



universität
wien

MASTERARBEIT / MASTER'S THESIS

Titel der Masterarbeit / Title of the Master's Thesis

„The B Side of Life – The difference between fans of heavy music and non-fans in alcohol use, personality risk for substance misuse, psychological distress, and musical engagement under the consideration of gender “

verfasst von / submitted by

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angestrebter akademischer Grad / in partial fulfilment of the requirements for the degree of
Master of Science (MSc)

Wien, 2023 / Vienna 2023

Studienkennzahl lt. Studienblatt /
degree programme code as it appears on
the student record sheet:

UA 066 840

Studienrichtung lt. Studienblatt /
degree programme as it appears on
the student record sheet:

Masterstudium Psychologie UG2002

Betreut von / Supervisor:

Mag. Dr. Reinhold Jagsch

Danksagung

Als Erstes danke ich Herrn Mag. Dr. Reinhold Jagsch für seine kompetente Betreuung. Seine ruhige, ausdauernde und freundliche Art, auf meine zahlreichen Fragen einzugehen und seine hervorragenden Vorschläge während der Planung haben diese Arbeit erst ermöglicht.

Ein weiterer Dank gebührt den Online-Magazinen *rockhard.de*, *metalinside.ch* und *oxfanzine.de* für die freundliche Unterstützung bei der Verteilung meines Fragebogens.

Allen TeilnehmerInnen an dieser Studie spreche ich zudem meine tiefste Dankbarkeit aus. Ohne sie wäre diese Arbeit nicht möglich gewesen. Das Maß an Interesse zu meiner Studie hat meine Erwartungen weit übertroffen.

Herzlichen Dank auch an die TEWA-Crew. Es war mir eine Freude, die Studienabschlussphase in dieser herausfordernden Zeit gemeinsam mit euch bewältigen zu dürfen. Die gegenseitige Beratung und Unterstützung hat maßgeblich zur Fertigstellung der Masterarbeit beigetragen.

Meinen FreundInnen, Andre, Max, Lukas und Tamara möchte ich ein ganz besonderes *Dankeschön!* aussprechen. Euren fachlichen und moralischen Beistand weiß ich ungemein zu schätzen. Ohne euch wäre ich nicht so weit gekommen.

Ein weiterer spezieller Dank geht an meine Familie. Eure bedingungslose, liebevolle Unterstützung über all die Jahre ist unbezahlbar. Danke, dass ihr an mich und meinen Weg glaubt.

Und zuletzt danke ich dir, Consi. Für alles, für immer.

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Abstract (English)

Background. Heavy music is an aggressive style of music that has been linked to heightened substance use and symptoms of psychological distress among fans. Still, it is debated whether heavy music fans are a risk group for substance misuse and symptoms of psychological distress. Within this debate, relevant personality traits which could explain a heightened risk for substance misuse have so far been overlooked. The influence of gender needs further investigation as well. While heavy music fans consistently claim this musical style to be beneficial to their mental health, the musical engagement of heavy music fans has not been examined in quantitative research before. This study aimed to test whether heavy music fans differ compared to non-fans in ratings of alcohol consumption, personality risk for substance misuse, psychological distress, and healthy/unhealthy musical engagement while considering the gender of participants. Consequently, an assessment was made of whether heavy music fans can indeed be considered a risk group for the examined categories. *Method.* A cross-sectional online survey was conducted. The survey presented to the sample ($N = 855$) consisted of a socio-demographic questionnaire, a self-prepared heavy music questionnaire, the Alcohol Use Disorders Identification Test (AUDIT), the Substance Use Risk Profile Scale (SURPS), the Brief Symptom Inventory (BSI-53), and the Healthy-Unhealthy Uses of Music Scale (HUMS). Multiple two-factorial analyses of variance were utilized to measure the differences in means between fans and non-fans and male and female participants, as well as to determine possible interaction effects between fandom and gender. Lastly, the correlation between both the healthy and unhealthy scale of the HUMS and depression was examined. *Results.* Heavy music fans reported significantly higher ratings of impulsivity (SURPS) and paranoid ideation (BSI-53) with small effect sizes. In addition, they showed significantly higher healthy musical engagement (HUMS) with a medium effect size. Differences between fans and non-fans for the remaining 14 scales were non-significant. No interaction effects between fandom and gender were found. Concerning genre-related fan group comparisons, the heavy electro fan group exhibited significantly higher ratings than all other fan groups in sensation seeking (SURPS), overall psychological distress (GSI, BSI-53), and unhealthy musical engagement (HUMS). The mean score of psychological distress herein indicates clinical conspicuity for this group. Heavy electro fans and punk fans additionally reported higher alcohol consumption with ratings suggesting harmful and hazardous consumption. Ratings of impulsivity were higher for heavy electro fans as well with a significant difference to metal fans. Finally, the healthy scale of the HUMS significantly and negatively correlated with depression, whereas the unhealthy scale significantly and positively correlated with depression. *Conclusion.* Appraising heavy music

fans to be a risk group for the tested main categories is incongruent to the results of this thesis. This is apparent by the lack of significant differences between ratings of fans and non-fans throughout most of the tested scales. Moreover, the fact that heavy music fans reported healthier musical engagement than non-fans does not support a problem-oriented approach to the influence of heavy music. Further investigations concerning the higher ratings of impulsivity and paranoid ideation of fans are needed, nonetheless. In contrast, heavy electro fans were found to be at a particular risk for heightened scores for scales of all main categories. This highlights the necessity for a new focus of investigation on this subgroup of fans in subsequent research. For the HUMS, the findings further validate its use to assess proneness for depression by music use for both scales.

Keywords: Heavy music, rock, punk, metal, electro, hip-hop, alcohol, substance use, personality, psychological distress, musical engagement, AUDIT, SURPS, BSI-53, HUMS

Abstract (Deutsch)

Hintergrund. Heavy Music ist ein aggressiver Musikstil, der mit erhöhtem Substanzkonsum und Symptomen psychischer Belastung von Fans in Verbindung gebracht wurde. Es bleibt jedoch umstritten, ob Fans von Heavy Music tatsächlich als eine Risikogruppe für Substanzmissbrauch und Symptome psychischer Belastung zu betrachten sind. Zudem wurden relevante Persönlichkeitsmerkmale, die ein erhöhtes Risiko für Substanzmissbrauch von Fans erklären könnten, in der Debatte bisher übersehen. Auch der Einfluss des Geschlechts bedarf weiterer Forschung. Obwohl Fans von Heavy Music häufig angeben, dass dieser Musikstil sich positiv auf ihre psychische Gesundheit auswirkt, wurde das gesundheitsbezogene Musikverhalten von Fans von Heavy Music bisher noch nicht in quantitativen Studien erhoben. In dieser Studie wurde untersucht, ob sich Fans von Heavy Music im Vergleich zu Nicht-Fans in Bezug auf Alkoholkonsum, persönlichkeitsbezogenes Risiko für Substanzmissbrauch, psychische Belastung sowie ihrem gesunden oder ungesunden Musikverhalten unterscheiden, unter Berücksichtigung des Geschlechts. Folglich wurde beurteilt, ob Fans von Heavy Music tatsächlich als Risikogruppe für die untersuchten Kategorien betrachtet werden können.

Methode. Es wurde eine Querschnittstudie in Form einer Online-Befragung durchgeführt. Der Fragenkatalog, der der Stichprobe (N = 855) vorgelegt wurde, bestand aus einem soziodemografischen Fragebogen, einem selbst erstellten Fragebogen zu Heavy Music, dem Alcohol Use Disorders Identification Test (AUDIT), der Substance Use Risk Profile Scale (SURPS), dem Brief Symptom Inventory (BSI-53) und der Healthy-Unhealthy Uses of Music Scale (HUMS). Mehrere zweifaktorielle Varianzanalysen wurden durchgeführt, um die Unterschiede der Mittelwerte zwischen Fans und Nicht-Fans sowie männlichen und weiblichen TeilnehmerInnen zu messen und um mögliche Interaktionseffekte zwischen Fandom und Geschlecht zu ermitteln. Zusätzlich wurden die Unterschiede zwischen genrebezogenen Fangruppen von Heavy Music analysiert. Schließlich wurde der korrelative Zusammenhang zwischen der gesunden und der ungesunden Skala des HUMS und Depression untersucht.

Ergebnisse. Fans von Heavy Music zeigten signifikant höhere Werte für Impulsivität (SURPS) und paranoide Gedanken (BSI-53) mit kleinen Effektstärken. Zusätzlich zeigten sie signifikant höhere Werte für gesundes Musikverhalten (HUMS) mit einer mittleren Effektstärke. Für die übrigen 14 getesteten Skalen ergaben sich keine signifikanten Unterschiede. Es wurden keine signifikanten Interaktionseffekte zwischen Fandom und Geschlecht festgestellt. Bezüglich der genrebezogenen Fangruppenvergleiche wies die Gruppe der Heavy Electro Fans signifikant höhere Werte als alle anderen Fangruppen für Sensation Seeking (SURPS), psychischer Belastung (GSI, BSI-53) und ungesundem Musikverhalten (HUMS) auf. Der Mittelwert der

psychischen Belastung dieser Gruppe indiziert zudem eine klinisch auffällige Symptomlast. Heavy-Electro-Fans und Punk-Fans gaben darüber hinaus einen erhöhten Alkoholkonsum an, wobei die Werte auf ein schädliches Konsumverhalten schließen lassen. Die Werte zu Impulsivität waren bei den Heavy-Electro-Fans ebenfalls erhöht, mit einem signifikanten Unterschied zu Metal-Fans. Schließlich korrelierte gesundes Musikverhalten signifikant und negativ mit Depression, während ungesundes Musikverhalten signifikant und positiv mit Depression korrelierte. *Schlussfolgerungen.* Die Einschätzung, dass Fans von Heavy Music eine Risikogruppe für die untersuchten Kategorien darstellen, steht im Widerspruch zu den Ergebnissen dieser Arbeit. Das zeigt sich daran, dass für den Großteil der getesteten Skalen keine signifikanten Unterschiede zwischen den Werten von Fans und Nicht-Fans festgestellt werden konnten. Dadurch dass Fans von Heavy Music angaben, Musik gesünder zu nutzen als Nicht-Fans, wird ein problemorientierter Ansatz zum Einfluss von Heavy Music anhand der Ergebnisse dieser Studie ebenfalls nicht unterstützt. Dennoch sind weitere Untersuchungen zu den höheren Werten für Impulsivität und paranoide Gedanken bei Fans notwendig. Im Gegensatz dazu wurde festgestellt, dass Heavy-Electro-Fans ein besonderes Risiko für erhöhte Werte für alle Skalen der psychischen Belastung aufwiesen. Dies unterstreicht die Notwendigkeit eines neuen Untersuchungsschwerpunktes auf diese Untergruppe von Fans in weiterer Forschung. Bezüglich des HUMS zeigen die Ergebnisse die Nützlichkeit der Verwendung des Fragebogens zur Bewertung der Depressionsanfälligkeit durch Musiknutzung für beide Skalen.

Schlüsselwörter: Heavy Music, Rock, Punk, Metal, Elektro, Hip-Hop, Alkohol, Substanzkonsum, Persönlichkeit, psychische Belastung, Musikverhalten, AUDIT, SURPS, BSI-53, HUMS

I Theoretical Part

Introduction

Heavy music, which is oftentimes also referred to as *hard* or *extreme* music, is an aggressive and intense style of music that is typically characterized by high levels of distortion, compression, harsh vocals, and high levels of energy and aggression (Morris, 2015; Mynett, 2017; Ollivier, Goupil, Liuni, & Aucouturier, 2019; Schwartz & Fouts, 2003; Sharman & Dingle, 2015). It usually encompasses rock, metal, and punk as its main subgenres and is famous for its violent, non-conformant, and provocative image and themes of drug use, hostile and depressive thoughts, or even suicide, which has often been absorbed and reinforced by mass media (Baker & Bor, 2008; Ollivier et al., 2019; Shafron & Karno, 2013). Famous examples of the appearance of heavy music in the context of these clinically relevant aspects in mass media are the drug-related deaths of Kurt Cobain (Jobes, Berman, O'Carroll, Eastgard, & Knickmeyer, 1996) and GG Allin (Krovatin, 2019), as well as the examples of Judas Priest and Ozzy Osbourne being blamed for adolescent violence and suicide in the 1990s (Weinstein, 2000). In fact, the image of heavy music fans being at risk for drug abuse, mental health issues, and aggressive behavior was not only displayed by public media. Scientific research has also dealt with the question, if fans of heavy music are a potential risk group for alcohol misuse, drug misuse, and various symptoms of psychological distress.

