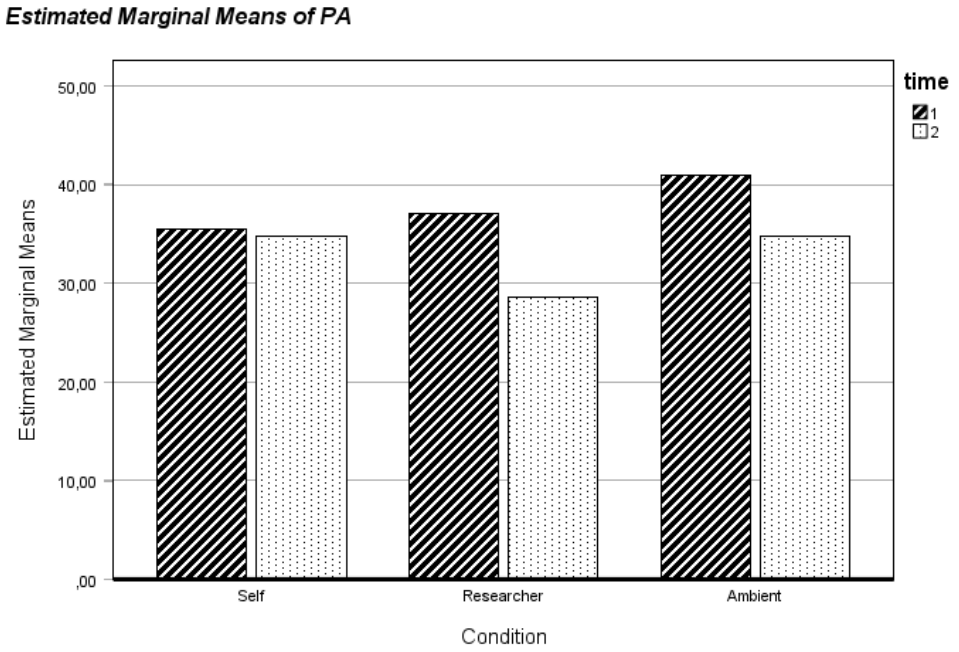
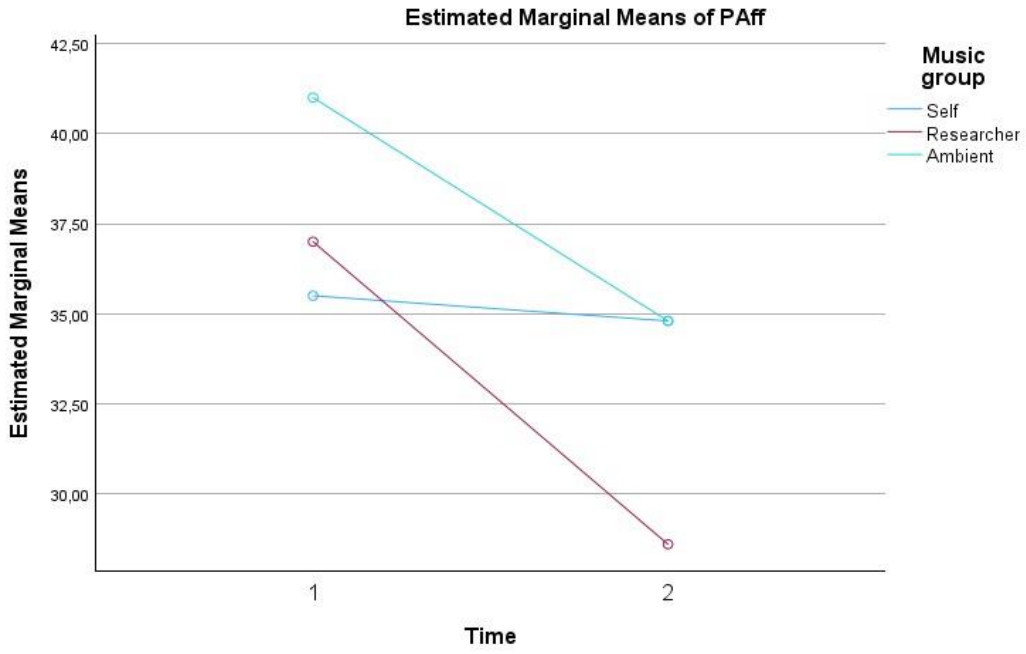



**Figure 11**
*Interaction Plot of Estimated Marginal Means of Positive Affect*



### 3.8 Assumption testing for the Negative Affect ANOVA

The first three assumptions were all met as these assumptions relate to the design of the study. This part of the study had a continuous dependent variable (negative affect); one between-subjects factor that is categorical with at least two categories (conditions, with three categories: self-selected music, researcher-selected music, and ambient sound); and one within-subjects factor that is categorical with at least two categories (time, with categories post stressor task and post listening condition). There were no significant outliers in the data as assessed by inspection of a boxplot and as assessed by examination of studentised residuals for values greater than +- 3 (Refer to Appendix K, Figure 17). The dependent variable, negative affect portrayed that there were no violations of the normality assumption as assessed by the Shapiro-Wilk's test, $p > .05$ and through assessing the Normal Q-Q plot (Refer to Appendix K, Table 29, and Figure 18 and 19). There was homogeneity of variances as assessed by Levene's test of homogeneity of variances, $p > .05$ (Refer to Appendix K, Table 30). Lastly, there was no need to test the assumption of sphericity as this studies within-subjects factor only had two categories (Laerd Statistics, 2015).

### 3.9 Mixed Model ANOVA for Negative Affect

The main effect of condition showed that there was no statistically significant difference in overall mean negative affect between conditions, $F(2,27) = 1.77$, $p = .19$, partial $\eta^2 = .12$, see Table 9 below. However, the main effect of time showed a statistically significant difference in mean negative affect at the different time points, $F(1,27) = 33.88$, $p < .05$, partial $\eta^2 = .56$, see Table 10 below. The effect size is .56, suggesting a medium effect size. Pairwise comparisons utilising a Bonferroni adjustment suggested a significant difference between time points with mean negative affect decreasing from time 1, post stressor task ($M = 15.23$, $SE = .68$, $p < .01$) to time 2, post listening condition ($M = 12.50$, $SE = .36$, $p < .01$), see Table 11 below.

Ultimately, of primary importance to the study, there was no statistically significant interaction between condition and time on negative affect, $F(2,27) = .70$, $p = .51$, partial $\eta^2 = .05$, see Table 10 below. Figure 12 and 13 below, show negative affect

differentiated by condition at time point 1 (post stressor task) and time point 2 (post listening condition). As can be seen, negative affect in all three conditions decreases from time 1 to time 2 with the biggest decrease in the self-selected music condition. The smallest decrease in negative affect occurred in the ambient sound condition but ultimately, there was no statistically significant interaction between condition and time on negative affect.

**Table 9**

*Tests of Between-Subjects Effects*

Measure: NA

Transformed Variable: Average

| Source | Type III Sum of Squares | df | Mean Square | F | Sig. | Partial Eta Squared |
|---|---|---|---|---|---|---|
| Intercept | 11537.07 | 1 | 11537.07 | 798.93 | .00 | .97 |
| Group | 51.03 | 2 | 25.52 | 1.77 | .19 | .12 |
| Error | 389.90 | 27 | 14.44 | | | |

NA = Negative Affect

**Table 10**

*Tests of Within-Subjects Effects*

Measure: NA

| Source | | Type III Sum of Squares | df | Mean Square | F | Sig. | Partial Eta Squared |
|---|---|---|---|---|---|---|---|
| Time | Sphericity Assumed | 112.07 | 1 | 112.07 | 33.88 | .00 | .56 |
| | Greenhouse-Geisser | 112.07 | 1.00 | 112.07 | 33.88 | .00 | .56 |
| | Huynh-Feldt | 112.07 | 1.00 | 112.07 | 33.88 | .00 | .56 |
| | Lower-bound | 112.07 | 1.00 | 112.07 | 33.88 | .00 | .56 |
| Time * Group | Sphericity Assumed | 4.63 | 2 | 2.32 | .70 | .51 | .05 |
| | Greenhouse-Geisser | 4.63 | 2.00 | 2.32 | .70 | .51 | .05 |
| | Huynh-Feldt | 4.63 | 2.00 | 2.32 | .70 | .51 | .05 |
| | Lower-bound | 4.63 | 2.00 | 2.32 | .70 | .51 | .05 |
| Error(Time) | Sphericity Assumed | 89.30 | 27 | 3.31 | | | |
| | Greenhouse-Geisser | 89.30 | 27.00 | 3.31 | | | |
| | Huynh-Feldt | 89.30 | 27.00 | 3.31 | | | |
| | Lower-bound | 89.30 | 27.00 | 3.31 | | | |

**Table 11**

*Pairwise Comparisons*

Measure: NA

| (I) Time | (J) Time | Mean Difference (I-J) | Std. Error | Sig.[b] | 95% Confidence Interval for Difference[b] | |
|---|---|---|---|---|---|---|
| | | | | | Lower Bound | Upper Bound |
| 1 | 2 | 2.73* | .47 | .00 | 1.77 | 3.70 |
| 2 | 1 | -2.73* | .47 | .00 | -3.70 | -1.77 |

Based on estimated marginal means

*. The mean difference is significant at the ,05 level.

b. Adjustment for multiple comparisons: Bonferroni.

**Figure 12**

*Bar Graph of Estimated Marginal Means of NA*

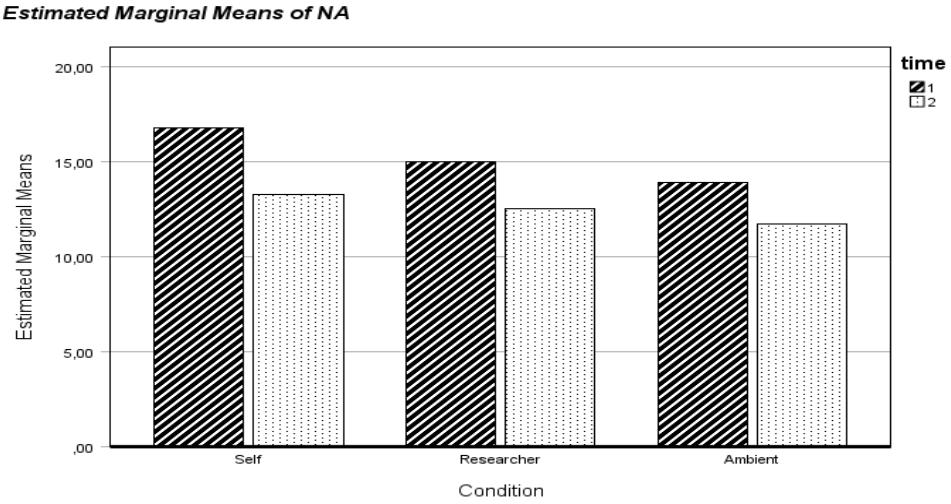
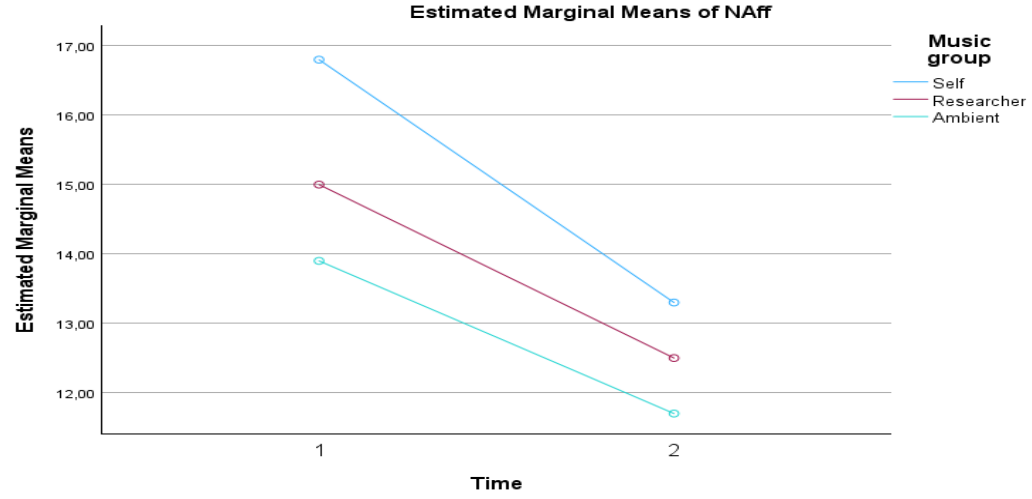



**Figure 13**

*Interaction Plot of Estimated Marginal Means of Negative Affect*



### 3.10 Musical characteristics of self-selected de-stressing music playlists

All participants were asked to send through their self-selected de-stressing music playlists before participating in the experiment, refer to Appendix M for all song names, artists, genres, and tempos. The first musical characteristic that was looked at was musical genre, to see what types of musical genres participants selected in order to relax. To assist in this process, a music genre finder was used from the website Chosic in order to identify as best as possible the genre for each song provided by each participant (Chosic, 2023). This was done by entering the song name provided by the participant, whereby the app would provide the genre of the song from the Spotify music app and from other websites (Chosic, 2023). It must be noted that this was not a simple process to identify the music genre of all the songs. This was because not all songs have a specific and defined genre with many songs combining different genres, other songs presenting a new pattern with no defined genre, and the introduction of many subgenres. Please refer to Appendix N, for a brief description of each genre.

Overall, 170 songs were sent through by the participants. See Table 12 below for frequencies, relative frequencies, and cumulative relative frequencies. The most selected genre was pop music, accounted for 51 songs of the 170 provided. The second most selected genre was rhythm and blues (r&b), which accounted for 19 songs. The third and fourth most selected genres were worship and gospel, which accounted for 13 and 12 songs, respectively. Rounding off the top five most selected genres was hip hop, with 11 songs selected. The top 3 most selected genres, pop, r&b, and gospel accounted for nearly 50% of the genres selected by participants. The top five most selected genres, pop, r&b, gospel, worship, and hip hop accounted for more than 60% of the genres selected by participants. It is notable that the first genres in which instrumental music tends to predominate (Classical and Jazz) only rank in positions 9 and 10 in the list. Moreover, if the instrumental genre is added to these, only 11 tracks (6.47%) out of the 170 that were submitted came from genres associated with instrumental music.

**Table 12**
*Genres of music chosen for self-selected music playlists.*

| Genre | Frequency selected | Relative frequency (%) | Cumulative relative frequency (%) |
|---|---|---|---|
| Pop | 51 | 30.00 | 30.00 |
| R&B | 19 | 11.18 | 41.18 |
| Gospel | 13 | 7.65 | 48.82 |
| Worship | 12 | 7.06 | 55.88 |
| Hip Hop | 11 | 6.47 | 62.35 |
| Lo-Fi | 9 | 5.29 | 67.65 |
| Rap | 9 | 5.29 | 72.94 |
| Pop Rock | 6 | 3.53 | 76.47 |
| Classical | 5 | 2.94 | 79.41 |
| Jazz | 5 | 2.94 | 82.35 |
| Amapiano | 4 | 2.35 | 84.71 |
| Heavy Metal | 4 | 2.35 | 87.06 |
| Country | 3 | 1.76 | 88.82 |
| Indie Pop | 3 | 1.76 | 90.59 |
| Neo Soul | 3 | 1.76 | 92.35 |
| Afro Soul | 3 | 1.76 | 94.12 |
| Rock | 3 | 1.76 | 95.88 |
| House | 2 | 1.18 | 97.06 |
| Grime | 1 | 0.59 | 97.65 |
| Indie Folk | 1 | 0.59 | 98.24 |
| Indie Hip Hop | 1 | 0.59 | 98.82 |
| Instrumental | 1 | 0.59 | 99.41 |
| Tropical House | 1 | 0.59 | 100.00 |
| Total | 170 | 100.00 | |

The next step was to compare songs chosen by participants for their self-selected music playlists to the songs in the researcher-selected music playlist and the ambient sound playlist, to see whether there were any similarities. There were some similarities between the self-selected music playlists and the researcher-selected music playlist however, only a low proportion of classical music featured in the self-selected playlists 2.94%. No ambient sounds, such as the sound of waterfalls or rivers running were provided by participants, indicating no similarities between the self-selected music playlists and the ambient sound condition. However, the likelihood of receiving any ambient sounds by participants for their self-selected music playlists was small to none, as their instructions were to think of and write

down six songs (song name and artist) or send through a playlist that you would listen to in order to relax, which is why it was unlikely for any participants to send through ambient sounds to make up their self-selected music playlists. Furthermore, only 11 songs provided by the participants for their self-selected music playlist was instrumental, i.e., had no lyrics, which could suggest that participants preferred listening to music that had lyrics in order to relax.

The next musical characteristic that was looked at was musical tempo. See Table 13 below for frequencies, relative frequencies, and cumulative relative frequencies. A website called Tunebat was used to assist in the process of classifying the tempo of each of the 170 songs sent through by the participants for their self-selected music playlists (Tunebat, 2024). The following tempo categories were used and were based off the tempo categories appearing in Adiasto et al's. (2022) meta-analysis on music listening and stress recovery. The expectation here was that music with a slow/slower tempo (80 and below / 81-100) would be selected the most, as there is a notion that slower tempo music is better for stress recovery compared to music with a faster tempo (Adiasto et al., 2022). In the current study, the most common tempo from the songs chosen by participants was the category between 101 - 120 bpm, appearing 43 times. This suggests that approximately 34% of the self-selected songs had a slow to slow moderate tempo, whereas almost 76% of the self-selected songs had a moderate to fast tempo.

**Table 13**
*Tempo of music chosen for self-selected music playlists.*

| Tempo (BPM) | Frequency | Relative frequency (%) | Cumulative relative frequency (%) |
|---|---|---|---|
| 80 and below | 19 | 11.18 | 11.18 |
| 81 – 100 | 39 | 22.94 | 34.12 |
| 101 – 120 | 43 | 25.29 | 59.41 |
| 121 – 140 | 36 | 21.18 | 80.59 |
| 141 – 160 | 15 | 8.2 | 89.41 |
| 161 and above | 18 | 10.59 | 100.00 |
| Total | 170 | 100.00 | |

# Chapter 4: Discussion

## 4.1 Introduction

The current study attempted to firstly, determine whether listening to music had an effect on positive affect and negative affect, after acute stress exposure. Secondly whether self-selected music playlists had the greatest effect on positive affect and negative affect, after acute stress exposure. Lastly, what musical characteristics do self-selected de-stressing music playlists display. To achieve this, a quantitative longitudinal experiment with elements of between and within subject's design was used. This chapter will discuss the results for each research question and draw on the current literature to compare results and contribute to or challenge these findings, speak about the theoretical and practical implications, limitations, and directions for future research.

## 4.2 To what extent does listening to music have an effect on positive affect and negative affect, after acute stress exposure?

To answer this research question, two mixed model ANOVAs were run, the first ANOVA assessed whether listening to music increased positive affect, after acute stress exposure and the second ANOVA assessed whether listening to music decreased negative affect, after acute stress exposure. The results from the first ANOVA for positive affect, showed a non-significant interaction effect between music condition and time. The results from the second ANOVA for negative affect also showed a non-significant interaction effect between music condition and time. Therefore, the results from both mixed model ANOVAs showed non-significant interaction effects between music condition and time, and thus two null results based on the hypothesises and predictions made for the study. The interaction plot of estimated marginal means for positive affect shows the researcher-selected and ambient conditions positive affect scores dropping from time 1 to time 2 and diverges from the positive affect scores in the self-selected condition. This shows the researcher-selected and ambient conditions positive affect decreasing from time 1 to time 2 but the self-selected group remaining somewhat similar from time 1 to time 2. This was highlighted because positive affect trends in a level of reduction instead of increasing, but where the level of reduction was least in the self-selected group. The

interaction plot shows the pattern of a slight interaction, but a pattern that was not in the expected direction and which failed to reach significance.

Looking at other studies that measured affect, through either the PANAS questionnaire, Profile of Moods Scale (POMS) or by asking individuals to detail whether they experience various emotions collectively, the effect of listening to music on post-stressor positive affect and negative affect was found to be assorted (Adiasto et al., 2022). The current study found differing results compared to de la Torre-Luque's et al. (2017) study, who used the PANAS questionnaire to measure affect. The current study looked at if listening to music would increase positive affect and decrease negative affect, following stress induction.

Drawing on the results gathered from the five self-report questions at the end of the experiment asking participants how the Stroop task made them feel, there was mixed evidence here. Table 2 and Figures 1 – 5 in Chapter 3 suggest that the stress induction task was not very successful in inducing stress amongst participants. The Stroop task was not as effective as was hoped for; factors that might have undermined its efficacy include, it was repetitive which means that once the participant understood how to respond to the mismatch between ink colour and the word appearing on the screen, it became repetitive and easy to answer, was not challenging enough, and too short in duration. Another potential factor for why it was unsuccessful was that the Stroop task was not effective in inducing enough stress amongst participants, as it is used to induce low to moderate levels of stress amongst participants (Bali & Jaggi, 2015).

Although the results from the ANOVAs were non-significant, a recent systematic review with meta-analysis of experimental studies on music listening and stress recovery in healthy individuals, found a non-statistically significant overall estimated effect of listening to music on stress recovery, $g$ = 0.15, 95% CI [-0.21,0.52], $t(13)$ = 0.92, p = 0.37 (Adiasto et al., 2022). Their results suggest that taking all variations of music and outcomes into account, the effect of listening to music on stress recovery is equal to silence or auditory control at this point in time (Adiasto et al., 2022).

Therefore, the current study hypothesised that listening to music would have an effect on positive affect and negative affect, after acute stress exposure, but due to

the non-significant interaction effects between condition and time, these hypothesises were not supported.

### 4.3 Do self-selected music playlists have the greatest effect on positive affect and negative affect, after acute stress exposure?

To answer the second research question of the study, two mixed model ANOVAs were run and analysed to see if self-selected music playlists had the greatest effect on positive affect and negative affect, after acute stress exposure. It was hypothesised that the self-selected music playlist group would have the greatest increase in positive affect and greatest decrease in negative affect, following acute stress exposure. The results from both mixed model ANOVAs from the current study were not statistically significant for the interaction between condition and time on positive affect, partial $\eta^2 = .13$ and between condition and time on negative affect, partial $\eta^2 = .05$. Both effect sizes are small, suggesting limited practical significance. Therefore, two null results on the predictions made for the study were found due to the non-significant results from both mixed model ANOVAs.

Research has suggested that there could be other factors that influence the stress recovery process when participants select their own music i.e., self-selected music playlist (Helsing et al., 2016; Jiang et al., 2016). These influences include individual music preferences, the state of being in control, and familiarity which may influence the effectiveness of self-selected music playlists on the stress recovery process (Helsing et al., 2016). Furthermore, Jiang et al. (2016) suggests that music has properties that incites arousal and valence, which in turn are mediated by an individual's musical preference, familiarity, and musical background, which again speaks to the additional variables of self-selected music that influences the stress recovery process. These authors do state however, that other researchers have found no association between arousal, music familiarity training, and stress reduction, which suggests that literature has mixed results, and more research is required on these relationships (Jiang et al., 2016).

The results for the main effect of condition showed that there was no statistically significant difference in mean positive affect between conditions and no statistically significant difference in mean negative affect between conditions. Although non-significant, the self-selected music group had higher mean positive affect scores

when compared with the researcher-selected music group. Furthermore, the self-selected music group also had higher mean negative affect scores than the ambient sound group, which was very surprising, as it was hypothesised that the self-selected music group would have the lowest mean negative affect score. These results from the current study do not match with what previous research has found on the effects of listening to music on positive affect and negative affect, after acute stress exposure across different music groups.