However, existing research is heterogeneous in terms of definitions of heavy music and recent trends of *heavy electro* and *heavy hip-hop* genres are being overlooked. Moreover, while actual substance use has previously been thoroughly examined, relevant personality traits that could explain a heightened risk for substance misuse of heavy music fans have vastly been omitted. These personality traits are *hopelessness*, *anxiety sensitivity*, *impulsivity*, and *sensation seeking*. They have consistently been linked to heightened and harmful drug consumption and are part of the model of personality risk for substance misuse (Woicik, Stewart, Pihl, & Conrod, 2009). Concerning psychological distress, only symptoms of *depression*, *anxiety*, *hostility*, and *psychoticism* have been debated. No other frequently prevalent symptom clusters of psychological distress have found attention yet. Thus, the clinically relevant symptoms of *somatization*, *obsession-compulsion*, *interpersonal sensitivity*, *phobic anxiety*, and *paranoid ideation*, which have been argued to be of pivotal importance for clinical and sub-clinical assessments of psychological distress (Franke & Derogatis, 2000), are to be addressed to enable more holistic assessments regarding the psychological distress of fans. Moreover, while a problem-oriented approach of public media and scientific research towards the topic of heavy music can be observed (Lozon & Bensimon, 2014; North & Hargreaves, 2006), it is still highly debated, whether heavy music fans truly are at risk for the illustrated dimensions.

Despite the existing problem-orientated approach on heavy music, fans consistently reported the music to positively affect their mental health and to be of central importance for coping with individual problems in qualitative studies (Ahmadi, 2009; Rowe, 2017; Rowe & Guerin, 2018; Thompson, Geeves, & Olsen, 2019). In quantitative research, modern approaches generally contemplate such healthy outcomes of music listening, while also considering possible unhealthy outcomes, leading to the construction of the *Healthy-Unhealthy Music Scale* (HUMS) by Saarikallio, Gold, and McFerran (2015). It assesses *healthy* and *unhealthy musical engagement*. While there are clear indications of a healthy musical engagement for fans of heavy music, no quantitative data has been provided to this day. Hence, it remains unknown, whether heavy music fans tend to use music in a healthier way than non-fans.

Under the consideration of the illustrated state of research, the main goal of this study was to examine possible differences between fans and non-fans of heavy music, within the debated and omitted dimensions of *alcohol consumption*, *personality risk for substance misuse*, *psychological distress* and *musical engagement* while considering possible gender differences. The aim was to further assess whether heavy music fans truly represent a risk group for these dimensions and to provide new data on musical engagement. The second goal was to investigate possible differences between genre-related heavy music fan groups, considering modern trends and developments, especially of the electro and hip-hop scene. Lastly, a contribution to the validation of the novel HUMS is provided as well. In the first chapter of this thesis, definitional elaborations of the term *heavy music* are discussed and determined. The following four chapters deal with definitions, gender differences, and the heavy music related state of research for alcohol consumption, personality risk for substance misuse, psychological distress, and musical engagement, respectively. In the sixth chapter, the aim of this thesis is stated in more detail. Subsequently, the study design, the sample size, and the applied screening instruments are described in chapter seven. Research questions and resulting hypotheses, as well as applied statistical analyses are also part of this chapter. In the eighth chapter, the results of this study are illustrated. Within the last, ninth chapter of this thesis, these results are critically discussed and an outlook for subsequent research and therapeutical practice is provided, with a special regard to possible approaches towards *heavy music therapy*.

1. Heavy music

This chapter includes elaborations on the definition of heavy music, the relevant sub-genres included in this study, the demarcation to the term *problem music* as well as considerations on the correct measurement of heavy music fandom in quantitative research. Finally, gender differences within the heavy music scene are briefly mentioned.

1.1 Defining heavy music

The term *heavy music* is an umbrella term that has been utilized to describe various music genres and attributes that are perceived to be heavy, aggressive, or extreme to the listener by multiple authors (Colley, 2008; Esfandiari & Mansouri, 2014; Schwartz & Fouts, 2003). In contemporary research, this term has found different names outside of heavy music, such as *hard and heavy music* (Ahmadi, 2009), *intense* and/or *rebellious music* (George, Stickle, Rachid, & Wopnford, 2007; Rentfrow & Gosling, 2003), *extreme music* (Ollivier et al., 2019; Sharman & Dingle, 2015) or simply *rock* (Delsing, ter Bogt, Engels, & Meeus, 2008; Mulder, ter Bogt, Raaijmakers, & Vollebergh, 2007). Despite these differences in terminology, the common quality of these terms is that they very consistently include the genres of rock, punk rock, and metal as their main genre components. Moreover, even though the included sub-genres of these umbrella terms are not identical across authors, factor analyses, which have been conducted to define main factors of music preference, revealed a considerable degree of convergence for rock, punk rock and metal across studies (Fricke & Herzberg, 2017; Rentfrow, Goldberg, & Levitin, 2011; Rentfrow & Gosling, 2003). Hence, a factor defined by rock, punk rock, and metal, which will be consistently referred to as heavy music in this thesis, can be considered a robust factor of music preference (Rentfrow et al., 2011).

The fact that the definition of heavy music is backed by its genre-based description makes the scientific discussion of the subject possible, but specific musical attributes of heavy music need to be defined to clarify the term, since the genres of rock, punk rock, and metal are very broad and encompass a great deal of sub-genres. Therefore, the question *what makes music heavy?* needs to be addressed. While studies are rarely concerned with providing attribute-based definitions for heavy music, pivotal attributes have been named.

A central work on this topic is a manual by Mark Mynett (2017), who is a recording-mixing-mastering engineer and senior lecturer in Music Technology and Production at the University of Huddersfield, and also acquired the world's first PhD in Contemporary Metal Music Production (Mynett, 2017). In his book titled *Metal Music Manual: Producing, Engineering, Mixing, and Mastering Contemporary Heavy Music*, which includes contributions of famous heavy music producers who worked on albums of bands such as Slipknot, Slayer,

Parkway Drive, Meshuggah, and Behemoth, he names *distortion* (especially for guitars), *fast tempi* (defined by a high beats per minute count in consideration of utilized subdivisions), *perceived loudness* (achieved by augmenting low and high frequencies of the audio spectrum), *compression*, *weight*, *size*, *proximity*, *density*, *power*, *aggression*, *energy*, *emotion*, and *intensity* to be vital factors of heavy music production. He also mentions an *aggressive/distorted vocal style* to be common, including high screams and low growls.

While explaining all technical components is beyond the scope of this thesis, heavy music thus can be defined as a highly energetic and fast music style that employs high levels of distortion and a targeted use of compression to be perceived as aggressive and intense. This compendious definition has in its core been applied by multiple authors studying heavy music (Morris, 2015; Ollivier et al., 2019; Schwartz & Fouts, 2003; Sharman & Dingle, 2015).

A last consideration that is to be made when applying this definition of heavy music is related to the inclusion of hard rock as opposed to simply rock. The overlaps between hard rock and relevant heavy music attributes are more pronounced, exemplified by aggressive vocals and more intense guitar distortion, whereas rock itself is composed of at least 238 sub-genres (Sonemic, 2022b), making the term imprecise. Since the definition of heavy music in this thesis is genre- as well as attribute-based, focusing on *hard* rock, punk rock, and metal as core genres of heavy music seems more appropriate.

1.2 Lyrical content of heavy music

An additional attribute of heavy music that is frequently considered is the unhinged, explicit, and dark lyricism, which is especially prevalent in metal music. Typical topics are (desire for) death, dystopia, (psychological) madness, sadness, fear, and violence (Cheung & Feng, 2021; Czedik-Eysenberg, Wiczorek, & Reuter, 2019). Oksanen (2011) additionally reports themes of severe alcohol misuse in rock and metal lyrics while themes of depression, hopelessness, and suicidality have a dedicated heavy music sub-genre called *Depressive Suicidal Black Metal* (Coggins, 2019), with band names such as *Make a Change... Kill Yourself* (Bandcamp, 2022). These contents highlight the necessity to investigate whether fans of heavy music are indeed a potential risk-group for substance misuse and psychological distress, independent from heavy music fandom being cause or effect of the explicit lyrical expression.

1.3 Considering heavy hip hop and heavy electro genres

Hard rock, punk rock, and metal represent the core of heavy music genres as presented above. However, recent trends in the heavy music scene suggest the necessity to consider more extreme and aggressive hip-hop and electro genres as well, since some hip-hop and electro artists successfully incorporate more and more heavy music attributes into their music as

discussed below. These genres will be termed heavy hip-hop and heavy electro in this thesis due to their attributional intersections with heavy music.

For hip-hop, rateyourmusic.com, one of the largest music databases and communities online, defines hardcore hip-hop, which itself is a sub-genre of hip-hop that further includes genres like horrorcore, gangster rap and trap metal, as: “Hip Hop music characterized by confrontation and aggression, whether in the lyricism, vocal delivery, hard beats, heavy production, or any combination thereof” (Sonemic, 2022a, n.p.). While the parallels to the previously mentioned relevant attributes of heavy music are apparent, this stream of hip-hop music can hardly be considered niche, due to its high current popularity. Leading bands of these genres such as Ghostemane, Scarlxrd, and City Morgue each can record between roughly 5.5 million (Ghostemane) and 1.15 million (City Morgue) monthly listeners on Spotify and hold listening counts for single tracks in the nine- and ten-digit range, indicating a relevant trend for heavy music (Spotify-Group, 2022). Additionally, while being rooted in hip-hop, these artists incorporate styles of rock, hardcore punk, and metal into their music and tour with bands of these genres (Cline, 2019; Jones, 2019; Law, 2020; Winkie, 2019).

For electronic music, smaller but relevant trends of electro artists that blend their sound with elements of heavy music genres have been part of the heavy music scene as well. An example is the emergence of the dark synthwave/darksynth genre around the year 2012, with leading artists like Carpenter Brut and Perturbator utilizing metal, industrial, and (post) punk influences for a heavier approach to electronic music (Classic Pop, 2018; Revolver-Magazine, 2021; Soundsright, 2020). While this trend is not as popular as recent heavy hip-hop movements based on listening counts on Spotify, the bands Carpenter Brut and Perturbator still hold listening counts for single tracks around the 20 million mark (Spotify-Group, 2022).

Outside of electro artists incorporating stylistic approaches from rock and metal genres, electronic music itself has a history of forming an increasing number of extreme sub-genres that are characterized by high levels of aggressiveness and speed. This evolution found its origin within rebellious techno movements in the early 1990s in Europe, leading to the concurrent development of hardcore electronic music (Hardcore Electronic Dance Music/EDM), which is not to be mistaken with the genre of hardcore punk (Future Music, 2021; Ludewig, 2014; St John, 2010). Hardcore (EDM) itself is a rather broad term that is closely linked with House as well as Techno and further deviates into a variety of extremely fast-paced and energetic sub-genres that utilize high levels of distortion and beat per minute counts in the 300bpm range (e.g., Terrorcore) as well as harsh/distorted vocals (e.g., Aggrotech), depending on the sub-genre (Future Music, 2021; Sonemic, 2022b). The extreme and experimental nature of

electronic micro-genres arguably finds its peak in the genre of noise music, which is described as an “experimental genre that strays away from conventional music structure, tonality, and composition and – as the name implies – consists predominantly of noise” (Sonemic, 2022c, n.p.), and its sub-genre, named power electronics, described as “waves of feedback, screeching analog synthesizers, and harsh, screamed vocals.” (Sonemic, 2022d, n.p.). The apparent overlaps between the attributes of heavy hip-hop and heavy electronic music sub-genres and the afore-mentioned relevant attributes of heavy music, as well as the abundance of heavy sub-genres of hip-hop and especially electronic music, make the consideration of these extreme hip-hop and electro genres in this study, which specializes in heavy music, necessary. Despite their illustrated relevance, heavy hip-hop and heavy electro genres have been widely omitted in literature on the topic of heavy music.

1.4 Demarcation to problem music

While this study appears to be the first to include *heavy* hip-hop and *heavy* electro genres when considering heavy music, genres of rock, punk rock, metal, hip-hop, and electronic music have been collectively studied under the term *problem music* before (Bodner & Bensimon, 2015; Lozon & Bensimon, 2014; Negut & Sarbescu, 2014; North & Hargreaves, 2006). The naming of this term, however, is exclusively related to the supposed problematic influences of these music genres on the general population, in particular on the listening youth in America, and does not in itself imply any specifications with regard to attributes that this music combines sonically (North & Hargreaves, 2006.) Moreover, the name of the term is strongly influenced by media coverage concerning music affiliated crimes and delinquent behavior in the USA and suggests, by the nature of its own wording, a negative influence on the listener (Bodner & Bensimon, 2015; Lozon & Bensimon, 2014; Negut & Sarbescu, 2014). Yet, in contemporary research, both negative and positive effects of problem music on the listener have been found, making exclusively negative assumptions towards these genres unsubstantiated (Lozon & Bensimon, 2014). Lozon and Bensimon (2014) who conducted a meta review on the influence of problem music on the listener, analyzing 92 studies on the topic, concluded that because of the positive and negative influences of this music, the expression problem music is not sustainable in the future and should be changed. This makes the utilization of this term inappropriate for this thesis. Moreover, this thesis uses the term heavy music to summarize the musical styles of hard rock, punk rock, metal, heavy hip-hop, and heavy electro based on their attributional similarities, which is an approach that goes beyond the characteristics of problem music. Problem music considers hip-hop and electro in a broader sense and does not factor in heavy styles of these genres or any attributional intersections.

1.5 Assessing heavy music fandom

Assessing heavy music fandom is necessary to make comparisons between a heavy music fan group and a non-fan group. Quantitative research on the topic is usually focused on doing so by employing an evenly graded item for each relevant genre at hand, requiring the participant to rate their individual liking of each genre and thus, focusing exclusively on assessing heavy music preference (e.g., Colley, 2008; Miranda & Claes, 2009; Rentfrow et al., 2011). The limitation of this approach is due to musical genres oftentimes being only broadly defined, which makes any terminology of heavy music exclusively based on genre description imprecise (Rentfrow et al., 2011; Weinstein, 2011). This is especially relevant for broad genre descriptions such as *rock*, which could be counterbalanced by utilizing a selection of very specific heavy music sub-genres. This has been realized to some degree in this thesis by focusing on *hard* rock instead of rock and by focusing on *heavy* sub-genres of hip-hop and electro. However, this method has its limits as well. It requires participants to be fully aware of the detailed characteristics of each genre to make accurate assessments towards their listening preferences. This can be hard especially for older generations or individuals that simply enjoy heavy attributes of music and do not care about genre specifics and labels (Rentfrow et al., 2011). Seeing that 160,588 bands are currently listed in the Metal-Archives (Encyclopaedia Metallum, 2022) which span over a plethora of different sub-genres for metal alone, any selection of specific genres irrevocably entails a certain degree of arbitrariness. Moreover, taking too many sub-genres into account can lead to problems of ecology, as the extent of the questionnaire simply becomes too long, leading to a higher dropout rate of participants. In this regard, Weinstein (2011) strongly advises to avoid hyper specialization towards sub-genres of heavy music. She argues that there is a never-ending debate inside the scene of what is considered heavy and what is not and since there is a danger of limiting the knowledge gained by a survey that is too specific and only addresses technically versed individuals of the heavy music scene.

To solve this issue, within this study it deemed to be necessary to firstly allow the participants to self-evaluate whether they consider themselves a fan of heavy music or not. This takes into account the individual's understanding of what is considered heavy as well as the extent to which persons see themselves involved into heavy music fandom. Furthermore, in line with existing research on the topic, preference and hours listened per week for each relevant heavy music genre was assessed. The number of heavy music genres for this study was limited to hard rock, punk rock, metal, heavy hip-hop, and heavy electro as discussed above. Moreover, cultural affiliation was assessed, since social and cultural components of heavy music fandom

play a pivotal role for members of the scene (Rowe; 2017; Rowe & Guerin, 2018). Additionally, a question relating to overall music listening hours has been included to illustrate music listening hours of both fans and non-fans for descriptive data and one question asking for the favorite heavy music genre has been posed. This is necessary to separate the heavy music fan group into more specific, genre-related subgroups, which was required for statistical analyses. See chapter 7.3.2 for a more detailed description of the items included in the self-prepared questionnaire for heavy music fandom.

1.6 Heavy music and gender

Heavy music is frequently preferred to a greater extent by men and most heavy music fans and musicians are male (Colley, 2008; Griffin, 2012; Hutcherson & Haenfler, 2010; Mulder et al., 2007; Recours, Aussagel, & Trujillo, 2009; Rowe & Guerin, 2018; Weinstein, 2000).

1.7 Summary

Heavy music is an umbrella term for a style of music that is characterized by high levels of distortion, compression, harsh vocals and high levels of energy and aggression. Explicit lyrical content with topics of alcohol/drug misuse and psychological distress up to themes of death and suicidal ideation have shown to be decisive for heavy music as well. The relevant genres of heavy music in this study are *hard rock*, *punk rock*, *metal*, *heavy hip-hop*, and *heavy electro*, which factors in recent trends of the heavy music scene and attributional intersections of these genres. While these genres have already been considered in research in a broader sense under the name of problem music, this work distances itself from using this term because of its negative connotation and the inconsiderate inclusion of broader genres without attributional considerations. Lastly, it is noted that men are more represented within the heavy music scene than other genders.

2. Alcohol

This chapter gives an overview of consequences, classifications, sociodemographic data, and gender differences of alcohol consumption. The relation between alcohol consumption and heavy music is presented as well.

2.1 Consequences of alcohol consumption

Alcohol is an integral part of society in Austria and around the world due to the pleasant taste of various alcoholic beverages and the euphoric effect that can be achieved by consuming

this psychoactive substance (Kuntsche, Knibbe, Gmel, & Engels, 2005; Strizek & Uhl, 2020). Positive outcomes of alcohol consumption include mood enhancement, sociability, stress reduction, coping, and even health benefits for moderate drinkers, such as lower risk for cardiovascular disease (Gronbaek, 2009; Kuntsche et al., 2005; Peele & Brodsky, 2000). However, harmful levels of alcohol consumption have been linked to a large variety of serious health-related issues, such as cirrhosis of the liver, gastrointestinal cancers, psychosis, neurological diseases, and an elevated risk for cardiovascular diseases (Strizek, Gaiswinkler, Nowotny, Puhm, & Uhl, 2022). In addition, a comorbidity between alcohol dependence and various mental and behavioral disorders was found. Disorders due to psychoactive substance use, mood disorders, as well as neurotic, stress-related, and somatoform disorders account for the largest proportion of comorbid diagnoses (Strizek et al., 2022). Furthermore, the possibility of legal purchase of alcoholic beverages in all European countries promotes harmful consumption and thus the development of alcohol-related diseases and disorders (Bachmayer, Strizek, Hojni, & Uhl, 2021; WHO, 2018).

The severe physical and psychological consequences that are associated with problematic drinking behaviors and the availability of alcoholic beverages make harmful alcohol consumption a serious health-related issue of public concern. Moreover, it highlights the importance of investigating possible risk and protective factors for harmful alcohol consumption to set evidence-based preventive measures in the future.

2.2 Classifications of alcohol consumption

To classify alcohol consumption, internationally approved harmlessness and hazard thresholds for healthy adults have been defined which are in accordance with recommendations of the Health Education Council and have been supported by the World Health Organization (Bachmayer et al., 2021). According to this definition, harmless alcohol consumption is classified by a threshold of 24 grams of pure alcohol per day for men (roughly 0.6 liters of beer and 0.3 liters of wine) and 16 grams of pure alcohol per day for women (0.4 liters of beer and 0.2 liters of wine). Consumption that is classified as hazardous to health starts at a threshold of 60 grams of pure alcohol per day for men (roughly 1.5 liters of beer or 0.75 liters of wine) and 40 grams of pure alcohol per day for women (1 liter of beer and 0.5 liters of wine).

This classification is associated with six different alcohol consumption groups. These groups are *primary abstinent* (never or barely drinks), *secondary abstinent* (doesn't drink anymore), *individuals with low alcohol consumption* (below harmlessness threshold), *individuals with medium alcohol consumption* (between thresholds), *individuals with problematic alcohol consumption* (above hazard threshold), and *chronical alcoholics*

(Bachmayer et al., 2021). The category of *chronical alcoholics* includes individuals that can be classified as "alcohol dependent" by using ICD-11 diagnosis criteria. The diagnosis criteria of the ICD-11 requires that at least two of three central criteria persist over a period of at least twelve months but can also be made if the substance is used continuously (daily or almost daily) for at least one month. These three criteria are:

- (1) *impaired control* over alcohol use relating to the onset, quantity, and circumstances or cessation of use;
- (2) *increasing precedence* of alcohol use over other aspects of life, including maintenance of health, and daily activities and responsibilities, such that alcohol use continues or escalates despite the occurrence of harm or negative consequences;
- (3) *physiological features indicative of neuroadaptation to the substance*, including tolerance to alcohol, withdrawal symptoms and/or repeated use of alcohol or pharmacologically similar substances to prevent or alleviate withdrawal symptoms (Heinz, Gül Halil, Gutwinski, Beck, & Liu 2021; World Health Organization, 2019).

The *Alcohol Use Disorders Identification Test* (AUDIT), created by the WHO, is an appropriate and frequently used screening tool for assessing alcohol consumption based on self-assessment, as it considers hazardous and harmful alcohol use as well as dependency symptoms (Saunders, Aasland, Babor, de La Fuente, & Grant, 1993).

2.3 Sociodemographic data of alcohol consumption in Austria

Currently, the number of people who can be classified as *chronical alcoholics* makes up an estimated 5% of the total population of Austria (Bachmayer et al., 2021). This is an equivalent of approximately 365,000 people, of which 75% are men and 25% are women. A further 10% of the population shows *problematic alcohol consumption*, and 15% are estimated to be between the harmless and hazardous limits, with men being more strongly represented than women in all the categories above. Concerning harmless alcohol consumption, 5% of Austrians are estimated to be *primary abstinent*, 9% can be considered *secondary abstinent* and 57% show *low alcohol consumption*. Men are less represented in all categories of harmless alcohol consumption (Bachmayer et al., 2021).

2.4 Alcohol consumption and gender

Men are at greater risk for hazardous and harmful alcohol consumption as well as symptoms of dependency, as illustrated by the sociodemographic data in Austria. Outside of Austria, a meta-analysis by Erol and Karpyak (2015) confirmed that women consume less alcohol, are less likely to develop alcohol-related disorders, and are more likely to be abstinent compared to men. However, while men generally consume more alcohol, women are at greater

risk for physical, cognitive, and motor damage from smaller amounts of alcohol and women show signs of alcohol intoxication from less amounts of alcohol, compared to men (Ceylan-Isik, McBride, & Ren, 2010; Llamosas-Falcón et al., 2022; Nolen-Hoeksema, 2004).

2.5 Alcohol consumption and heavy music

Research on the topic of alcohol and heavy music is predominantly intertwined with assessments of overall substance use (alcohol *and* illicit drug use) and hard to separate, which is why the bulk of research on alcohol is covered within the following chapter (3.4). Nevertheless, this chapter gives a brief overview of studies that focus on alcohol consumption and heavy music.

Regarding alcohol abuse specifically, Oksanen (2012, 2013), who analyzed rock autobiographies, found alcohol addiction to be a serious issue among rock musicians, whereas Butkovic and Rancic Dopudj (2017), who examined drinking behaviors of classical and heavy metal musicians, could show that metal musicians consumed alcohol more often compared to the general population. Moreover, Lacourse, Claes, and Villeneuve (2001), found a positive relation between alcohol usage and the preference for heavy metal in a sample of 275 secondary school students. A possible explanation for the elevated alcohol use of heavy music musicians and fans is provided by self-medication hypothesis. According to this hypothesis, substances with sedative and anxiolytic effects like alcohol and other sedative drugs are consumed with the intent to cope with negative or stressful states, as they occur with psychological symptoms or disorders. This makes alcohol particularly attractive to individuals with internalizing disorders, such as anxiety and affective disorders or individuals with symptoms of depression and anxiety (Hoyer & Knappe, 2020). A study by Doak (2003) showed results that support the relevance of self-medication and coping on the topic of heavy music. In this study, individuals diagnosed with various psychiatric disorders preferred musical genres like rap/hip-hop, hard rock, heavy metal, and techno and stated to consume a multitude of different drugs, including alcohol, with the intent to relax, to elevate mood, to focus, and to escape reality.