As mentioned above in section 4.2, the stress induction task for this study was very weak. As this was unsuccessful, the results from the analyses were most likely going to present conflicting results to that found in the literature and be non-statistically significant. This was evident in both mixed model ANOVAs, especially the mixed model ANOVA for positive affect, whereby positive affect was higher after the stressor task compared to positive affect after the listening condition. Suggestions to overcome this problem have been provided in the future research section, section 4.7.

de la Torre-Luque et al. (2017) researched the effects of listening to music on positive affect and negative affect, after acute stress exposure and found emotional changes with regards to valence and arousal, when individuals listened to preferred relaxing music, which was the music participants selected for relaxation in the recovery stage (de la Torre-Luque et al., 2017). This means that individuals who listened to self-selected relaxing music (the experimental group) reported lower positive affect scores and higher negative affect scores after the stressor task and higher positive affect scores and lower negative affect scores after listening to music, compared to the control group, $p < .05$ (de la Torre-Luque et al., 2017). Their results suggest that listening to music, specifically self-chosen relaxing music, has potential to increase an individual's positive emotions and decrease their negative emotions due to daily acute stressors.

However, a study by Radstaak et al. (2014) found that individuals who listened to relaxing music reported higher levels of positive affect after the stressor task compared to participants in the control group. However, they found no significant differences in negative affect after the stressor task between groups, which is what

was found in the current study and adds to the mixture of results in the current literature (Radstaak et al., 2014).

Therefore, insufficient evidence was found to support the hypothesis that self-selected music playlists would have the greatest effect on increasing positive affect and greatest effect on decreasing negative affect, following acute stress exposure. Due to the stress induction task having a very weak effect, the study was unable to successfully address this research question and test this hypothesis. Additionally, due to practical constraints, the design of the study lacked statistical power, which makes a non-significant result quite likely even if there was a real but weak to moderate effect.

### 4.4 What musical characteristics do self-selected de-stressing music playlists display?

The last research question explores what musical characteristics do self-selected de-stressing music playlists display and whether there are firstly, any similarities between participants self-selected de-stressing music playlists in terms or genre and tempo, and secondly, whether there are any similarities between self-selected de-stressing music playlists and the other two playlists in the study. Currently, the literature suggests that it is too early to determine whether musical characteristics such as genre, and tempo for example, have an impact on stress recovery (Adiasto et al., 2022). However, finding out whether these numerous variables/factors associated with listening to music have an impression on the stress recovery process could help individuals choose music that works best in coping with daily acute stress exposure, which would evidently, increase the effectiveness of the music (Jiang et al., 2016).

Other research has found that almost two thirds of relaxing music that participants selected had lyrics, which may be a reason why only a few pieces without lyrics were provided by participants in the current study (Baltazar & Västfjäll, 2020). However, another reason for only a few pieces without lyrics being provided may be due to the instructions that were provided to the participants which stated to please provide six songs. Participants may have only treated a piece of music as being a song if it is sung and has lyrics, which could be a reason to why, so few instrumental pieces were provided.

Comparing these results to Groarke & Hogan (2019) study, they appear to be similar in some regards. In their study, the most popular genre for younger adults was pop music which made up 64 songs out of 173 provided (Groarke & Hogan, 2019). In the current study, pop music was also the most popular genre selected, showing a similarity in genre between the studies. Younger adults for their study were participants who were between 18-30 years old, which was similar to the participants in the current study. Their second and third most selected genres, however, were different to that of the current study, with theirs being indie and folk, making up 24 and 16 respectively (Groarke & Hogan, 2019). The differences seen in genres between studies could be attributed to the differences in participant characteristics, backgrounds, and cultures, as their study occurred in the UK, and the current study occurred in South Africa. The current study has added to the literature, in a small manner, with the type of music that individuals from South Africa might listen to in order to relax, which is somewhat different to the type of music provided by individuals from other countries, as highlighted by more worship and gospel songs being chosen in the small South African sample.

Furthermore, the tempo of each of the 170 songs sent through by the participants for their self-selected music playlist was looked at. The tempo category that appeared the most in the current study was between 101 – 120, which is considered a moderate tempo. This tempo category was interesting as research suggests that music with slower tempo is better at inducing relaxing feelings than music with a faster tempo (de la Torre-Luque, 2017; Groarke et al., 2019). Additionally, some studies have investigated whether a slower tempo or faster tempo is more beneficial for the stress recovery process, with one study indicating that sequential decreases in tempo predicted greater increases in parasympathetic activity compared to sequential increases in tempo (Bretherton et al., 2019). In the current study, the slowest tempo category appeared 4$^{th}$, suggesting that the majority of participants preferred listening to music that had a slow to moderate tempo compared to a very slow tempo. Furthermore, there was no one dominant tempo with a lot of mixing of tempos in participants self-selected music playlists. This could suggest that participants enjoyed listening to a variety of songs with different tempos in order to relax.

As mentioned above, some research studies have attempted to contribute to this discussion on what musical characteristics do self-selected de-stressing music playlists display and essentially, what music works best for dealing with daily acute stress exposures, however it is still inclusive whether musical characteristics play a role (Adiasto et al., 2022). The main source of research attempting to clarify this topic of which music works best and whether there is any moderating effect of the relationship between listening to music and recovery from stress is from Adiasto et al's. (2022) meta-analysis. The authors reiterate the point that little can be said about these differences at this point in time due to the lack of current literature available.

Therefore, it is still too early to definitely conclude whether musical characteristics play a part in the stress recovery process. However, the current study has provided a lot of interesting information about the musical characteristics of self-selected de-stressing music playlists, specifically in a South African context, and further highlights the need for more current research on this important topic.

### 4.5 Theoretical and Practical Implications

The current research study explored whether listening to music had an effect on positive affect and negative affect, after acute stress exposure. The results from the current study implicate that no definitive conclusions can be made on whether listening to music has an effect on positive affect and negative affect due to daily acute stressors at this point in time. The study acknowledged the lack of research on different music playlists in the current literature, which this study investigated and added to the literature on by finding that there were no statistically significant differences in music playlists on positive affect and negative affect. Furthermore, there has been a lack of research on music listening and affect in a South African context, which this study has aimed to contribute towards in a small manner. South African university students from the University of the Witwatersrand participated in this study's experiment, which has practical implications from a South African perspective for the current literature. Additionally, future studies should carry out this research in workplace settings in South Africa, as this could have practical implications for improving well-being and health in the workplace.

Future research studies could use the Broaden-and-Build theory of positive emotions as a theoretical framework as it was argued that positive emotional

experiences can act against the negative emotions that arise from daily acute stressors, which would help prevent the harmful consequences of stress (Fredrickson, 2004). The theory also states that positive emotions encourage novel, exploratory thoughts, and behaviours which overtime enhance a person's ability to cope with the demands or stressors (Tugade & Fredrickson, 2004). Most importantly, these resources serve as reserves that individuals can draw upon at a later stage to give them the best change of successful coping and survival (Fredrickson, 2004). This theory has the potential to have an impact in the field of affect and listening to music, and more broadly the field of stress recovery and listening to music. This was why the current study incorporated the Broaden-and-Build theory of positive emotions as positive emotions help broaden an individual's momentary thought-action collection and build their enduring persona resources, which as mentioned above, can be called upon if needed (Fredrickson, 2004).

### 4.6 Limitations

The current study had a few limitations present that should be noted. The first limitation of the study was the reliability of the negative affect scales, and the bottoming out of the responses of the negative affect scales, especially at the post negative affect measurements. Removing items from the post negative affect scale was considered in order to help improve the reliability of the scale, however almost half the items would have had to be removed and this still would not have significantly improved the reliability, which is the reason for keeping the scale as it was as well as to keep it consistent with the other scales in the study. Furthermore, due to a lack of general variance within the scores of the negative affect scales, there was a bottoming out of responses as the majority of all participants had a response of 1 (not at all) for experiencing the negative affect items. Therefore, caution should be used with interpreting the results and generalisability of the study, specifically the negative affect results.

The second limitation was the sample size. Generally, a larger sample size is preferred which helps with power, central limit theorem and the generalisability of the study (Field, 2018). The current study aimed to have a sample size between 30 – 60 participants in order to adequately address the research questions. During the recruitment stage, 70 individuals signed up to participate in the study, however due

to the pre-screening stage of the study, which was used for ethical considerations, caution, and to eliminate outliers, a lot of participants did not meet the requirements needed and were unable to participate. 32 individuals who signed up were unable to participate because their anxiety scores were above the cut-off score, and 8 individuals were currently taking medication for stress or anxiety which is one of the main reasons why the sample size decreased to 30. Another reason for the smaller sample size was the issue of trying to organise dates and times for participants to individually participate in the experiment and the issue of participants not showing up to participate. The data collection part of the study took roughly 3 months to get 30 participants which was extremely difficult while trying to balance coursework and assessments, examinations, and internship applications. Furthermore, it would not have been ethical to continue recruiting and running experiments in the final weeks of the year, as students were busy finishing off their coursework, assessments and preparing for and writing final examinations. After encountering all these setbacks, the study was able to achieve a final sample of $N = 30$, which was the minimum sample size that was set for the study. With this small sample size, the study was going to be limited when it comes to power.

The third limitation is a methodological limitation. The study used volunteer sampling and purposive sampling techniques which fall under non-probability sampling. Non-probability sampling does not fairly represent the population, as there is no way to ensure everyone has an equal chance of being chosen to participate, which effects the generalisability of the results obtained (Acharya et al., 2013). Therefore, caution should be used when viewing the results of the study. The current study did, however, use random assignment to allocate participants to each of the three groups in the experiment which helps with selection bias. This allows each participant an equal chance of being assigned to each group (Kim & Shin, 2014). Random assignment assists with the internal validity of the study as it helps with ensuring that there are no systematic differences between the participants in each group, which helps with suggesting that the outcomes of the experiments are due to the independent variable (Dunbar-Jacob, 2018). However, it should be noted that the assumption of group equivalence based on random assignment is less well supported when group sizes are smaller, which is the case in the current study.

The fourth limitation which links to the sample of the study was that the sample was not too representative of the South African population in terms of gender, with 73.3% of the study's sample identifying as female as opposed to approximately 51,1% identifying as female in South Africa (StatsSA, 2021). However, there tends to be more females than males in the field of psychology in South Africa, as a study on the feminisation of psychology in South Africa suggested that the profession of psychology in South Africa is dominated by females (Skinner & Louw, 2009). This makes sense for the current study as to why the sample had more females than males, as the study targeted psychology students. The sample was, however, relatively similar in terms of the ethnicity make up of South Africa, with the majority of participants in the sample consisting of African participants, 60% (StatsSA, 2023). Furthermore, as the final sample consisted of university students recruited through convenience sampling, this hinders the generalisability of the results to other contexts. However, the study initially aimed at recruiting Wits plus psychology students who were currently working and studying before having to expand, as they were experiencing the pressures from work, university and were more accessible, which is why they were deemed a relevant sample to target.

### 4.7 Future Research

There has been quite a number of research studies assessing whether listening to music is an effective stress recovery strategy; however, the literature is filled with mixed results. Some research studies have found evidence suggesting listening to music may indeed be a useful stress recovery strategy. On the other hand, research studies have also found that listening to music may not be effective for dealing with acute stress exposures, which is why there is a need for more research on this topic, which will attempt to clarify the mixed results currently in the literature (Adiasto et al., 2022). Furthermore, there have been very few studies that have specifically looked at the effect of listening to music on positive affect and negative affect, after acute stress exposure, highlighting the need for more research and further clarity. Future research should consider adding other stress coping techniques into their experiments in order to not only compare listening to music to an ambient sound group or silence group, but to compare listening to music to other coping mechanisms, such as meditation or yoga for example. This will allow for

comparisons to be made and to see whether listening to music is as effective as other stress recovery strategies (de la Torre-Luque et al., 2017). Another suggestion is to add more measures to the research would be beneficial in order to gather a more holistic view on listening to music and stress recovery. The current study wanted to add the State Trait Anxiety Inventory (STAI) as an additional measure for the study, however due to lack of finances for research, the STAI was not added as a measure due to the cost.