2.6 Summary

Alcohol is a popular psychoactive substance due to the pleasant short-term effects of consumption and the possibility of legal purchase but is also related to serious psychological and physiological health hazards. While men consume more alcohol on average and are more prone to develop alcohol-related diseases and disorders, women develop sequelae of alcohol consumption at lower consumption rates. This makes alcohol a serious health-related issue for both genders. Contemporary research additionally suggests the preference for heavy music to be a possible risk factor for elevated alcohol consumption, outside of gender. Due to its

availability, the widespread consumption, and social relevance in European cultures, alcohol consumption is directly assessed within this study in the attempt to replicate existing results on the relation between heavy music and alcohol, while considering the gender of participants.

3. Personality risk for substance misuse

The four personality traits of the *Substance Use Risk Profile Scale* (SURPS), their relevance for personality risk for substance misuse, and gender differences within these traits are described within this chapter. An overview of the state of research on personality risk for substance misuse and heavy music, as well as research on actual substance use and heavy music, is also provided.

3.1 Relevant personality traits for substance misuse

When considering motives for not just alcohol but illicit drug use and misuse, two critical motives are being commonly acknowledged by contemporary research. These motives are *positive reinforcement*, linked to the ability of many substances to enhance positive emotions, and *negative reinforcement*, which relates to the ability of some substances to attenuate or liberate from negative affective states such as stress or anxiety (Koob, 2004; Woicik et al., 2009). Furthermore, individual differences in personality play a relevant role in understanding motivations for substance use and there is evidence that certain personality traits increase the vulnerability for harmful alcohol and drug use and the development of dependence (Hoyer & Knappe, 2020; Woicik et al., 2009).

Combining these elements, the personality dimensions of hopelessness, anxiety sensitivity, impulsivity, and sensation seeking have been associated with positive and negative reinforcement and an elevated risk for substance use including alcohol and other illicit drugs (Krank et al., 2010; Woicik et al., 2009). These four personality dimensions also compose the SURPS, an assessment tool for personality risk for substance misuse, in which all four dimensions have shown to be differentially associated with specific patterns of substance use and misuse (Woicik et al., 2009). The SURPS has proven to be a valid assessment tool for identifying individuals vulnerable to substance abuse in clinical and subclinical samples while being independent of assessing actual drug use (Krank et al., 2010; Woicik et al., 2009). This suggests advantages in terms of social desirability over questionnaires directly asking about actual illicit drug use. Characteristics and individual associations towards substance use of these four dimensions are discussed below.

3.1.1 Hopelessness. In its core, the trait hopelessness is defined by negative views of the world, oneself, and the future (Hoyer & Knappe, 2020) and has found considerable attention in clinical psychology since at least the construction of the *Beck Hopelessness Scale* (Beck, Weissman, Lester, & Trexler, 1974). Considering the negative convictions concerning the self and the future, hopelessness is tightly linked to depression and is a major risk factor for suicidal ideation and suicide (Brown, Beck, Steer, & Grisham, 2000; Huen, Ip, Ho, & Yip, 2015; Kuo, Gallo, & Eaton, 2004; O'Connor, Connery, & Cheyne, 2000; Serafini et al., 2020). Regarding substance use, hopelessness is associated with alcohol and sedative drug use with the intent to cope with negative feelings (Krank et al., 2010; Woicik et al., 2009) and is related to negative reinforcement motives for substance use (Woicik et al., 2009).

3.1.2 Impulsivity. Impulsivity is a multidimensional construct that is not just regarded to be of central relevance for theories of personality but is part of the diagnosis of various mental and behavioral disorders, such as antisocial personality disorder, borderline personality disorder, ADHD, and bipolar affective disorder (Moeller, Barratt, Dougherty, Schmitz, & Swann, 2001). It describes the tendency to execute impulses and decisions without completely processing possible consequences, as well as a disregard for immediate negative and long-term consequences of one's behavior (Moeller et al., 2001; Woicik et al., 2009). Concerning substance use, impulsivity is associated with elevated overall substance use, including alcohol and cannabis (Krank et al., 2010; Lee-Winn, Mendelson, & Johnson, 2018; Verdejo-Garcia, Perez-Garcia, & Bechara, 2006), and has specifically been linked to frequent stimulant drug use (Woicik et al., 2009). Furthermore, the trait has been associated with positive as well as negative reinforcement motives for substance use (Woicik et al., 2009).

3.1.3 Anxiety sensitivity. Anxiety sensitivity is characterized by the fear of experiencing anxiety-related physical sensations since those are expected to induce negative consequences that go beyond the unpleasant feelings during an acute anxiety or panic attack (Hoyer & Knappe, 2020; Reiss, Peterson, Gursky, & McNally, 1986). These assumed consequences are centered around physical, social, and cognitive factors, such as a heart attack, negative social evaluation, and/or the fear of losing control over one's mind during feelings of anxiety, which can lead to a self-reinforcing circle of fear (Olatunji & Wolitzky-Taylor, 2009; Reiss & McNally, 1985). Physical sensations are misinterpreted as signals of danger, leading to fear of assumed consequences, which in turn initiates elevated anxiety-related physical reactions, such as sweating or hyperventilating, which consequently can induce panic attacks (Hoyer & Knappe, 2020; Olatunji & Wolitzky-Taylor, 2009). The relation between anxiety sensitivity and substance use is not as clear as for the other dimensions of the SURPS. While

the trait has shown to be a positive predictor for future alcohol use disorders for adults (Schmidt, Buckner, & Keough, 2007), some studies found no link or a negative link between anxiety sensitivity and overall substance use (Krank et al., 2010; Malmberg et al., 2010; Wagner, 2001). The inconclusive findings towards the association of anxiety sensitivity and substance use might be attributed to the appealing effect of some substances to release tension combined with the anxiety-related potential of most substances to invoke worrying body sensations, resulting in an ambivalent attitude towards drug use (Krank et al., 2010; Schmidt et al., 2007; Woicik et al., 2009). In this regard, the trait has been positively associated with coping and negative reinforcement motives for substance use (Woicik et al., 2009).

3.1.4 Sensation Seeking. The personality dimension of sensation seeking refers to the urge to seek out new and intense stimuli and situations and the willingness to take various risks to do so (Zuckerman, 1994; Zuckermann, Kolin, Price, & Zoob, 1964). Sensation seeking has shown to be a significant positive predictor for alcohol use and future binge drinking (Chen, Miller, Grube, & Waiters, 2006; Sargent, Tanski, Stoolmiller, & Hanewinkel, 2010). Furthermore, the trait has been associated with polysubstance use and continuous alcohol, cannabis, and hallucinogenic drug use (Dubey & Arora, 2008; Krank et al., 2010; Woicik et al., 2009). Sensation seeking is also associated with motives of positive reinforcement for substance use (Woicik et al., 2009).

3.2 Personality risk for substance misuse and gender

The personality dimensions of the SURPS hold unique profiles regarding gender differences. Unambiguous results could be found for anxiety sensitivity and sensation seeking. For anxiety sensitivity, women usually score higher in scales measuring this trait (Olatunji & Wolitzky-Taylor, 2009). Concerning sensation seeking, it is empirically verified that men tend to score higher than women (Cross, Cyrenne, & Brown, 2013; Navas et al., 2019).

Gender differences within the dimensions of impulsivity and hopelessness are still ambiguous. Hence, it is debated whether men or women tend to be more impulsive (Cross, Copping, & Campbell, 2011). Gender differences concerning hopelessness are debated as well, with some studies showing no effects (Memetovic, Ratner, & Richardson, 2013; Pössel & Smith, 2019). However, adolescent boys appear to be under greater risk for hopelessness, but there are indices for a reverse effect over time for hopelessness and gender, meaning decreasing expressions for men and increasing expressions for women in adulthood (Evans et al., 2005; Woicik et al., 2009).

3.3 Personality risk for substance misuse and heavy music

Despite the illustrated relevance of considering personality dimensions when examining individual motivations towards substance use and misuse, research on the topic of personality risk for substance misuse in the field of heavy music is very scarce. In fact, there appear to be no published studies that explicitly focused on heavy music and utilized the SURPS to measure the four personality dimensions of hopelessness, anxiety sensitivity, impulsivity, and sensation seeking. However, some studies exist that consider at least sensation seeking in the context of heavy music which are presented below. The other personality dimensions that are part of the SURPS are completely omitted, except for one study by Ekinçi, Bez, Topcuoglu, and Nurmedow (2011), who found over half their sample to have moderate levels of hyperactivity/impulsivity as measured with the *Adult ADD/ADHD Scale* (Gunay et al., 2006).

Concerning sensation seeking, higher levels have been linked to liking heavy metal and punk (Arnett, 1991b; Weisskirch & Murphy, 2004) and disliking less arousing music (McNamara & Ballard, 1999). Furthermore, adults scoring high in sensation seeking felt less aggressive, less activated, and calmer when exposed to heavy metal compared to low sensation seekers (Nater, Krebs, & Ehlert, 2005). This might be an explanation for the tendency to seek out heavy music, since it does not evoke the same undesirable reactions for individuals scoring high on the trait. Lastly, male musicians scoring high on sensation seeking were more likely to perform in intense and rebellious music genres (alternative, heavy metal, punk, rock) in a study by Miller and Quigley (2012). In this study, both sensation seeking and playing intense and rebellious music were positively associated with overall substance use as well.

Beyond sensation seeking alone, the only findable source utilizing the SURPS that is broadly connected with heavy music is a study by González Ponce, Díaz-Batanero, Vera, Dacosta-Sánchez, and Fernández-Calderon (2020), which examined personality traits among polysubstance users who attended one or more music festivals in the span of the last year at the time of measurement. Hopelessness, impulsivity, and sensation seeking were all positively correlated with polysubstance use. Moreover, 97.5% of participants reported to have consumed alcohol within the last year and further consumption quotas were at 90.3% for cannabis, 81% for ecstasy, 58.5% for cocaine, 50.7% for amphetamine and 45.3 % for LSD. Yet, the only indication of the attended festivals being related to heavy music is them including electronic music and rock music, which makes any transferable conclusions towards heavy music fans difficult.

While it is apparent that further research is necessary, which considers relevant personality factors in the face of potentially harmful substance use, a bulk of contemporary

research is focused on directly examining alcohol and drug use of heavy music fans, which will be presented below.

3.4 Substance use and heavy music

Concerning substance use among fans of heavy music, Arnett (1991b), who compared adolescents with a preference for heavy metal music with a peer group that had low preference for the genre, found a significant positive relation between drunk driving, smoking marijuana, and liking heavy metal. Furthermore, heavy metal fans showed a higher tendency for reckless behavior, including overall drug use and minor criminal activity. Still, overall drug use was more common with male heavy metal fans than with female fans of the genre. Similar results could be shown by Pimentel, Milfont, Gouveia, Vione, and Monteiro (2018), who revealed that a greater preference for alternative music, including rap, heavy metal, punk, rock, and electronic, was associated with more favorable attitudes toward the use of alcohol, marijuana, cocaine, crack, and ecstasy, while two studies by Mulder et al. (2009a, 2009b) yielded results which indicated that adolescents who like hard music (punk/hardcore, techno/hardhouse) are more likely to use substances. Fried (2003), who questioned community members from Indiana and college students from Minnesota, found a strong stereotype that heavy metal fans are self-destructive, whereas rap fans were described to be a threat to others. Self-destructiveness included behaviors such as alcohol abuse, taking drugs, partying too much, and suicide.