There is also a need for more research on this topic in work and organisational settings, as well as to compare listening to music to other work related stress management interventions to see whether listening to music is a beneficial stress coping strategy in the workplace. This will help find out whether listening to music increases employee positive affect and satisfaction and decreases their negative affect and dissatisfaction in the workplace. If meaningful results are found in work and organisational settings, businesses and organisations could suggest listening to music as a mechanism or intervention to help their employees cope with daily acute stressors. This could help the organisation promote employee well-being and a provide a strategy that would assist employees in coping with daily acute stressors. Secondly, listening to music could be a cost-effective and easily accessible stress coping strategy which would help employee's general well-being and save organisation's time and money.

### 4.8 Conclusion

Therefore, this research study has attempted to contribute to the literature on whether listening to music has an effect on positive affect and negative affect, after acute stress exposure. The mixed model ANOVAs found non-significant interactions between condition and time, indicating insufficient evidence to support the claim that listening to music would increase an individual's positive affect and decrease their negative affect, after acute stress exposure. This research contributes to the mixed findings in the current literature with some studies finding significant results for listening to music and stress recovery with other studies finding non-significant results and suggesting it may still be too early to conclusively determine whether listening to music can help in the stress recovery process. This research study did, however, find interesting information on the musical characteristics that a small

South African sample chose for their self-selected ‘de-stressing’ music playlists, which was compared to the musical characteristics from other studies. Thus, more research is needed to clarify the conflicting findings evident in the literature, which may provide clarity on whether listening to music helps with stress recovery and whether this can be generalised to the organisations and the workplace.

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## Appendix A

**Table 14**
*Pre-screening questionnaire*

Please answer the four questions below, and if you meet the requirements, please continue onto the next page to complete the General Anxiety Disorder Questionnaire.

1. Do you have a serious hearing impairment that would affect your ability to listen to music?

☐ Yes ☐ No

2. Are you currently taking any medication for stress or anxiety?

☐ Yes ☐ No

If you have selected **"Yes"** for either question 1 or 2 above, thank you for taking part in the study up until this point, unfortunately, you will **not** be allowed to participate further.

3. Are you currently attending the University of the Witwatersrand?

☐Yes ☐ No

4. Are you 18 years of age or older?

☐ Yes ☐ No

If you select **"No"** for either question 3 or 4 above, thank you for taking part in the study up until this point, however you will **not** be allowed to participate further.

Please continue to the next page if you have meet the requirements above.

**Table 15**
*General Anxiety Disorder (GAD-7) Questionnaire.*

The Generalized Anxiety Disorder questionnaire is a seven-item, self-report anxiety questionnaire designed to assess the participants health status within the previous 2 weeks (Williams, 2014). If a participants self-reported anxiety score is too high, between 15-21, they will not be allowed to participate in the study to eliminate potential outliers and for their own well-being. They will be provided with the contact information of the University of the Witwatersrand's counselling and careers development unit if they would like to make an appointment. The contact information: info.ccdu@wits.ac.za

Please answer the following questions:

| In the past two weeks, how often have you been bothered by the following problems? | Not at all | Several days | More than half the days | Nearly every day |
|---|---|---|---|---|
| 1. Feeling nervous, anxious, or on edge? | 0 | 1 | 2 | 3 |
| 2. Not being able to stop or control worrying? | 0 | 1 | 2 | 3 |
| 3. Worrying too much about different things? | 0 | 1 | 2 | 3 |
| 4. Trouble relaxing? | 0 | 1 | 2 | 3 |
| 5. Being so restless that it is hard to sit still? | 0 | 1 | 2 | 3 |
| 6. Becoming easily annoyed or irritable? | 0 | 1 | 2 | 3 |
| 7. Feeling afraid, as if something awful might happen? | 0 | 1 | 2 | 3 |

Scoring GAD-7 Anxiety Severity:

The GAD-7 total score for the seven items ranges from 0 to 21. 0–4: minimal anxiety 5–9: mild anxiety 10–14: moderate anxiety 15–21: severe anxiety (Williams, 2014).

Total Score:

## Appendix B

**Table 16**
*Demographics questionnaire*

Please fill out / tick the box that corresponds to you:

1. Gender:

☐ Male ☐ Female ☐ Transgender Female ☐ Transgender Male ☐ Gender variant/nonconforming ☐ Other ☐ Prefer not to say.

If you have selected other and would like to specify: ☐

2. Age:

☐ Under 18 ☐ 18-25 ☐ 26-35 ☐ over 35

3. Demographic group (for descriptive purposes):

☐ African ☐ White ☐ Indian ☐ Coloured ☐ Asian ☐ Other ☐ Prefer not to say.

If you have selected other and would like to specify: ☐

4. Current qualification registered for:

☐ Bachelors degree ☐ Honours degree ☐ Masters degree ☐ PhD ☐ Postgraduate diploma ☐ Other

If you have selected other, please specify: ☐

## Appendix C

**Table 17**
*Positive and Negative Affect Schedule (PANAS)*

The PANAS questionnaire is a self-report measure which is made up of two mood scales, one scale measuring positive affect, and one scale measuring negative affect. This questionnaire consists of 20 words that describe different feelings and emotions. Please read through each item and choose the appropriate answer to how you are feeling **at this moment in time** (Watson et al., 1988). The PANAS questionnaire uses a 5-point Likert scale for scoring.

**Instructions:**

Please indicate the extent you feel this way **right now** for each of the items listed below:

1= not at all, 2= a little, 3= moderately, 4=quite a bit, 5=extremely.

| Right now, I feel: | 1=not at all | 2=a little | 3=moderately | 4=quite a bit | 5=extremely |
|---|---|---|---|---|---|
| 1. Interested | 1 | 2 | 3 | 4 | 5 |
| 2. Distressed | 1 | 2 | 3 | 4 | 5 |
| 3. Excited | 1 | 2 | 3 | 4 | 5 |
| 4. Upset | 1 | 2 | 3 | 4 | 5 |
| 5. Strong | 1 | 2 | 3 | 4 | 5 |
| 6. Guilty | 1 | 2 | 3 | 4 | 5 |
| 7. Scared | 1 | 2 | 3 | 4 | 5 |
| 8. Hostile | 1 | 2 | 3 | 4 | 5 |
| 9. Enthusiastic | 1 | 2 | 3 | 4 | 5 |
| 10. Proud | 1 | 2 | 3 | 4 | 5 |
| 11. Irritable | 1 | 2 | 3 | 4 | 5 |
| 12. Alert | 1 | 2 | 3 | 4 | 5 |
| 13. Ashamed | 1 | 2 | 3 | 4 | 5 |
| 14. Inspired | 1 | 2 | 3 | 4 | 5 |
| 15. Nervous | 1 | 2 | 3 | 4 | 5 |
| 16. Determined | 1 | 2 | 3 | 4 | 5 |
| 17. Attentive | 1 | 2 | 3 | 4 | 5 |
| 18. Jittery | 1 | 2 | 3 | 4 | 5 |
| 19. Active | 1 | 2 | 3 | 4 | 5 |
| 20. Afraid | 1 | 2 | 3 | 4 | 5 |

**Scoring:**

Positive affect score: There are 10 items representing positive affect. To find out the participants positive affect score, sum up the scores on items 1,3,5,9,10,12,14,16,17,19. Scores range between 10-50, with higher scores representing higher levels of positive affect (Watson et al., 1988).

Negative affect score: There are 10 items representing negative affect. To find out the participants negative affect score, sum up the scores on items

2,4,6,7,8,11,13,15,18,20. Scores range between 10-50, with lower scores representing lower levels of negative affect (Watson et al., 1988).

PANAS scores:

Positive affect:  Negative affect:

## Appendix D

**Table 18**
*Stress task questions*

Please answer the following questions and indicate how you felt when completing the Stroop task.

| I felt: | 1= not at all | 2= a little | 3= moderately | 4= quite a bit | 5= a great extent |
|---|---|---|---|---|---|
| 1.Pressurised | | | | | |
| 2.Agitated | | | | | |
| 3.Stressed | | | | | |
| 4.Self-conscious | | | | | |
| 5.Anxious | | | | | |

## Appendix E




*Participation Information Sheet*

Good day,

My name is Dane Mertsch, and I am currently studying towards my master's degree in Organisational Psychology at the University of the Witwatersrand. My supervisor is Dr Michael Pitman, who is a senior lecturer at the University of the Witwatersrand. I am conducting a research study on the effects of listening to music on affect and emotion in the context of stressful experiences.

I am inviting you to take part in an experiment which will last about 15-20 minutes. In the experiment you will complete a cognitive-perceptual task which will take roughly 5 minutes, and once completed, fill out a questionnaire about your emotional and affective state. Once this is finished, you will listen to an audio track for 10 minutes, before filling out the same questionnaire for a second time.

The experiment will take place at the University of the Witwatersrand, in the MA master's room, in the Umthombo building. The data collected from this study will be stored in a file on my password protected laptop. Only my research supervisor and I will have access to this information.

When I share the results of the study, I will not include your name or anything else that could identify you. With your permission, other researchers may use the data collected from this research study, but your name and any personal information will not be included, used, or passed on.

If you decide to take part in the research study, it should be because you want to volunteer. You do not have to take part and you can stop participating at any time. You will not get any direct benefits if you choose to join the research study, and you will not lose any services, benefits, or rights you would normally have if you decide not to join. Taking part in the research study will not cost you anything.

The risks for this research study are minimal and are no more than what happens in everyday life. If you need support or counselling services following the experiment, these are available free of charge at the University's Counselling and Careers Development Unit (CCDU). The contact information for this unit is: info.ccdu@wits.ac.za

If you have any questions, during or afterwards, about the research study, please do not hesitate to contact me or my supervisor using the details provided below.

Researcher:

Dane Mertsch, 2742576@students.wits.ac.za

Supervisor:

Dr Michael Pitman, Michael.Pitman@wits.ac.za

## Appendix F

*Informed Consent Form*

I ……(name and surname) consent to participate in this research study, assessing the effects of listening to music on positive affect and negative affect, after acute stress exposure conducted by Dane Mertsch, and supervised by Dr Michael Pitman.

I am aware that:

- Participation in this study is completely voluntary.
- I may withdraw from participating in this study at any time.
- Participation will have no negative outcomes on my academic studies.
- My details will be kept confidential.
- I will not be harmed or injured during this study.
- There are minimal risks associated with this study.
- None of my identifiable information will be included in the research report and no results can be traced back to me.
- I am aware that the results of this study will be reported in the form of a research report for the partial completion of the degree, masters in Organisational Psychology.
- I may request feedback from the study once it has been completed.
- The data from this study will be stored on the researcher's password protected laptop during and after completion of the study.

Participant:

…… (signature)

…… (date)

# Appendix G

*Ethical Approval*

UNIVERSITY OF THE WITWATERSRAND JOHANNESBURG

**SCHOOL OF HUMAN AND COMMUNITY DEVELOPMENT ETHICS COMMITTEE**
**CONSTITUTED UNDER THE UNIVERSITY HUMAN RESEARCH ETHICS COMMITTEE (NON-MEDICAL)**

| | |
|---|---|
| **CLEARANCE CERTIFICATE** | **PROTOCOL NUMBER: MAORG/23/07** |
| **PROJECT TITLE:** | Effects of listening to music on positive affect and negative affect, after acute stress exposure. |
| **INVESTIGATOR** | Mertsch Dane (2742576) |
| **SCHOOL/DEPARTMENT OF INVESTIGATOR** | SHCD/Psychology |
| **DATE CONSIDERED** | 20 June 2023 |
| **DECISION OF THE COMMITTEE** | Approved unconditionally |
| **RISK LEVEL** | Low Risk |
| **EXPIRY DATE** | 31 December 2025 |
| **ISSUE DATE OF CERTIFICATE** 05 July 2023 | **CHAIRPERSON** _____ (Dr Aline Ferreira Correia) |

cc: Dr Michael Pitman (Supervisor)

---

**DECLARATION OF INVESTIGATOR**

To be completed in duplicate and **ONE COPY** returned to the Chairperson of the School/Department ethics committee.