Further results displaying positive relations between the taste for heavy music and drug use could be shown by Vuolo, Uggen, and Lageson (2014), who analyzed taste clusters of musical preferences and substance use among adolescents and young adults by examining three large distinct data sets on three analytic levels in the USA. Level A was based on aggregated FBI Uniform Crime Report arrest data, the National Household Survey on Drug Abuse and Arbitron Radio Reports listenership data. Level B was based on a cross-sectional survey of US teenagers conducted by the New York Times and CBS News and Level C was based on a complete record of drug arrests and seizures for 40 concerts at a large music venue in Wisconsin. On Level A, music affiliation with classic rock, hard rock, and urban music (e.g., hip-hop) was a significant positive predictor for self-reported last month marijuana use and other illicit drug use. On Level B, a significantly higher use of marijuana and alcohol among those identifying with classic rock, punk rock, heavy metal, and hard rock was found. More particularly, heavy genres of rock showed stronger associations with substance use, exemplified by punk rock fans being 3.9 times more likely to have smoked marijuana in their lifetime and being 2.7 more likely to drink alcohol, compared to alternative rock listeners. Heavy metal/hard rock fans were 3.4 more likely to have consumed marijuana in comparison to alternative rock

listeners as well. For genres outside of rock and metal, hip-hop fans reported the highest lifetime use rates with 53% for alcohol, and 28% for marijuana, whereas females were 39% less likely to have smoked marijuana in this data set overall. On Level C, which examined marijuana, LSD and cocaine arrests per concert across four rock sub-genres, marijuana-related arrests were occurrent across all four sub-genres and heavy metal was associated with arrests for cocaine and LSD.

Lastly, Chen et al. (2006), who examined the link between a variety of different music genres and substance use, found listening to heavy metal, punk, rap, rock, and techno to positively predict frequency of alcohol use whereas punk, rap, and rock positively predicted frequency of marijuana use in this sample of 1,056 American community college students. Moreover, frequently listening to rap and techno positively predicted frequency of club drug use, including ecstasy, amphetamines, methamphetamine, and hallucinogens.

3.4.1 Substance use and heavy electro. There are indices in contemporary research that the sub-group of heavy electro fans might be particularly prone to substance use and misuse compared to other heavy music fan groups. This is because the subculture around electronic dance and techno music has been very consistently linked to various hallucinogenic and/or mood enhancing drugs, such as ecstasy, ketamine, rohypnol, LSD, and various types of amphetamines, especially in the context of clubbing and across different cultures and ethnicities around the world (Hitzler, 2002; Hunt & Evans, 2003; Maxwell, 2005). There are also indices that electro fans who favor heavier and more extreme sub-genres of dance music like hardcore and hardhouse consume more alcohol and drugs than other electro fans (ter Bogt & Engels, 2005). Ter Bogt et al. (2012) even suggested to regard electronic and dance music as the more relevant deviant music for young adolescents, since they found strong associations between liking trance, house, hardhouse, and techno music and substance use, but found only substantially smaller effects for heavy metal and rock listeners in their sample. However, there are no studies that compared heavy electro fans with all remaining heavy music fan groups that are central for this study. Furthermore, ter Bogt et al. (2012) performed the grouping exclusively via the assessment of preference and did not factor in actual fandom of heavy music or its respective genres.

3.4.2 Limitations of the link between substance use and heavy music. Even though there is a clear positive trend between alcohol/drug consumption and heavy music preference, especially with men and young adults showing higher risk for substance misuse, this trend is not always as clear as in the presented research. Some studies displayed mixed results, with young heavy metal fans (aged around 15 years old) showing either low or negative effects with

substance use like alcohol and marijuana consumption (Mulder et al., 2009a, 2009b; ter Bogt et al., 2012). Additionally, contemporary research is mainly focused on young adolescents or college students. Overall research explicitly focusing on *heavy* music genres and thus not simply using broad terms like rock, rap or dance music, is scarce. Thus, further research that utilizes a more holistic assessment of heavy music fan groups within an adult sample is needed.

3.5 Health hazards of illicit drug use

The relevance of investigating risk groups of illicit drug use can be demonstrated by illustrating health-related hazards of drug use. Outside of alcohol alone, the use of illicit drugs is associated with severe health-related issues for consumers including a highly increased mortality rate (Larney et al., 2019; Mathers et al., 2013). In 2020, at least 5,800 overdose deaths related to illicit drugs have been recorded in the European Union alone. Most of these drug-related deaths are due to the consumption of opioids, such as heroin, while stimulants, such as crack and cocaine, amphetamines, and synthetic cannabinoids are of further current concern. Additionally, the number of overdose deaths in the European Union have increased since 2012 and in recent years, more than three quarters of overdose deaths were men. Despite health-related concerns, consumption rates and numbers of treatment admissions for substance use disorders remain high which is to be attributed to the mood enhancing effects (European Monitoring Centre for Drugs and Drug Addiction, 2022).

3.6 Summary

The personality traits of hopelessness, anxiety sensitivity, impulsivity, and sensation seeking have been found to differentially account for patterns of substance use and misuse and are part of the SURPS. Gender differences for these traits appear to be of importance as well. Despite their relevance for predicting alcohol/drug abuse and dependence, these traits have not found sufficient consideration within the topic of heavy music yet. In contrast, a vast proportion on research on heavy music is dedicated to directly assessing substance use, with near unambiguous results, indicating fans of heavy music to elicit elevated substance use and misuse, especially for male fans. Moreover, existing data suggests there to be relevant differences between genre-related fan groups of heavy music concerning risk for substance misuse, with heavy electro fans being at particular risk for elevated consumption, but differences between all heavy music fan groups are yet to be examined, especially within an adult sample.

Considering the already elaborated state of research on actual substance use, the lack of research on personality risk for substance misuse, advantages of social desirability, and elaborations of economic viability in the face of included items for this study, this thesis is

focused on assessing the personality traits of the SURPS as opposed to directly assessing illicit drug use.

4. Psychological distress

This chapter describes clinically relevant symptoms of psychological distress, gender differences of psychological distress, and gives an overview on the state of research concerning those dimensions of psychological distress that have been examined in the context of heavy music. Additionally, in the context of hostility, the *General Aggression Model* (GAM) and the importance of considering fandom of heavy music are discussed.

4.1 Clinically relevant symptoms of psychological distress

When considering psychological distress, it is necessary to specify which symptom clusters are referred to. The *Brief Symptom Inventory* (BSI-53), which is a screening instrument that is frequently used in both clinical practice and psychological research, postulates nine symptom clusters/dimensions to be of central relevance for assessing psychological distress in clinical, as well as sub-clinical samples (Derogatis, 1975; Franke & Derogatis, 2000). The nine dimensions of relevance are *somatization*, *obsession-compulsion*, *interpersonal sensitivity*, *depression*, *anxiety*, *hostility*, *phobic anxiety*, *paranoid ideation*, and *psychoticism*. Outside of these symptom clusters, the BSI-53 allows for a comprehensive appraisal of the overall distress level of subjects via the Global Severity Index (GSI), which takes into account the scores of all dimensions (Derogatis, 1975; Franke & Derogatis, 2000). In the following, the nine clinically relevant symptoms of psychological distress are briefly described, to give insight on which symptom clusters are addressed in this study and thus, which aspects of psychological distress are being referred to.

4.1.1 Somatization. Somatization refers to aspects of psychological distress caused by the perception of physical dysfunction, ranging from simple physical complaints to functional disorders. In the context of BSI-53, the focus is on cardiovascular, gastrointestinal, and respiratory complaints. Unpleasant bodily sensations related to the functionality of the autonomic nervous system, such as dizziness and feelings of weakness and numbness in individual parts of the body, are also covered. These physical complaints show high prevalence with functional etiology but can also have purely organic causes. Hence, they can be cause or effect of psychological distress (Franke & Derogatis, 2000; Hoyer & Knappe, 2020).

4.1.2 Obsession-Compulsion. This symptom cluster refers to thoughts, impulses, and actions that are perceived as constantly present, unchangeable, strange, or involuntary. These symptoms are characteristics of obsessive-compulsive or related disorders and obsessive-compulsive personality disorder (Franke & Derogatis, 2000; Hoyer & Knappe, 2020; World Health Organization, 2019). Moreover, the dimension includes symptoms indicative of cognitive impairment, such as difficulties with concentration and memory (Franke & Derogatis, 2000).

4.1.3 Interpersonal Sensitivity. Slight social insecurity up to complete social inadequacy describe this dimension. The four included questions for interpersonal sensitivity assess increased emotional vulnerability, feelings of inferiority toward others, elevated self-consciousness, and the feeling of being disliked by others. Self-doubt, self-insecurity, and negative expectations regarding social interactions are typical characteristic of this dimension as well (Franke & Derogatis, 2000). The characteristics of interpersonal sensitivity are directly related to and overlapping with symptoms of social anxiety disorder (Hoyer & Knappe, 2020; Kumari, Sudhir, & Mariamma, 2012; Vidyanidhi & Sudhir, 2009).

4.1.4 Depression. Feelings of loneliness, gloom, loss of interest, hopelessness and worthlessness describe symptoms of depression as measured by the BSI-53. Suicidal ideation is part of this dimension as well. Depending on the intensity of the depressive symptomatology, the degree of severity ranges from feelings of sadness to indications of severe clinically manifest depression, including complete listlessness and the wish to die (Franke & Derogatis, 2000; Hoyer & Knappe, 2020). Furthermore, the depressive mood state is a central component of mood disorders, such as bipolar or related disorders and depressive disorders as categorized by the ICD-11 (World Health Organization, 2019), and disorders associated with depression represent the third largest health burden worldwide (James et al., 2018). In Austria, the one-year prevalence for all depressive disorders is at 9.8% (Nowotny, Kern, Breyer, Bengough, & Griebler, 2019). This highlights the particular importance of this dimension for measurements of psychological distress.

4.1.5 Anxiety. The symptom cluster of anxiety manifests itself via nervousness, trembling, panic attacks, and feelings of fright and inner tension. Feelings of apprehension and fear are prevalent as well. Low expressions in this dimension indicate at least physically perceptible nervousness, high expressions suggest deep feelings of anxiety and strong nervous unrest (Franke & Derogatis, 2000). In the clinical setting, symptoms of anxiety are part of Anxiety or Fear-Related Disorders as classified by the ICD-11, like generalized anxiety

disorder, panic disorder, agoraphobia, specific phobia, and social anxiety disorder (World Health Organization, 2019). It is estimated that 6.5% of the Austrian population are affected by anxiety-related disorders (Łaszewska, Österle, Wancata, & Simon, 2018).

4.1.6 Hostility. Hostility is described by anger, aggression, irritability, rage, and disgruntlement. Moreover, the active desire to break an object or to hurt an individual is directly assessed by the BSI-53. Expressions of hostility can range from slightly increased irritability to strongly pronounced aggressiveness and malevolence (Franke & Derogatis, 2000). The ICD-11 defines hostility as “a tendency to experience persistent or frequent angry feelings, especially in response to minor slights and insults, and to adopt an unfriendly or threatening attitude in interactions with others” (World Health Organization, 2019, n.p.). In the clinical setting, hostility is known to be a critical symptom cluster for aggressive personality disorder and can occur in various clinically relevant mental states, such as within manic and hypomanic episodes (Hoyer & Knappe, 2020; World Health Organization, 2019).

4.1.7 Phobic anxiety. Phobic anxiety differs from the dimension of anxiety in that persistent and unreasonable fears are directly related to a specific person, object, location, or situation, resulting in a strong desire to avoid or escape the fear-inducing medium. Consequently, phobic anxiety is central for agoraphobia and specific phobia (Hoyer & Knappe, 2020; World Health Organization, 2019). Phobic anxiety as measured by the BSI-53 relates primarily to symptoms of Agoraphobia and thus fear-related avoidance of certain places and crowds. Feelings of phobic anxiety can range from mild feelings of threat to massive anxiety as well as avoidance behavior (Franke & Derogatis, 2000).

4.1.8 Paranoid ideation. Thought projection, suspicion, grandiosity, constriction, fear of losing autonomy, and delusional deception are central aspects of paranoid ideation (Swanson, Bohnert, & Smith, 1970, as cited by Franke & Derogatis, 2000). The expression of this symptom cluster ranges from feelings of distrust and inferiority to strong psychotic symptoms (Franke & Derogatis, 2000). While paranoid ideation can be considered a cognitive process that is a natural part of human cognition, which is triggered upon the perception of threats and can lead to adequate actions of self-perseverance (Barreto Carvalho et al., 2017; Castilho et al., 2019), strong expressions are part of various psychiatric disorders, such as schizophrenia and bipolar type I disorder (World Health Organization, 2019). The ICD-11 defines paranoid ideation as “ideation, not held with delusional intensity, involving suspiciousness or beliefs of being harassed, persecuted, or unfairly treated by others” (World Health Organization, 2019, n.p.).

4.1.9 Psychoticism. Originally, the concept of psychoticism has been established by Eysenck (1972, 1976, 1992), who postulated psychoticism to be a robust and pivotal personality trait in the psychiatric setting, next to extraversion and neuroticism, within his three-factor approach of personality. The trait has been described to be tightly linked to psychotic and schizoaffective episodes and disorders. Furthermore, Eysenck (1992) described individuals with high expressions of psychoticism to be cold, egocentric, impersonal, impulsive, antisocial, unemphatic, tough-minded, and creative. Franke and Derogatis (2000) report symptoms of psychoticism to range from mild feelings of isolation and interpersonal alienation to psychotic episodes. Moreover, individuals with high expressions of psychoticism are prone to an isolated lifestyle characterized by distorted perceptions of reality and are vulnerable for symptoms of Schizophrenia such as hallucinations and thought disintegration (Franke & Derogatis, 2000). Thus, the BSI-53 is focused on the psychotic component of psychoticism.

4.2 Psychological distress and gender

On average, women are affected more frequently and more severely by psychological distress than men, as measured by the BSI-53. This is illustrated by the occurrence of significant gender differences in all dimensions of the BSI-53, with some inconsistencies throughout normative samples. The American normative samples which have been conducted in the clinical setting on inpatient psychiatric patients exhibited strong and nearly exclusively significant differences, except for obsession-compulsion in one sample. The German subclinical comparative sample for adults, which is the most relevant for this study, also displayed higher ratings for women in all dimensions of psychological distress, including the GSI. The only dimensions with non-significant differences were obsession-compulsion, phobic anxiety, and paranoid ideation (Franke & Derogatis, 2000). However, by applying the manual of the BSI-53, these differences are already considered by processing the raw data into standardized data (T-scores), which enables comparability of the data and the presentation of gender differences that go beyond expected differences (Franke & Derogatis, 2000).

With regards to heavy music, male and female fans appear to differ in ratings of psychological distress, but results are inconsistent und scattered, making conclusive statements inept. However, there are some indices that female fans are more prone to higher ratings of depression and suicidal ideation (Lacourse et al., 2001; Miranda & Claes, 2009), while men's aggression levels have shown to be affected more strongly by aggressive music (Fischer & Greitemeyer, 2006; Mast & McAndrew, 2011).

4.3 Psychological distress and heavy music

The link between psychological distress and heavy music preference is not as distinct

as the portrayed link of drug consumption and heavy music preference in respective literature. Consequently, differences of psychological distress in heavy music fans compared to non-fans are still debated. Extensive literature review revealed that most of the research on heavy music with reference to clinically relevant psychological symptoms is focused on the dimensions of depression, anxiety (with special regard to suicide), and hostility. Psychoticism has found some attention as well. Other relevant clinical symptoms are not covered yet. Furthermore, research on the topic usually focuses on heavy metal music and leaves out other heavy music genres. Overall, for most dimensions, a central topic of debate revolves around whether heavy music is the cause of psychological distress due to its extreme content, or whether individuals who already are under distress seek out this music for cathartic release. In the following, a summary of the results of studies on those symptom clusters with an existing body of research is given.

4.3.1 Depression, anxiety, and heavy music. Depression and anxiety are usually considered compendiously in studies related to heavy music. Concerning increased levels of depression and/or anxiety of individuals with a preference for heavy music, Shafron and Karno (2013), who examined the emotional states of American college students, reported significantly higher levels of depression and anxiety among listeners of heavy metal, punk, and hard rock compared to non-listeners. Moreover, increased quantity of listening was particularly associated with increased levels of anxiety. Miranda and Claes (2009) also revealed that preference for metal music is related to higher depression levels in adolescent girls, but only if they perceived their peers to be even more depressed. Similarly, another study, which examined various psychiatric disorder symptoms of young adults in Turkey who commonly visit heavy metal bars and listen to heavy music, found that one fourth of the participants were under high risk for a depressive episode and one third of the group had significant social anxiety levels (Ekinici et al., 2011). Moreover, different sub-genres of heavy music, specifically of heavy metal music, have been argued to exhibit composition-based parallels with symptoms of manic-depressive bipolar disorder, by mirroring correspondent mood states through specific characteristics of heavy music, such as rhythmic complexity, overall speed, ambience, and vocal harshness (Angeler, 2018).

On the other hand, listening to heavy music has been shown to significantly decrease symptoms of depression for female students with depressive symptomatology, even more so than classical music (Esfandiari & Mansouri, 2014). Another study showed similar or lower levels of depression and anxiety among heavy metal fans compared to the general population (Recours et al., 2009). Within qualitative research, Rowe and Guerin (2018) interviewed a small sample of 28 Australian heavy music fans over a four-year span, via multiple long, informal

conversations, about life experiences towards social struggles, family relations, mental health, and musical identity. While all participants experienced marginalization at school and about half of the participants reported disruptive family lives, little to no indices of mental health issues were discovered for these young adults. Furthermore, all heavy music fans stated the music to be a pivotal and positive factor in their lives that helped them experience a sense of community and social protection.

4.3.1.1 Suicide and heavy music. A wealth of studies examined whether fans of heavy music are at a greater risk of suicide or suicidal ideation. This is especially important in the context of depression, since depression is the most common psychiatric disorder in people who commit suicide (Hawton, Casañas I Comabella, Haw, & Saunders, 2013). Contemporary research refers to the topic of suicide in multiple ways, including suicide rates, suicide attempts, and suicide ideation, whereas in other cases, the risk for self-harming behavior is investigated (Stack, Lester, & Rosenberg, 2012).

Concerning the risk of self-harm and suicide of heavy music fans, Hughes, Knowles, Dhingra, Nicholson, and Taylor (2018) conducted a systematic review which aimed to clarify the relationship between people who self-identify as being part of an alternative subculture as well as people who have a preference for heavy music and the occurrence of self-harm or suicide, observing both data from actual suicide occurrences, as well as data based on self-rated suicidal ideation. The results of this review clearly indicate a strong link between being associated with alternative subcultures and/or preferring heavy music and self-harm, suicide, and suicidal ideation, especially for adolescents. Beyond the papers that were part of the analysis by Hughes et al., ter Bogt, Hale, Canale, Pastore, and Vieno (2021) also revealed the preference for goth music to be a relevant factor for developing depressive symptoms for adolescents aged 10 to 15 years old.

In a study by North and Hargreaves (2006) liking problem music was also significantly and positively related to whether participants have considered self-harming, have self-harmed, wished themselves dead, and/or considered suicide. However, participants indicated that their self-harming tendencies preceded their involvement with problem music, giving rise to the notion that problem music might not be the cause of suicidal thoughts or self-harming, but simply represents a musical style that is alluring for individuals with self-destructive tendencies. In this regard, Lacourse et al. (2001) found a significant correlation between preference for heavy metal music and suicidal risk amongst young female listeners, whereas listening to music for vicarious release was not associated with suicidal risk. Listening to music for vicarious release was even negatively related with suicidal risk for female listeners, suggesting that

listening to music with the goal of emotional and cathartic release might be a legitimate coping mechanism for young female adults. Consequently, Lacourse et al. (2001) concluded that since listening to music may offer a certain protection against suicidal risk, heavy metal music might simply attract troubled adolescent individuals for cathartic release and is not actually the cause of suicidal risk. This notion has been backed by multiple authors studying the topic (Arnett, 1991a; Baker & Brown, 2016; Hughes et al., 2018; Recours et al., 2009).

Independent of this ongoing discourse on adolescent suicidal risk and the influence of heavy music on it, further results for adult samples are needed, to clarify whether the depicted vulnerability for suicidal ideation is effective for adult fans as well.

4.3.2 Hostility and heavy music. Hostility has found a considerable amount of attention in contemporary research. Studies on the topic of heavy music fans being more hostile or aggressive than non-fans are oftentimes centered on the question whether aggressive or violent music has a lasting effect on the listeners hostility or aggression levels, implying that individuals who continuously listen to aggressive music might be more hostile and aggressive in real-life settings because of pre-existing traits or as a consequence of long-term exposure to aggressive music (Fischer & Greitemeyer, 2006; Slade, Olsen, & Thompson, 2019).

Beyond heavy music, the General Aggression Model (GAM; Anderson & Bushman, 2002) has shown to be a valuable model to give insights into how the exposure to violent media can make aggressive actions more likely.

4.3.2.1 General Aggression Model. The GAM represents an integration of different explanations of aggressive behavior and thus includes approaches of Cognitive Neo-association Theory (Berkowitz, 1989, 1993), Social Learning Theory (Bandura, 1977), Script Theory (Huesmann, 1986, 1998), Social Interaction Theory (Tedeschi & Felson, 1994) and Excitation Transfer Theory (Zillmann, 1988). By combining core elements of these social-cognitive theories, the GAM provides an explanatory approach for the emergence of aggression both in short- and long-term settings. In the short-term, an interaction of *personal* (e.g. gender, trait hostility) and *situational* (e.g. provocation, aggressive cue stimuli, discomfort) *variables* are postulated to mediate the likeliness of aggressive behavior by influencing the final outcome behavior through the internal state they create. These internal states are highly interconnected and are centered around *cognitive priming*, *negative affect*, and *physiological arousal*. The cognitive state, interacting with the present state of arousal, then triggers an automatic or controlled evaluation and decision-making processes that can lead to aggressive behavior based on the quality and intensity of the prevalent psychological and/or physical state (Anderson & Bushman, 2002; Dorsch & Wirtz, 2014). In short, depending on personal dispositions (e.g.,

hostility), a stress inducing situation can trigger aggressive behavior by producing a negative mood state, priming hostile cognition, and invoking high physiological arousal. For long-term effects and the development and maintenance of aggression over time, the GAM postulates that the activation of aggressive knowledge structures through repeated aggressive acts leads to the automation of aggressive cognitions, reinforcement of aggression-related attitudes, and perceptual bias in social interactions. These processes strengthen hostile personality traits and attributional styles, which in turn influence the evaluation of new potentially harmful situations as a personal variable (Anderson & Bushman, 2002; Dorsch & Wirtz, 2014).

In simpler terms, this means that based on personal factors and the individual perception of heavy and aggressive music being threatening, negative mood inducing or highly arousing, constant exposure to this medium could persistently alter cognitive dispositions of listeners towards a more hostile and aggressive state and consequently lead to more aggression. Aggressive thoughts could become more easily accessible, and anger and arousal could be permanently increased by heavy music, which in turn could increase the likelihood for aggressive acts (Anderson & Bushman, 2002; Slade et al., 2019).

4.3.2.2 The importance of considering heavy music fandom. There are indices that fans of heavy music with a high preference for extreme and aggressive music genres interact in different ways with the music than those who indicate lower levels of appreciation and consequently are affected differently (Shafron, 2018). This is of importance when applying the principles of the GAM, since the music needs to be perceived as aggressive or arousing to trigger the cognitive and behavioral loops postulated by the GAM. Hence, the presence of fandom towards heavy music appears to be a pivotal factor that needs to be considered when examining undesirable effects of heavy music on the listener.

This notion has been thoroughly examined by Thompson et al. (2019), who illustrated the emotional experiences of fans and non-fans of death metal, one of the most aggressive, violent, and non-conformant sub-genres of metal music. After listening to selected musical pieces of the genre, death metal fans and non-fans reported highly divergent emotions related to their listening experience. Fans of death metal stated to have gone through a wealth of positive emotions by listening to the music, like power and joy, as well as happiness and stress reduction, with the desire to utilize the resultant mood to participate in a wide variety of social or artistic activities. Qualitative assertions of fans regarding their experience with death metal were centered around statements like: “This sort of music makes me feel energetic when I’m down, and when I’m angry, it brings me to a dark place internally so that I can work through these feelings” (Thompson et al., 2019, p. 226). Non-fans however, reported mostly negative

feelings when exposed to this kind of violent music, with emotions centered around feelings of tension, fear, and anger. Statements of non-fans towards the music included: “It sounds like messed-up teenagers making throaty, irritating noises about how bad their lives are” (Thompson et al., 2019, pp. 226–227), or “I can’t understand how anyone finds this music pleasant to listen to” (Thompson et al., 2019, p. 227). Additionally, only non-fans listed song lyrics, which they found to be highly discomforting, to be a relevant reason for why the music induced different emotions and described the music on a less technical level. The authors concluded that fans of violent music might frame their engagement with violent music on an aesthetic level that is distinguishable from real-life circumstances of violence, implying that fans of heavy music might be more prone to utilizing a combination of distancing and embracing mechanisms to excerpt joy out of an otherwise repulsive art-form.