I/we fully understand the conditions under which I am/we are authorized to carry out the abovementioned research and I/we guarantee to ensure compliance with these conditions. Should any departure be contemplated from the research procedure as approved, I/we undertake to submit an amendment of the protocol to the Committee.

_____ 31 / 07 / 2023

**Signature** **Date**

## Appendix H

*Permission to conduct research and use Wits' students as participants*.

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

**OFFICE OF THE DEPUTY REGISTRAR**

31 July 2022

Dane Mertsch
Student Number (2742576)
Master of Arts by Coursework and Research Report
School of Human and Community Development

**TO WHOM IT MAY CONCERN**

**"Effects of listening to music on positive affect and negative affect, after acute stress exposure."**

This letter serves to confirm that the above project has received permission to be conducted on University premises, and/or involving staff and/or students of the University as research participants. In undertaking this research, you agree to abide by all University regulations for conducting research on campus and to respect participants' rights to withdraw from participation at any time.

If you are conducting research on certain student cohorts, year groups or courses within specific Schools and within the teaching term, permission must be sought from Heads of School or individual academics.

Ethical clearance has been obtained. (Protocol number: MAORG/23/07)

Research Expiration: (31 December 2025)

Nicoleen Potgieter
**University Deputy Registrar**

# Appendix I

**Table 19**
*Reliability Statistics (Pre Positive Affect)*

| Cronbach's Alpha | Cronbach's Alpha Based on Standardized Items | N of Items |
|---|---|---|
| .79 | .79 | 10 |

**Table 20**
*Item-total statistics (Pre Positive Affect)*

| | Scale Mean if Item Deleted | Scale Variance if Item Deleted | Corrected Item-Total Correlation | Squared Multiple Correlation | Cronbach's Alpha if Item Deleted |
|---|---|---|---|---|---|
| 1. Interested | 34.00 | 29.52 | .55 | .78 | .77 |
| 3. Excited | 34.50 | 28.60 | .50 | .67 | .77 |
| 5. Strong | 34.43 | 29.84 | .33 | .48 | .80 |
| 9. Enthusiastic | 34.27 | 28.27 | .58 | .79 | .76 |
| 10. Proud | 33.90 | 30.51 | .41 | .41 | .78 |
| 12. Alert | 33.50 | 30.19 | .53 | .53 | .77 |
| 14. Inspired | 34.57 | 28.74 | .53 | .46 | .77 |
| 16. Determined | 33.83 | 28.83 | .60 | .62 | .76 |
| 17. Attentive | 33.43 | 33.84 | .23 | .40 | .80 |
| 19. Active | 34.07 | 30.63 | .42 | .53 | .78 |

**Table 21**
*Reliability Statistics (Post Positive Affect0*

| Cronbach's Alpha | Cronbach's Alpha Based on Standardized Items | N of Items |
|---|---|---|
| .92 | .92 | 10 |

**Table 22**
*Item-Total statistics (Post Positive Affect)*

| | Scale Mean if Item Deleted | Scale Variance if Item Deleted | Corrected Item-Total Correlation | Squared Multiple Correlation | Cronbach's Alpha if Item Deleted |
|---|---|---|---|---|---|
| 1. Interested | 28.87 | 77.78 | .75 | .74 | .91 |
| 3. Excited | 29.73 | 71.79 | .82 | .72 | .91 |
| 5. Strong | 29.33 | 73.20 | .73 | .77 | .91 |
| 9. Enthusiastic | 29.10 | 73.13 | .87 | .85 | .91 |
| 10. Proud | 29.67 | 74.99 | .70 | .68 | .92 |
| 12. Alert | 30.17 | 80.56 | .44 | .48 | .93 |
| 14. Inspired | 29.20 | 77.20 | .59 | .53 | .92 |
| 16. Determined | 29.37 | 72.93 | .83 | .77 | .91 |
| 17. Attentive | 29.47 | 76.67 | .67 | .64 | .92 |
| 19. Active | 29.70 | 75.05 | .71 | .70 | .92 |

**Table 23**
*Reliability Statistics (Pre Negative Affect)*

| Cronbach's Alpha | Cronbach's Alpha Based on Standardized Items | N of Items |
|---|---|---|
| .67 | .75 | 10 |

**Table 24**
*Item-Total statistics (Pre Negative Affect)*

| | Scale Mean if Item Deleted | Scale Variance if Item Deleted | Corrected Item-Total Correlation | Squared Multiple Correlation | Cronbach's Alpha if Item Deleted |
|---|---|---|---|---|---|
| 2. Distressed | 12.97 | 11.96 | .27 | .32 | .67 |
| 4. Upset | 14.00 | 11.72 | .67 | .73 | .60 |
| 6. Guilty | 14.13 | 12.26 | .54 | .85 | .62 |
| 7. Scared | 14.03 | 12.45 | .58 | .69 | .62 |
| 8. Hostile | 14.10 | 12.65 | .48 | .76 | .63 |
| 11. Irritable | 13.63 | 12.59 | .22 | .34 | .67 |
| 13. Ashamed | 14.13 | 14.05 | .16 | .49 | .67 |
| 15. Nervous | 13.37 | 10.59 | .47 | .42 | .62 |
| 18. Jittery | 12.97 | 12.65 | .09 | .16 | .73 |
| 20. Afraid | 14.07 | 12.96 | .45 | .56 | .64 |

**Table 25**
*Reliability Statistics (Post Negative Affect)*

| Cronbach's Alpha | Cronbach's Alpha Based on Standardized Items | N of Items |
|---|---|---|
| .32 | .38 | 10 |

**Table 26**
*Item-Total Statistics (Post Negative Affect)*

| | Scale Mean if Item Deleted | Scale Variance if Item Deleted | Corrected Item-Total Correlation | Squared Multiple Correlation | Cronbach's Alpha if Item Deleted |
|---|---|---|---|---|---|
| 2. Distressed | 11.27 | 3.72 | -.06 | .17 | .42 |
| 4. Upset | 11.33 | 3.89 | .08 | .31 | .31 |
| 6. Guilty | 11.30 | 4.08 | -.07 | .37 | .36 |
| 7. Scared | 11.27 | 3.65 | .13 | .61 | .30 |
| 8. Hostile | 11.27 | 3.58 | .24 | .44 | .26 |
| 11. Irritable | 11.17 | 3.52 | -.01 | .06 | .39 |
| 13. Ashamed | 11.30 | 3.53 | .32 | .60 | .24 |
| 15. Nervous | 11.10 | 2.85 | .43 | .75 | .12 |
| 18. Jittery | 11.00 | 3.31 | .23 | .61 | .24 |
| 20. Afraid | 11.20 | 3.75 | .10 | .33 | .31 |

# Appendix J

**Figure 14**
*Boxplot of PA by group (Pre PA), After Stress Test and (Post PA), Post Condition.*

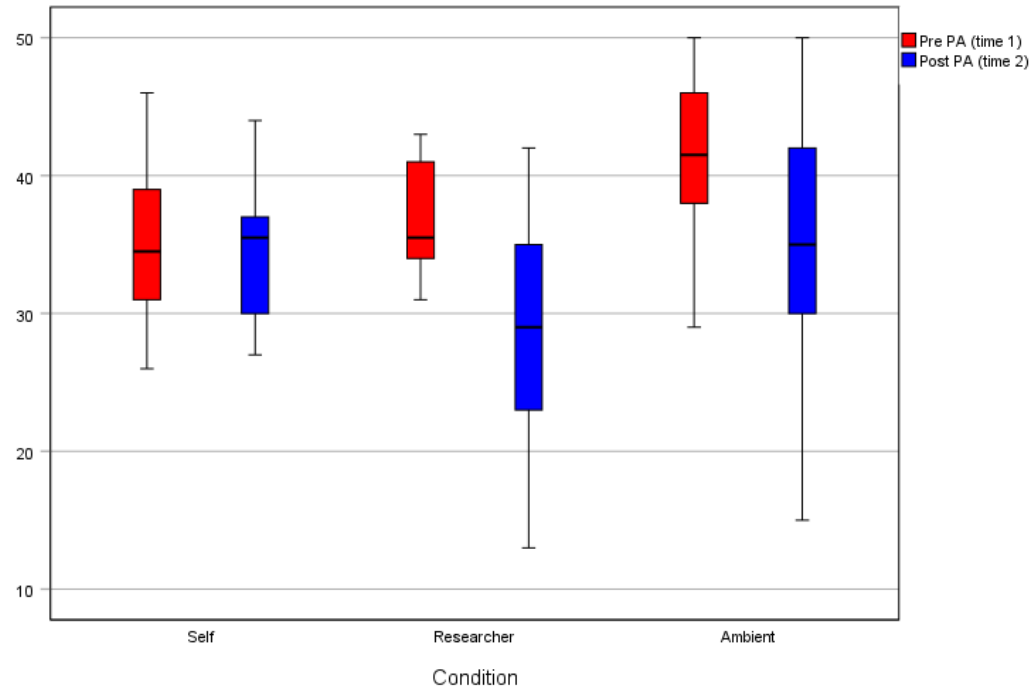



**Table 27**
*Test of Normality*

| | | Shapiro-Wilk | | |
|---|---|---|---|---|
| | Music group | Statistic | df | Sig. |
| Pre PA | Self | .97 | 10 | .86 |
| | Researcher | .92 | 10 | .35 |
| | Ambient Sound | .96 | 10 | .79 |
| Post PA | Self | .92 | 10 | .33 |
| | Researcher | .98 | 10 | .98 |
| | Ambient Sound | .92 | 10 | .32 |

**Figure 15**
*Normal Q-Q Plot of Studentised Residual for Pre PA*

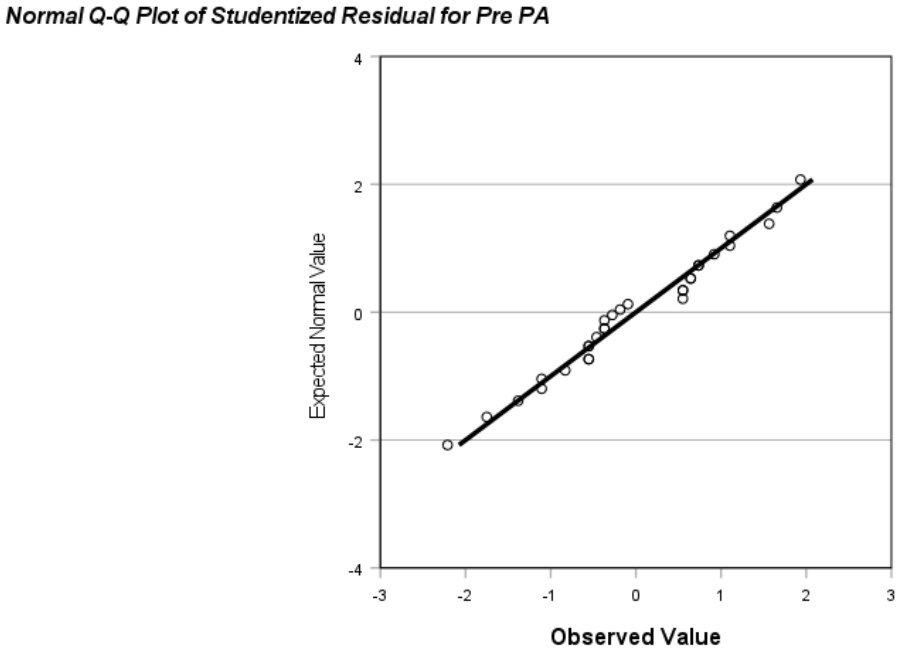



**Figure 16**
*Normal Q-Q Plot of Studentised Residual for Post PA*

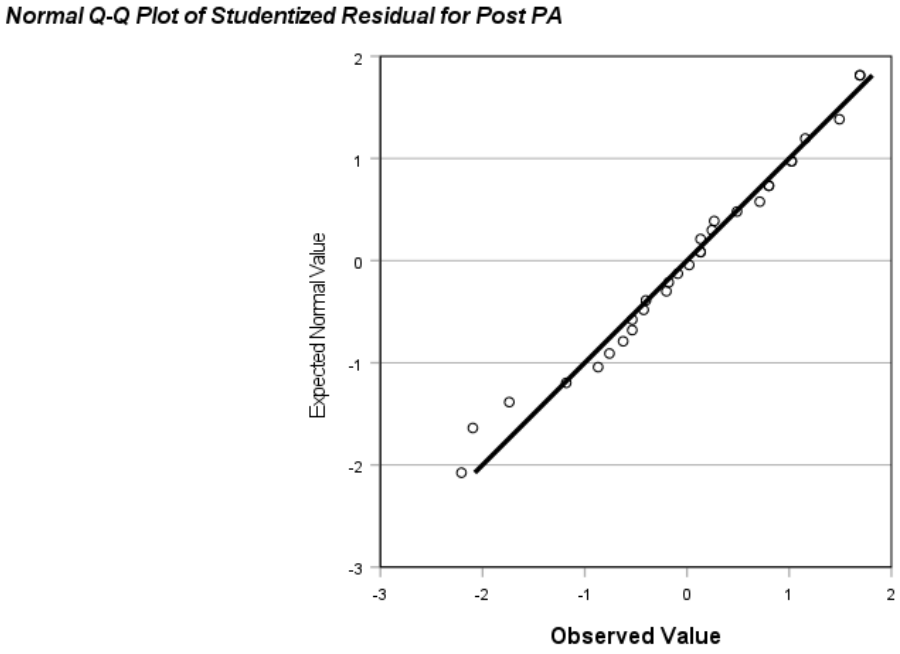


**Table 28**

*Levene's Test of Equality of Error Variances[a]*

| | | Levene Statistic | df1 | df2 | Sig. |
|---|---|---|---|---|---|
| Pre PA | Based on Mean | 1.28 | 2 | 27 | .30 |
| | Based on Median | 1.20 | 2 | 27 | .32 |
| | Based on Median and with adjusted df | 1.20 | 2 | 24.65 | .32 |
| | Based on trimmed mean | 1.26 | 2 | 27 | .30 |
| Post PA | Based on Mean | 1.76 | 2 | 27 | .19 |
| | Based on Median | 1.77 | 2 | 27 | .19 |
| | Based on Median and with adjusted df | 1.77 | 2 | 20.04 | .20 |
| | Based on trimmed mean | 1.75 | 2 | 27 | .19 |

Pre PA = Positive Affect Post Stress Task; Post PA = Positive Affect Post Music.

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept + Group
Within Subjects Design: Time

## Appendix K

**Figure 17**
*Boxplot of NA by group (Pre NA), After Stress Test and (Post NA), Post Music.*

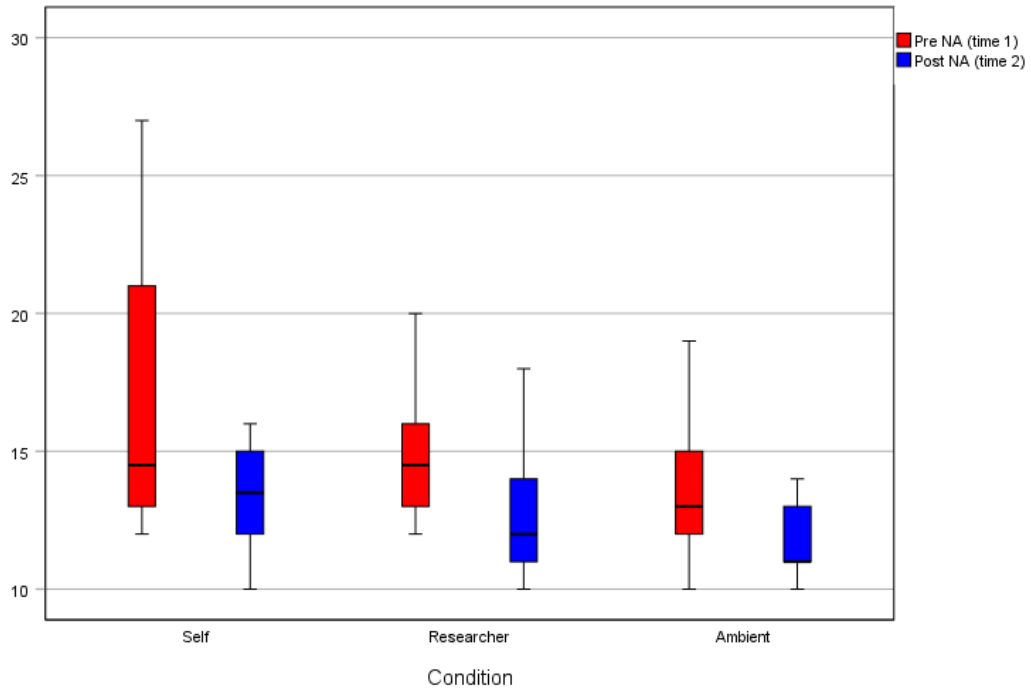



**Table 29**
*Tests of Normality*

| | | Shapiro-Wilk | | |
|---|---|---|---|---|
| | Music group | Statistic | df | Sig. |
| Pre NA | Self | .85 | 10 | .06 |
| | Researcher | .90 | 10 | .23 |
| | Ambient Sound | .89 | 10 | .18 |
| Post NA | Self | .94 | 10 | .50 |
| | Researcher | .88 | 10 | .13 |
| | Ambient Sound | .87 | 10 | .10 |

**Figure 18**
*Normal Q-Q Plot of Studentised Residual for Pre NA*

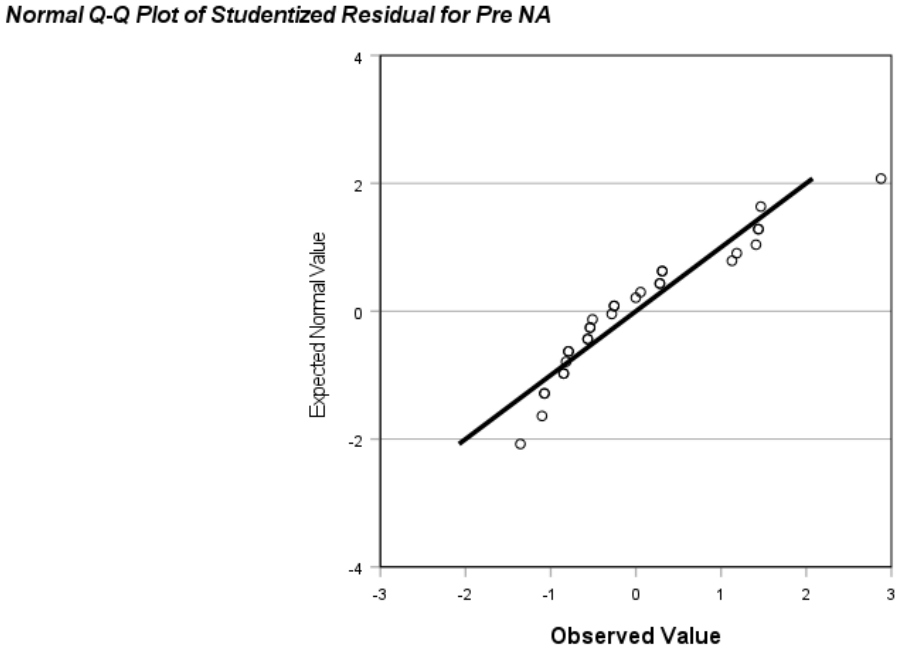



**Figure 19**
*Normal Q-Q Plot of Studentised Residual for Post NA*

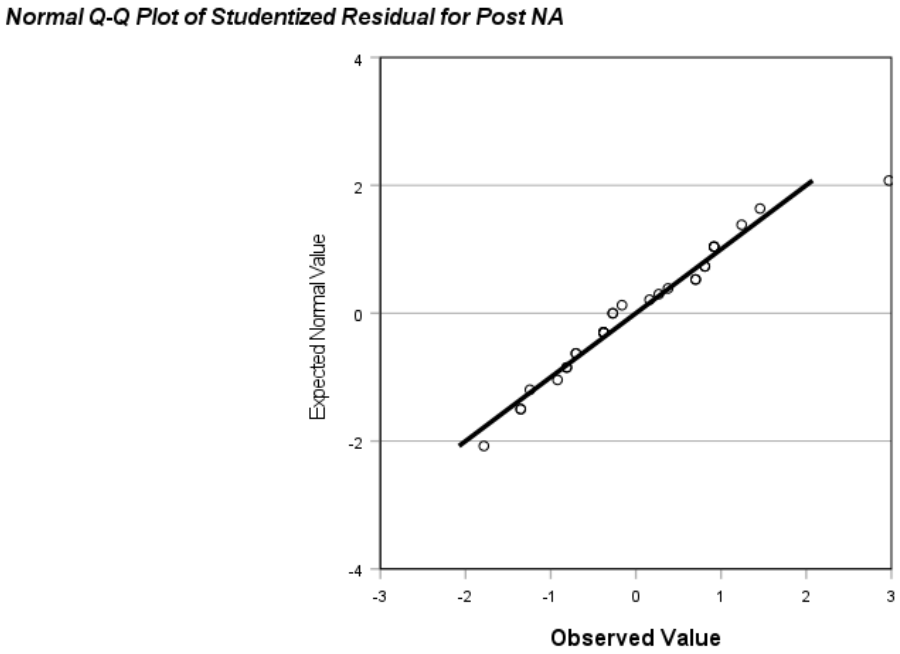


**Table 30**

*Levene's Test of Equality of Error Variances[a]*

| | | Levene Statistic | df1 | df2 | Sig. |
|---|---|---|---|---|---|
| Pre NA | Based on Mean | 2.20 | 2 | 27 | .13 |
| | Based on Median | .79 | 2 | 27 | .47 |
| | Based on Median and with adjusted df | .79 | 2 | 17.28 | .47 |
| | Based on trimmed mean | 1.94 | 2 | 27 | .16 |
| Post NA | Based on Mean | 1.51 | 2 | 27 | .24 |
| | Based on Median | 1.29 | 2 | 27 | .29 |
| | Based on Median and with adjusted df | 1.29 | 2 | 20.87 | .30 |
| | Based on trimmed mean | 1.38 | 2 | 27 | .30 |

Pre NA = Negative Affect Post Stress Task; Post NA = Negative Affect Post Music.

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept + Group

Within Subjects Design: Time

# Appendix L

*Supervisor and Supervisee Contract.*

**Statement of principles for postgraduate supervision**

In a context of academic freedom and within a framework of individual autonomy and the pursuit of knowledge, this statement is written in the belief that there is a reciprocal relationship and mutual accountability between supervisor and student

**THE SUPERVISOR AND THE STUDENT:**

1. Will establish agreed roles and clear processes to be maintained by both parties. In the case of joint supervision, the roles and responsibilities of each supervisor and the student need to be clarified.
2. Will meet regularly and as frequently as is reasonable to ensure steady progress towards the completion of the proposal, research report, dissertation or thesis. This time varies but the normal minimum requirement for face-to-face contact spread across each year of registration is: 10 contact hours for an Honours project, 15 contact hours for a Masters by coursework and research report and 24 contact hours for a Masters by dissertation and a PhD.
3. Will keep appointments, be punctual and respond timeously to messages.
4. Will keep one another informed of any planned vacations or absences as well as changes in his or her personal circumstances that might impact on the work schedule. Unplanned absences or delays should be discussed as soon as possible and arrangements should be made, to catch up lost time.
5. Will ensure that research on animal or human subjects is conducted with prior approval and according to the procedures and the requirements of the relevant Ethics committee.
6. Will both complete Progress Reports on the research project as required/requested by the relevant Faculty Graduate Studies Committee.