The concept of heavy music fans showing differences in higher-order cognition regarding their aesthetic experience towards heavy music has also been supported by Ollivier et al. (2019), who found extreme music fans reacting equally negative, equally fast, and more accurately to isolated cues of auditory threat, mimicking real-life danger. This outcome has been unexpected, since heavy music listeners actively seek out these cues in heavy and extreme music but showed no signs of habituation towards auditory threat signals outside of their aesthetic experience whatsoever (Ollivier et al., 2019).

4.3.2.3 State of research. Similar to the illustrated ambiguous results on the topic of depression and anxiety, there are findings suggesting heavy music to foster negative mood states and overall aggression levels whereupon other studies show either no negative effects or even positive effects on the listeners mood including anger, especially for fans of heavy music genres (Sharman & Dingle, 2015; Thompson et al., 2019).

Concerning negative outcomes of listening to violent or aggressive music, being exposed to aggressive lyrics has been associated with increases in aggressive behavior and decreases in prosocial behavior (Coyne & Padilla-Walker, 2015) as well as increases in hostility- and aggression-related cognitions for non-fans (Anderson, Carnagey, & Eubanks, 2003). Furthermore, listening to sexual-aggressive song lyrics has shown to increase aggressive cognitions and behavior towards the opposite sex, especially for male participants (Fischer & Greitemeyer, 2006) and heavy metal music with violent lyrics elevated aggressive behavior for men as measured by the hot sauce task/paradigm (Lieberman, Solomon, Greenberg, & McGregor, 1999; Mast & McAndrew, 2011). Furthermore, listening to heavy music with violent lyrical content has successfully been linked to an increased risk for music genre induced driver aggression (Brodsky, Oliveri, & Chekaluk, 2018).

Beyond the effect of violent or aggressive lyrics alone, Brummert Lennings and Warburton (2011), who examined the lyrical effect of heavy music and controlled for aggressive musical tone, illustrated exposure to violent lyrical content to have a greater amplifying effect on aggression than listening to the same music with no lyrical content, which in turn still had a greater effect than not listening to music at all. In line with these results, George et al. (2007), who examined the association between the preference for different types of music and various cognitive, behavioral and personality factors, also found fans of heavy music genres to be significantly more hostile, depressed, and less emotionally stable than other music fans. Male heavy metal listeners and rap listeners have also shown greater aggressive tendencies and lesser regard for women, compared to fans of most other genres (Rubin, West, & Mitchell, 2001). Lastly, in a longitudinal research design, Selfhout, Delsing, ter Bogt, and Meeus (2008) revealed preference for heavy metal and hip-hop to be significant predictors for later externalizing problem-behavior in a sample of 931 Dutch adolescents, with male heavy metal fans showing stronger effects on externalizing problems than female fans of heavy metal. Externalizing problem-behavior comprised of direct and indirect aggression and delinquency.

In contrast to these results, some authors have concluded that violent media has merely trivial effects on real-world aggressive outcomes, while others have reported no significant links between violent media exposure and aggressive or undesirable outcomes at all (Ballard & Coates, 1995; Ferguson, 2015; Ferguson & Kilburn, 2009; Sprankle, End, & Bretz, 2012; Unsworth, Devilly, & Ward, 2007). Ferguson and Kilburn (2009) even stated that research on media violence is not to be seen as a significant public health concern and that the public and scientific interest towards the potential aggression-fueling effects of violent media appear to be driven primarily by ideological or political beliefs, rather than objectivity. This is referenced by existing studies on the topic of violent media exposure to have issues with publication bias and poor methodology, like inadequate aggression measures and an overall failure to consider personal variables like sex/gender or preexisting dispositions towards aggressive cognitions or behavior (Ferguson & Kilburn, 2009). As illustrated, the failure to assess heavy music fandom or even preference in studies exposing participants to aggressive music illustrates the necessity to reexamine differences of fans and non-fans in the dimension of hostility.

4.3.3 Psychoticism and heavy music. Since psychoticism has been linked to creativity (Acar & Runco, 2012; Eysenck, 1992), some research has focused on examining the relation between psychoticism and the creative medium that is music. In this regard, psychoticism has shown to be a positive predictor of liking the genres blues, jazz, electronic, techno, and trance music (Till, Tran, Voracek, & Niederkrötenhaler, 2016). Regarding heavy music more

specifically, a study examining the enjoyment of hard rock music videos with violent contents of undergraduate students revealed individuals scoring high on psychoticism to enjoy these videos more than their peers scoring low on psychoticism (Robinson, Weaver, & Zillmann, 1996). Additionally, individuals scoring high on measures of psychoticism reported to like hard rock and problem music styles and dislike more popular, easy listening styles (North, Desborough, & Skarstein, 2005; Rawlings, Hodge, Sherr, & Dempsey, 1995). Contrary to these results, Lester and Whipple (1996), found positive significant correlations between scores of psychoticism and the preference for blues and jazz, but no significant correlations for any heavy music genre.

4.4 Summary

The relevant symptom clusters of psychological distress within this study are somatization, obsession-compulsion, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, and psychoticism. Out of these dimensions, only depression and anxiety (with special regard to suicide), hostility, and psychoticism have found attention in contemporary research related to heavy music. Moreover, within all explored symptom clusters, the relation between psychological distress and heavy music is still under heavy debate, highlighting not just the necessity to expand the state of research by examining overlooked dimensions, but also to contribute to the ongoing debate by providing confirmatory data. Moreover, the factors of fandom and gender need to be considered in analyses concerning psychological distress, since both factors appear to have a significant impact regarding the vulnerability for symptoms of psychological distress and the effect of heavy music on the listener.

5. Musical Engagement

This chapter gives an overview of the effect of music on mental health and the concept of healthy and unhealthy musical engagement. It also depicts the relation between musical engagement and gender, as well as heavy music. Ultimately, a brief overview of existing approaches to heavy music therapy is given.

5.1 Music and mental health

Music listening is an integral part of everyday life and is one of the most important leisure activities, which is partly due to its potential to form personality and identity, regulate mood, and lessen feelings of anxiety (McFerran & Saarikallio, 2014; Nilsson, 2008; Rentfrow

& Gosling, 2003; Schwartz & Fouts, 2003). Furthermore, music listening has been related to social connection, overall wellbeing, and relaxation and has shown potential to facilitate introspection, catharsis, and cognitive change (Chin & Rickard, 2014; McFerran & Saarikallio, 2014; Schäfer, Sedlmeier, Städtler, & Huron, 2013; Silverman, 2021; Van Goethem & Sloboda, 2011). On the contrary, music can also be used in a maladaptive manner by applying negative coping strategies or listening habits like denial and rumination, which has been linked to negative mood states such as depression and anxiety (Garrido, Eerola, & McFerran, 2017; McFerran & Saarikallio, 2014). This appears to be especially relevant for individuals with mental health problems where music is often used to intensify feelings of distress rather than help with coping, even when unintended (McFerran & Saarikallio, 2014).

In recent time, both healthy and unhealthy effects of music listening have found consideration within clinical psychology. The beneficial effects of music have long been successfully integrated into psychological interventions, forming music therapy, in which the use of slow and relaxing music is usually recommended for clinical practice (Nilsson, 2008), whereas preference and familiarity of the utilized music appear to play a central role for relaxation responses (Tan, Yowler, Super, & Fratianne, 2012). Contemporary approaches towards healthy outcomes of music listening consider, that the style of music might be only important as far as the music can be enjoyed by the listener and that the individual context of musical engagement needs to be examined in a more comprehensive way (McFerran & Saarikallio, 2014; Saarikallio et al., 2015). Modern approaches also contemplate that music listening is not strictly beneficial to health and depends on individual music listening habits (Saarikallio et al., 2015), which has been increasingly considered in research and in the therapeutical praxis of music therapy as of late (Gold, Saarikallio, Crooke, & McFerran, 2017; McFerran, Hense, Koike, & Rickwood, 2018; Silverman, 2020, 2021, 2022). Nevertheless, the consideration of individual music preferences and listening habits yielded some promising results in the therapeutical setting. In this regard, between therapist and patient, discussing and raising awareness of healthy and unhealthy uses of music and individual preferences resulted in less perceived psychological distress, a greater ability to control the effects of music on the individual mood, more awareness of the relationship between music and mental health and in more careful choices of music (McFerran et al., 2018).

5.2 Healthy/unhealthy musical engagement

The illustrated concept of healthy and unhealthy musical engagement, which factors in the possibility of individual musical engagement potentially being either beneficial or debilitating for one's wellbeing, has been established and operationalized by Saarikallio et al.

(2015). Saarikallio and colleagues developed the two dimensional *Healthy-Unhealthy Music Scale* (HUMS), which is an assessment tool of *healthy/unhealthy musical engagement*. Within this approach, musical engagement is seen as an indicator of proneness for depression, which is dependent on healthy or unhealthy uses of music. Thus, healthy musical engagement is postulated to foster positive mood states, whereas unhealthy engagement induces or promotes depressive mood states. Both healthy and unhealthy musical engagement are based on behavioral patterns and individual experiences when engaging with music. Hereby, healthy engagement has successfully been linked to mood enhancement, distractive relaxation, and social connection (Saarikallio et al., 2015). Correspondently, unhealthy engagement includes tendencies of rumination through repeated listening, escape and avoidance of problems through music listening, as well as mood worsening through listening, even when consciously unintended (Saarikallio et al., 2015).

Outside of these core elements of healthy/unhealthy musical engagement, healthy musical engagement has also shown to predict positive and adaptive coping styles, whereas unhealthy musical engagement has been shown to predict negative and maladaptive coping styles for inpatient adults in the clinical setting (Silverman, 2020, 2021, 2022). In addition, the HUMS has found application in therapeutic practice, where the questionnaire is used to select potential participants for musical interventions, as well as for HUMS-based music therapy sessions. Within these sessions, the questionnaire is filled in and discussed with participants to make out existing ways of music use, after which playlists with carefully and jointly selected songs are created, with the goal to shift mood and alleviate distress (Gold et al., 2017; Hense, Silverman, & McFerran, 2018; McFerran et al., 2018).

Lastly, it is important to note however, that within the original creational study of the HUMS, both healthy and unhealthy musical engagement positively correlated with depression (Saarikallio et al., 2015). The healthy subscale correlating positively with depression undermines the asserted use of the questionnaire for assessing proneness for depression by music use for the healthy dimension. Logically, the postulated mood enhancing effects of healthy musical engagement should protect from depressive feelings. This result has not been reappraised in continuative research. Thus, current reported findings only indicate the unhealthy dimension to accurately predict depression, which needs reexamination in an adult sample.

5.2 Musical engagement and gender

To the best knowledge of the author, the only recorded quantitative data on gender differences on the dimensions of healthy and unhealthy musical engagement is to be found in the original article of the HUMS by Saarikallio et al. (2015). Within this paper, only within the

HUMS unhealthy scale significant gender differences were found, with higher scores for female adolescents. Thus, further investigations are needed for well-founded conclusions on gender differences for musical engagement, especially for adult samples.

Moreover, another study related to music listening and coping strategies yielded more ambiguous results. In this study by Miranda and Claes (2009), which focused on emotion-oriented, problem-oriented, and avoidance/disengagement coping through music listening, female listeners tended to use more overall coping by music listening than male listeners, be it emotion-oriented, problem-oriented, or avoidance/disengagement coping. Moreover, coping strategies by music listening had different outcomes for both genders. In detail, problem-oriented coping by music listening was associated with lower depression levels for girls (Miranda & Claes, 2009). Emotion-oriented coping by music listening was only linked to higher depression levels in boys, whereas avoidance/disengagement coping by music listening was only associated with higher depression levels in adolescent girls. While not being directly related to the dimensions of the HUMS, these results illustrate the need for further investigation on the topic of musical engagement while considering the gender of participants, since both healthy and unhealthy musical engagement have been linked to adaptive and maladaptive coping strategies, respectfully (Silverman, 2020, 2021, 2022). Furthermore, these results indicate that men and women differ towards their approach to music listening and towards the health-related outcomes of their listening habits, which needs further investigation.