**THE SUPERVISOR:**

1. Undertakes to provide guidance for the student's research project in relation to the design and scope of the project, the relevant literature and information sources, research methods and techniques and methods of data analysis.
2. Will provide guidance at the commensurate NQF level requirements for autonomy and accountability that the student is expected to demonstrate.
3. Has a responsibility to be reasonably accessible to the students.
4. Will be prepared for meetings with the student. This includes being up-to-date on the latest work in his/her area of expertise.
5. Will expect written work as jointly agreed, and will return that work with constructive criticism within a timeframe (a suggestion of 2-4 weeks) jointly agreed at the outset of the research.
6. Will provide advice that can help the student to improve his/her writing. This may include referrals for language training and academic writing. The supervisor will provide guidance on technical aspects of writing such as referencing as well as on discipline specific requirements. Detailed correction of drafts and instruction in aspects of language and style are **not** the responsibility of the supervisor.
7. Will guide the student in the production of a research report, dissertation or thesis. Provision should be allowed for adequate, mutually respectful, discussion around recommendations made.
8. Will assist with the construction of a written time schedule, which outlines the expected completion dates of successive stages of the work.
9. Will encourage the student to present work at postgraduate/ staff seminars/national/international conferences as appropriate.
10. Will assist with the publication of research articles as appropriate.
11. Will discuss the ownership of research conducted by the student in accordance with the University rules on intellectual property, copyright, **guidelines on authorship/co-authorship**, and **policy on research integrity.**
12. Will ensure that the student is aware of the University's Plagiarism Policy, knows what plagiarism is, and what the consequences are for academic dishonesty and violation of research integrity and intellectual property.
13. Will ensure that the student is made aware in writing of the inadequacy of progress and/or of any work where the standard is below par. Acceptability will be according to criteria previously supplied to the student.
14. Has a duty to refuse to allow the submission of sub-standard work for examination, regardless of the circumstances. If the student chooses to submit without the consent of the supervisor, then this should be clearly recorded and the appropriate procedures followed.

**THE STUDENT:**

1. Takes full responsibility for the research and its successful completion; including managing the process under the guidance of supervisor (s).
2. Will attend such courses and lectures that are compulsory for the degree, and undertakes to catch up fully on any work, lectures and/or assignments, that are missed.
3. Undertakes to work independently under the guidance of the supervisor(s). This includes reading widely and critically to ensure that the seminal **and** current literature pertinent to his/her chosen topic has been identified, consulted and critiqued.
4. Undertakes to work in accordance with the academic standards expected by the University for the commensurate NQF level of qualification.
5. Is obliged to make appointments to consult the supervisor(s) and arrange meeting times convenient to both parties well in advance.
6. Should submit written work for discussion with the supervisor(s) well in advance of a scheduled meeting. The kind and frequency of written work should be agreed with the supervisor(s) at the outset of the research.
7. Written work that is submitted to the supervisor, including final submissions to examiners, should be relatively free from basic spelling mistakes, incorrect punctuation and grammatical errors. Responsibility for the accuracy of language, the overall structure and coherence of the final research report, dissertation or thesis rests with the student.
8. Cannot expect the supervisor to be proof-reader and editor of his/her work or to approve work with any of the weaknesses spelt out in **7** above.
9. Undertakes to heed the advice given by the supervisor(s) and to engage in discussion around suggestions made. Ultimately the student has to take responsibility for the quality, integrity and presentation of the work.
10. Should strive to maintain a focus on his/her research area and to work diligently within the agreed time schedule.
11. Take responsibility to comply with all the requirements related to the ethical clearance of his/her research before the research begins.
12. Agrees to honour agreements about ownership of the research and in accordance with the University's guidelines and rules in relation to co-authorship, copyright and intellectual property.
13. Will ensure that the work contains no instances of plagiarism, violation of intellectual property and research integrity standards, that all citations are properly referenced, and that the list of references is accurate, complete and consistent.
14. Agrees to work in accordance with the criteria of acceptability as supplied by the supervisor(s).
15. Undertakes not to place the supervisor(s) under undue pressure to submit work for examination until the supervisor is satisfied that it has reached an acceptable, **examinable*** level of quality.

We confirm that we have read and understood this statement and agree to be guided by its principles for as long as we continue to work together.

Name of student: Dane Mertsch

Student Number: 2742576

Student's signature: [signature]

Name of Supervisor: Dr Michael Pitman

Supervisor's signature: [signature]

Name of Co-Supervisor: _____

Co-Supervisor's signature: _____

The broad area of study is: Music and stress.

Provisional submission date is: 15/02/2024

Degree: Masters degree

School: Organisational Psychology

Faculty: Humanities

Date: 26/03/2023

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**2021/05/01**

# Appendix M

**Table 31**

*Song name & Artist, Genre & Tempo*

| Song Name & Artist | Genre | Tempo (BPM) |
|---|---|---|
| 1. Amanda Black - Kahle | -Pop | -167 |
| 2. Yinka Bernie - It's okay to cry | -Pop | -174 |
| 3. Dr Tumi - Be lifted | -Afro Soul | -84 |
| 4. Worship House - Ndzi Tlakusela | -Gospel | -118 |
| 5. Guvna B - Fall on Me | -Hip Hop | -92 |
| 6. Mlindo the vocalist - AmaBlesser | -Pop | -170 |
| 7. More than able by Elevation Music ft. Chandler Moore | -Worship | -146 |
| 8. Firm foundation by Maverick City Music | -Worship | -86 |
| 9. Still by Hillsong Worship | -Worship | -140 |
| 10. Mbilu Yanga by We Will Worship | -Worship | -78 |
| 11. For a reason by Zhane | -R&B | -173 |
| 12. Magic by Coldplay | -Pop | -93 |
| 13. Jonas Blue - Fast car | -Tropical House | -114 |
| 14. Jhene Aiko - While we're young | -R&B | -128 |
| 15. Shining - DJ Khaled, Beyoncé, Jay Z | -Rap | -112 |
| 16. Lovin' me - FIFTY FIFTY | -Pop | -171 |
| 17. Better off- Ariana Grande | -Pop | -93 |
| 18. Open (passionate) - Kehlani | -R&B | -124 |
| 19. Medicine - Jaywillz | -Pop | -131 |
| 20. Weekday - Aitch ft Mo$tack and Steel Banglez | -Hip Hop | -102 |
| 21. Head and heart - Joel Corry and MNEK | -House | -123 |
| 22. Jealous - Labrinth | -Pop | -117 |
| 23. Anxiety - Cat Burns | -Pop | -88 |
| 24. I speak Jesus - Charity Gayle | -Worship | -148 |
| 25. Demons - Imagine Dragons | -Pop Rock | -90 |
| 26. Birds- Imagine Dragons | -Pop Rock | -120 |
| 27. Eastside - Benny Blanco, Halsey, Khalid | -Pop | -90 |
| 28. Cruel Summer - Taylor swift | -Pop | -170 |
| 29. Fictional-Khloe Rose | -Pop | -130 |
| 30. Sitting in traffic - Ruel | -Pop | -48 |
| 31. Vampire - Dominik Fike | -Pop Rock | -98 |
| 32. Superstar Sh*t - Dominik Fike | -Pop Rock | -70 |
| 33. In the dark - Mars Baby | -R&B. | -74 |
| 34. Says - Nils Frahm | -Classical | -150 |
| 35. Skalds and Shadows - Blind Guardian | -Metal | -179 |
| 36. Kaunaz Dagaz - Brothers of Metal | -Metal | -146 |
| 37. Radioactive - Bullet for my Valentine | -Metal | -143 |
| 38. Clocks - Coldplay | -Pop | -131 |
| 39. Every time We Touch - Electric Callboy | -Metal | -155 |
| 40. Too Much - Jacob Banks | -R&b | -82 |
| 41. Mrs. - Leon Bridges | -Afro Soul | -120 |
| 42. Hey, Ma - Bon Iver | -Indie Folk | -144 |
| 43. Cry Your Heart Out - Adele | -Pop | -125 |
| 44. Nobody's perfect - J Cole | -Rap | -120 |
| 45. Leave You - Sfarzo Rtee | -Amapiano | -113 |
| 46. Be my summer - Snoh Aalegra | -R&B | -105 |
| 47. Let go - Aaron May | -Indie Hip Hop | -110 |
| 48. Lovesick - Mura Musa | -Pop | -85 |

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|---|---|---|
| 49. Just a goodbye - Hoko, Lucie Cravero.<br>50. Frozen lands - Softy, No spirit.<br>51. Rust - tin., Nokiaa, Seeyouthere.<br>52. Endless - Brillion, Dimension 32.<br>53. Crystal glow - Softy, Wishes and dreams. | -Lo-Fi<br>-Lo-Fi<br>-Lo-Fi<br>-Lo-Fi<br>-Lo-Fi | -118<br>-175<br>-77<br>-75<br>-113 |
| 54. Didn't Cha Know - Erykah Badu<br>55. Ivy - Frank Ocean<br>56. Self-control - Frank ocean<br>57. While we're young - Jhene Aiko<br>58. Love Yourz - Jcole<br>59. Let it be (remastered 2009) - Beatles | -R&B<br>-Pop<br>-Pop<br>-R&B<br>-Rap<br>-Rock | -135<br>-116<br>-80<br>-128<br>-83<br>-143 |
| 60. SZA - broken clocks<br>61. Cleo - Sol Desire<br>62. The weeknd - Angel<br>63. Bambelela Qinisela - Mthunzi Namba<br>64. Kelvin Momo - Emaphupheni<br>65. Victony - Kolomental | -Rap<br>-R&B<br>-Pop<br>-Gospel<br>-House<br>-Pop | -113<br>-113<br>-128<br>-129<br>-112<br>-95 |
| 66. Lovely - Billie Eilish and Khalid<br>67. Remember This - NF<br>68. She's Not Just a Pretty Face - Shania Twain<br>69. Do It Again - Elevation Worship<br>70. Silence - Khalid and Marshmello | -Pop<br>-Pop<br>-Country<br>-Worship<br>-Pop | -115<br>-79<br>-99<br>-172<br>-142 |
| 71. Muye - Black Coffee<br>72. Ultralight Beam - Kanye West<br>73. Starsigns - AKA<br>74. Love - Kendrick Lamar<br>75. O Nketsang - Rex Rabane<br>76. Nights - Frank Ocean | -Pop<br>-Rap<br>-Hip Hop<br>-Hip Hop<br>-Jazz<br>-Pop | -122<br>-105<br>-126<br>-126<br>-112<br>-90 |
| 77. Hourgalss - baby Tate, James Vickery.<br>78. Love in the dark - Adele.<br>79. Hide and seek- Stormzy.<br>80. Leave before you love me -Marshmello, Jonas brothers.<br>81. Chasin' you - Morgan Wallen.<br>82. Bless the broken road - Music travel love. | -R&B<br>-Pop<br>-Grime<br>-Pop<br>-Country<br>-Country | -95<br>-110<br>-105<br>-120<br>-97<br>-140 |
| 83. Show me how - Men I Trust<br>84. Dark Paradise - Lana del Ray<br>85. Hostage - Billie Eilish<br>86. Heart Shaped Box - Nirvana<br>87. California Dreamin - Jose Feliciano<br>88. Redbone - Childish Gambino | -Indie Pop<br>-Pop<br>-Pop<br>-Rock<br>-Pop<br>-Rap | -166<br>-120<br>-130<br>-203<br>-98<br>-160 |
| 89. Rivers flow in you - Yiruma<br>90. Play me - Gene Ammons<br>91. Diphororo - Jonas Gwangwa<br>92. Divenire - Ludovico Einaudi<br>93. You are me, I am you - Dave Koz<br>94. The moment - Kenny G | -Classical<br>-Jazz<br>-Jazz<br>-Classical<br>-Jazz<br>-Jazz | -145<br>-100<br>-173<br>-88<br>-162<br>-181 |
| 95. Holida - Rema.<br>96. Lanke - Teni.<br>97. The weekend - Stormzy & RAYE.<br>98. Don't forget to breathe- Stormzy & yebba.<br>99. May I have this dance- Franics and the Lights, Chance the rapper. | -Pop<br>-Pop<br>-Pop<br>-Hip hop<br>-Hip hop | -112<br>-116<br>-93<br>-54<br>-90 |

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|---|---|---|
| 100. Ndenzel'Uncedo hymm 377 - Joyous celebration. | | |
| 101. Kubobonke Othixo - Ntokozo Mbambo. | -Gospel | -110 |
| 102. Interlude-Zulu worship medley live - Ntokoz | -Gospel | -102 |
| Mbambo. | -Gospel | -102 |
| 103. Avumile-Benjamin Dube, Xolani Mdlalose. | -Gospel | -176 |
| 104. We love you lord - Dr Tumi. | -Afro Soul | -104 |
| 105. Ndinomhlobo.- kholeka. | -Gospel | -105 |
| 106. Pretty Hurts - Beyonce | -R&B | -130 |
| 107. Breathe Me - Sia | -Pop | -120 |
| 108. Rearview - Andra Day (instrumental) | -Instrumental | -116 |
| 109. Come Hang Out - AJR | -Indie Pop | -91 |
| 110. Ayaka's Story (Piano) - Jordy Chandra | -Lo-Fi | -130 |
| 111. Jireh - Elevation Worship | -Worship | -140 |
| 112. To Zion - Lauryn Hill | -R&B | -173 |
| 113. Crazy Love - Maverick City | -Worship | -140 |
| 114. Seasons Change - Corinne Bailey Rae | -Neo Soul | -135 |
| 115. Breathless - Corinne Bailey Rae | -Neo Soul | -178 |
| 116. Don't Change - Musiq Soulchild | -Neo Soul | -102 |
| 117. First of May - Bees Gees | | |
| 118. Yo-Yo Ma - Bach: Cello Suite No. 1 in G Major, | | |
| Prélude | -Rock | -62 |
| 119. Maria Callas sings "Casta Diva" (Bellini: Norma, Act | -Classical | -75 |
| 1) | -Classical | -88 |
| 120. Mamma Mia - Here We Go Again | -Pop | -138 |
| 121. Follow My Heart - Kwamie Liv | -Indie Pop | -105 |
| 122. What A Heavenly Way To Die - Troye Sivan | -Pop | -122 |
| 123. Breathe - Omar Rudberg | -Pop | -139 |
| 124. Just Friends - Trevor Jackson | -Pop | -82 |
| 125. Girls girls girls - FLETCHER | -Pop | -140 |
| 126. I Tried - Daniel Seavey | -Pop | -132 |
| 127. Gurenge - Kato. | -Lo-Fi | -134 |
| 128. Golden hour- JVKE. | -Pop | -94 |
| 129. Departure - Kato. | -Lo-Fi | -56 |
| 130. Calling - Metro Boomin, Swae lee, NAV. | -Hip Hop | -140 |
| 131. Die for you- The Weekend | -Pop | -134 |
| 132. Keep goin'- FLVME. | -Hip Hop | -93 |
| 133. Weston Road flows - Drake. | -Rap | -83 |
| 134. Angelz and demonz - A-Reece. | -Hip Hop | -75 |
| 135. Gone till Novemeber -Rod Wave. | -Rap | -83 |
| 136. Ballin' - Roddy rich. | -Rap | -97 |
| 137. Bigger than me - A-Reece. | -Hip Hop | -140 |
| 138. Hey Ya! - OutKast | -Hip Hop | -80 |
| 139. Kill Em with Kindness - Selena Gomez | -Pop | -120 |
| 140. Paint the Town Red - Doja Cat | -Pop | -100 |
| 141. Iris - The Goo Goo Dolls | -Pop Rock | -156 |
| 142. You Need to Calm Down - Taylor Swift | -Pop | -85 |
| 143. Could Have Been Me - The Struts | -Pop Rock | -80 |
| 144. Kea Ho Rata Jesu - Benjamin Dube | | |
| 145. Jesu 'Lidwala - Lusanda Beja | | |
| 146. I Long To Worship You - Parachute Band | -Gospel | -109 |
| 147. In The Name - Lakewood Music (Kim Walker- | -Gospel | -80 |
| Smith) | -Worship | -94 |
| 148. Alikho Ithemba - Sechaba | -Worship | -148 |
| 149. Up where we belong - Bebe Winans & Cece | -Gospel | -120 |
| Winans. | -Gospel | -61 |

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|---|---|---|
| 150. Immnandi Lento - Mellow and Sleezy, Sjavasdadeejay & Titom. | -Amapiano | -112 |
| 151. Fatela - Aymos & Ami Faku. | -Amapiano | -112 |
| 152. Life worth living- Majid Jordan. | -R&b | -140 |
| 153. Ojos Azules- Blessed, Peso Pluma & SOG. | -Pop | -98 |
| 154. Be my summer- Snoh Alegra. | -R&b | -105 |
| 155. Suka- Kyanyisa and Tyler Icu. | -Amapiano | -112 |
| 156. Best Days - Alessia Cara. | -Pop | -78 |
| 157. Those eyes - sorry IDK. | -Lo-Fi | -180 |
| 158. Tzama - Yoni Glassman. | -Pop | -96 |
| 159. Ghost - Zoe Wees. | -Pop | -80 |
| 160. Staying up late - Bazzi. | -Pop | -86 |
| 161. Simple things - Terica Marie. | -R&B | -130 |
| 162. Free this feeling - Spring Gang. | -R&B | -143 |
| 163. You'll be fine - Spring gang. | -R&B | -92 |
| 164. Easy on me - Adele. | -Pop | -142 |
| 165. Best part - Daniel Caesar. | -R&B | -75 |
| 166. Imagine us there - Spring gang. | -R&B | -81 |
| 167. Goodbye Fear: Moment - Todd Galberth and Dr. Dharius Daniels. | | |
| 168. Yebo Nkosi (Jesus is enough)- Xolly Mncwango. | -Gospel | -124 |
| 169. Jireh - Elevation worship & Maverick city music. | -Gospel | -120 |
| 170. Shall not want - Maverick city music & Elevation worship. | -Worship<br>-Worship | -140<br>-142 |

## Appendix N

*Genre Descriptions (From FMA & Chosic):*

The following descriptions are provided by the platform Chosic and Free Music Archive (FMA).

Pop: is a genre that blends catchy melodies, upbeat rhythms, and relatable lyrics to create songs that are easy to sing along to and appeal to a wide audience (Chosic, 2024):

R&B: is a genre of music that blends elements of soul, funk, and pop. It is characterized by smooth vocals, melodic hooks, and a strong emphasis on rhythm and groove (Chosic, 2024)

Gospel: is characterized by its uplifting and inspirational lyrics, often referencing Christian beliefs and values. Gospel music typically features powerful vocals, harmonies, and instrumentation such as piano, organ, and drums (Chosic, 2024).

Worship: is a genre of Christian music that is designed to inspire and uplift listeners through lyrics that focus on faith, hope, and love (Chosic, 2024).

Hip Hop: is characterized by its rhythmic beats, spoken word lyrics, and electronic instrumentation (Chosic, 2024).

Lo-Fi: is a genre characterized by its raw and unpolished sound quality, often recorded on low-quality equipment or in a DIY setting. It typically features distorted guitars, lo-fi production techniques, and introspective lyrics (Chosic, 2024).

Rap: is characterized by rhythmic and rhyming speech, often accompanied by beats and electronic instrumentation. The lyrics often address social and political issues, personal experiences, and boastful claims (Chosic, 2024).

Classical: is a genre that is characterized by its formal structure, use of orchestral instruments, and emphasis on melody and harmony. It is often associated with the works of composers such as Bach, Mozart, and Chopin, who are known for their intricate compositions, technical skill, and emotional depth (Chosic, 2024).

Pop rock: is a genre that combines elements of pop music with rock music, resulting in catchy and upbeat songs with guitar-driven melodies and energetic rhythms. It often features anthemic choruses and relatable lyrics that speak to the struggles and triumphs of everyday life (Chosic, 2024).

Jazz is a genre that is characterized by improvisation, syncopated rhythms, and a strong emphasis on individual expression. Jazz has a rich history and has evolved over time, incorporating elements of blues, swing, bebop, and fusion (Chosic, 2024).

Amapiano: is a popular South African music genre that emerged in the early 2010s. It is characterized by its unique fusion of deep house, jazz, and kwaito rhythms. The genre is known for its catchy melodies, heavy basslines, and soulful vocals (Chosic, 2024).

Metal: is a genre that is characterized by its heavy and aggressive sound, often featuring distorted guitars, fast-paced drumming, and powerful vocals. It has roots in rock and roll but has evolved over the years to include a wide range of sub-genres, including thrash, heavy, and power metal (Chosic, 2024).

Country: is a genre that is characterized by its storytelling lyrics, twangy guitars, and use of fiddles and banjos. It often focuses on themes of love, heartbreak, and small-town life (Chosic, 2024).

Indie pop: is a genre that blends elements of indie rock and pop music. It often features introspective and emotional lyrics, with a focus on personal experiences and relationships. The music is characterized by its catchy melodies, dreamy instrumentation, and lo-fi production (Chosic, 2024).

Neo soul: is a genre of music that blends elements of soul, R&B, and hip-hop with a modern twist. It often features smooth vocals, live instrumentation, and socially conscious lyrics that explore themes of love, identity, and spirituality (Chosic, 2024).

Afro soul: is a genre that blends traditional African rhythms and melodies with contemporary soul music. It is characterized by its smooth and soulful vocals, accompanied by percussion instruments such as drums and shakers (Chosic, 2024).

Rock: is a genre characterized by its heavy use of electric guitars, drums, and bass. It often features powerful vocals and lyrics that touch on themes of rebellion, love, and angst (Chosic, 2024).

House: is a genre of electronic dance music  that is characterized by its repetitive 4/4 beat, synthesized melodies, and use of samples and drum machines (Chosic, 2024).

Grime: is a British music genre that emerged in the early 2000s. It is characterized by fast-paced, aggressive beats and lyrics that often address social and political issues (Chosic, 2024).

Indie folk: is a genre that blends traditional folk music with contemporary indie rock elements. It often features acoustic instruments, such as guitars and banjos, and incorporates introspective lyrics that explore themes of love, loss, and self-discovery (Chosic, 2024).

Indie hip hop: is a subgenre of hip hop music that is characterized by its experimental and alternative approach. It often features unconventional beats, introspective lyrics, and a DIY ethos (Chosic, 2024).

Instrumental: is characterized by its lack of lyrics and its focus on instrumental elements such as melody, harmony, rhythm, and timbre (FMA, 2024).

Tropical house: is a subgenre of electronic dance music that incorporates elements of tropical and Caribbean sounds, such as steel drums and marimbas, with deep house beats and synths. It often features laid-back, summery vibes and catchy melodies (Chosic, 2024).

## Appendix O

*Experiment Playlists:*

Researcher Selected Playlist (Playlist B):

- Carnival of the Animals: The Swan by Camille Saint-Saëns, Isata Kanneh-Mason, Jeneba Kanneh-Mason, Sheku Kanneh-Mason (65 BPM).
- Ave María (Arr. Vikingur Ólafsson) – Upright Piana by Sigvaldi Kaldalons, Vikingur Ólafsson (101 BPM).
- 6 Consolations, S. 172: No. 3 in D-Flat Major (Lento, Placid) by Franz Liszt, Daniel Barenboim (75 BPM)
- Experience by Ludovico Einaudi, Daniel Hope, I Virtuosi Italiani (92 BPM).
- Full Moon (Arr. Lewin for Guitar) by Ludovico Einaudi, Miloš Karadaglić (98 BPM).

Ambient Sound Playlist (Playlist C):

- Fjällbäck by In the River (Sound FX) (79 BPM).
- Forest River by Wild Ambience (94 BPM).
- Blissful Brook (Rain) by NatuREM (176 BPM).
- Tha Chin (River) by NatuREM (78 BPM).
- Waterfall Creek by Natural Waters (120 BPM).