5.3 Musical engagement and heavy music

There exists no research that is focused on examining healthy and unhealthy dimensions of musical engagement as measured by the HUMS in the realm of heavy music yet. However, some studies provided interesting insights into possible outcomes. Since the quantity of music has shown to increase during stressful times (Thomson, Reece, & Di Benedetto, 2014) and music listeners tend to choose to listen to music that mirrors their active mood state (Hense et al., 2018; McFerran, Garrido, O'Grady, Grocke, & Sawyer, 2015; McFerran & Saarikallio, 2014; Sharman & Dingle 2015), it is unsurprising that distressed individuals have shown to prefer angry music and genres like metal and hard rock (Gold et al., 2017; McFerran et al., 2018).

Still, while the experience of negative emotions appears to be a relevant aspect of musical engagement for heavy music fans, numerous authors reject the notion that listening to heavy music causes depressive, anxious, or suicidal thoughts and support the idea that it might be more of an indicator for emotional vulnerability of listeners (Baker & Bor, 2008; Baker & Brown, 2016; Lacourse et al., 2001; Rustad, Small, Jobes, Safer, & Peterson, 2003). Other

studies could even show positive effects of listening to heavy music for fans of the genre, like regulating sadness, enhancing positive emotions and feelings of power and joy, indicating a healthy musical engagement (Quinn, 2019; Riches, 2011; Sharman & Dingle, 2015; Thompson et al., 2019). Results supporting this assumption were displayed by Sharman and Dingle (2015), who lead adult extreme metal fans through an anger induction, followed by either 10 min of listening to extreme music from their own playlist, or 10 min of silence for the control group. Participants who listened to extreme music when angry showed a decrease in subjective hostility and irritability that was equivalent to those who sat in silence. Furthermore, 69% of participants agreed to listen to extreme music to calm themselves down when feeling angry, 87% stated that they listen to extreme music to enhance feelings of happiness and all participants stated to use extreme music to enhance their wellbeing (Sharman & Dingle, 2015).

Qualitative studies also consistently revealed heavy music to pose high value in terms of applying coping strategies and regulating mood through music listening for fans of the music (Ahmadi, 2009; Rowe, 2017; Rowe & Guerin, 2018; Thompson et al., 2019; Quinn, 2019). Key elements that are consistently mentioned in related studies are katharsis, feelings of solace and validation, forming identity, and confronting negativity. These key elements, which show parallels to healthy musical engagement, are seen by heavy music fans to be vital factors of their musical experience, protecting them from feelings of alienation, anxiety, and depression. (Ahmadi, 2009; Henry & Caldwell, 2007; Riches, 2011; Rowe, 2017; Rowe & Guerin, 2018).

To this day, this remains virtually unacknowledged in therapeutical practice, which might be ascribed to the case that heavy music appears to be anything but relaxing for non-fans and unacquainted listeners (Thompson et al., 2019). Still, even though research on the topic indicates a healthy form of musical engagement for heavy music fans, it remains completely unclear, whether heavy music fans differ in their healthy or unhealthy musical engagement compared to non-fans and if they do, to which extend possible differences are apparent. While it is evident that heavy music fans do utilize music in healthy ways, there is simply no evidence to be found that heavy music fans are more likely to use music in a healthier manner than non-fans and quantitative data on this topic is completely missing yet.

5.4 Heavy music therapy

As mentioned above, music therapy has successfully been conducted to treat various clinically relevant symptoms like depression (Tang, Huang, Zhou, & Ye, 2020), anxiety (Nilsson, 2008), and anger (Hakvoort, Bogaerts, Thaut, & Spreen, 2015; Jackson, 2010) and has also been used to treat substance use disorders, be it with varying results (Hohmann, Bradt, Stegemann, & Koelsch, 2017). If heavy music fans are to be identified as a potential risk-group

for alcohol and drug misuse, as well as for symptoms of psychological distress, music therapy appears to be a promising form of psychological intervention for heavy music fans that experience distress in these categories. Yet, there are barely any documented examples of music therapy that utilizes the style of heavy music as a therapeutic tool in working with fans. This is surprising in the fact that fans repeatedly stated this music to be of central importance to their life and since the use of preferred music in therapy may increase engagement and motivation (Dingle, Gleadhill, & Baker, 2008; Sharman & Dingle, 2015).

Still, some examples can be found. There are two recorded approaches of rap music being used to treat substance misuse, but it remains unclear to which extent the style of rap that is being utilized is to be considered heavy or extreme (Baker, Dingle, & Gleadhill, 2012; Lightstone, 2012) and one further example of rap therapy in which facing aggressive lyrics together is part of the therapeutic process (Buttery, 2004).

Yet, the only explicitly *heavy* approach to music therapy that is professionally documented is practiced by Quinn (2019), a clinical psychologist, who uses the technique of voice dialogue when working with fans of heavy music. Voice dialogue is a psychodynamically rooted theory that focuses on bringing pushed-away emotions or cognitions into conscious awareness (Stone & Stone, 2011). Quinn also reports using the mutual examination of heavy metal lyrics as a form of exposure therapy, since lyrical content often consists of themes and emotions that are pushed away by individuals and society (Baker & Brown, 2016; Quinn, 2019). Resulting insights of the voice dialogue are then combined with narrative therapy practice (Morgan, 2000), implying that the meaning of the lyrics is meant to be integrated into a narrative story of the client's experiences and recovery. Further suggestions for the implementation of heavy music into therapy are made by Clavier (2014), who suggests similar elements for successful heavy metal therapy, namely interpretation of lyrics, exploration of emotions, exploring limits, and channeling energy. In Clavier's approach, exploring limits refers to the ability of a music therapist to help focus on finding limits of cognitive and emotional capacity and to learn responsible listening. Channeling energy means focusing the energy heavy music can evoke in a positive direction whereat a music therapist can help in raising awareness about a healthy approach.

If quantitative research on the expression of healthy and unhealthy musical engagement of heavy music fans indicates higher musical engagement for fans, compared to the general population, these results appear to be of relevance for therapeutic praxis. This is because if musical engagement is particularly prevalent with heavy music fans, it appears to be promising to discuss existing listening habits and to inform about healthy and unhealthy uses of music,

which is implemented in the HUMS-based music therapy sessions (Gold et al., 2017; Hense et al., 2018; McFerran et al., 2018). Healthy listening habits could be facilitated and maintained, and unhealthy uses could be laid bare and changed over time. Implementing the basic approaches of the HUMS-based music therapy sessions based on research data thus might be a meaningful addition to existing branches of *heavy music therapy*.

5.5 Summary

Music can have beneficial or debilitating effects on mental health and wellbeing, based on individual music listening habits. Modern approaches of music psychology and therapy factor in both healthy and unhealthy effects of music listening which lead to the development of the HUMS. Within this two-factorial model, musical engagement is seen as an indicator of proneness for depression. *Healthy musical engagement* is expected to foster positive mood states, whereas *unhealthy musical engagement* promotes depressive mood states. However, the link between *healthy musical engagement* and *depression* is not yet clear and needs reexamination. The same applies to possible gender differences. Still, the HUMS has found recent attention within psychological research as well as therapeutical praxis, with promising results. On the topic of heavy music, multiple studies suggest a particular prevalent healthy music use for heavy music fans, but no quantitative data utilizing the HUMS dimensions exists yet. Moreover, it remains unclear whether heavy music fans use musical engagement to a greater extent than non-fans, be it healthy or unhealthy.

Regarding music therapy, first attempts have been made to implement heavy music as a therapeutical tool. Relevant factors that appear to be of importance for a successful application of heavy music into therapy are the mutual and meaningful confrontation of lyrics, and a sensible supervision of the therapist regarding and teaching a healthy musical engagement. It is argued that quantitative data concerning musical engagement of heavy music fans is relevant for possible implementations of HUMS-based music therapy sessions into existing branches of heavy music therapy in the future.

II Empirical Part

6. Aim of this study

The main goal of this study was to examine whether fans of heavy music pose a possible risk group for harmful *alcohol consumption*, *personality risk for substance misuse*, and *psychological distress* in an adult sample, as well as to determine whether fans differ compared to non-fans towards their *musical engagement*. To achieve this goal, it was planned to compare the mean scores of the scales of the AUDIT, SURPS, BSI-53, and HUMS between a heavy music fan group and a non-fan group while considering gender and possible interaction effects of heavy music fandom in all analyses. This was intended because contemporary research suggests gender to be relevant throughout all selected variables.

Another goal of this study was related to the effort to consider more recent heavy music trends, which resulted in the inclusion of *heavy hip-hop* and *heavy electro* sub-genres. Since this appeared to be the first attempt to include these genres into heavy music, differences between subgenre-related fan groups of heavy music were analyzed for all variables as well, allowing for a differentiated understanding of the individual fan groups of heavy music. For the fan group comparisons, analyzes of psychological distress were limited to the sum score of the BSI-53 in order not to vastly exceed the scope of this thesis.

The described approach firstly aimed to contribute to the existing knowledge on the relation between heavy music preference and *alcohol consumption* (AUDIT), *sensation seeking* (SURPS), *depression*, *anxiety*, *suicidal ideation*, *hostility*, and *psychoticism* (BSI-53) which are the only included dimensions that have been examined in quantitative research on the topic before. Secondly, this approach aimed to gain new insights on dimensions which yet remained unconsidered in existing literature on the topic, expanding the state of research. These remaining dimensions are *hopelessness*, *anxiety sensitivity*, *impulsivity* (SURPS), *somatization*, *obsession-compulsion*, *interpersonal sensitivity*, *phobic anxiety*, and *paranoid ideation* (BSI-53), as well as *healthy/unhealthy musical engagement* (HUMS).

Additionally, the relationship between *healthy-* and *unhealthy musical engagement* (HUMS) and *depression* (BSI-53) was aimed to be replicated and reexamined, which presented a possibility to contribute to the evaluation and validation of the HUMS in an adult sample.

7. Method

This chapter describes the study design and conduct, sample size, measurement instruments, research questions, and resulting hypotheses. Finally, the statistical methods used for hypothesis testing are discussed in more detail.

7.1 Study design and conduct

The study has been conducted on the general population, with a minimum age of 18 years old, in the form of a cross-sectional online study design. The data collection period took place from December 2021 to March 2022. The questionnaire has been constructed via SoSciSurvey (Leiner, 2019). It included a form of consent on the front page, informing participants on the content and aim of the study, as well as assuring anonymity and protection of privacy. Thereafter, sociodemographic data of participants was assessed, followed by several questions concerning heavy music preference, listening hours, and affiliation. This was followed by the German versions of the AUDIT (Wetterling & Veltrup, 1997), the SURPS (Jurk et al., 2015), the BSI-53 (Franke & Derogatis, 2000), and the HUMS (Riedl & Stegemann, 2018). All measures are described in detail in chapter 7.3. The questionnaire, which consisted of 117 items took about 12 min to complete. The online link to the questionnaire was distributed via snowball-sampling and was posted into social media groups on Facebook, Reddit, and several music forums. Additionally, three heavy music online magazines, *rockhard.de*, *metalinside.ch*, and *ox-fanzine.de* supported the study by sharing the link on their Facebook-page after being contacted by the author.

7.2 Sample size

The final sample size spans 855 participants. The target of at least 210 participants was therefore exceeded. Detailed sample descriptions are presented in chapter 8.

7.3 Screening instruments

The following instruments were utilized to assess sociodemographic data of participants, heavy music fandom, alcohol consumption, personality risk for substance misuse, psychological distress, and healthy/unhealthy musical engagement.

7.3.1 Sociodemographic data questionnaire. This questionnaire, which was used to collect socio-demographic data, was self-prepared. The participants were asked about their gender (female, male, diverse), age, country of residence, level of education, and relationship status. Consequently, it comprised five items.

7.3.2 Heavy music questionnaire. This self-prepared questionnaire appraised heavy music fandom and was used to part participants into a heavy music fan group and a non-fan group, as well as to provide data on heavy music preference, quantity of listening, and overall affiliation. The first item was dichotomous and could be answered with either yes or no, asking if the respondent would consider oneself a fan of heavy music or not. In the following, several questions referring to preference and quantity of listening for relevant heavy music genres were included. The relevant heavy music genres included in this questionnaire were *hard rock*, *punk rock*, *metal*, *heavy rap/hip-hop*, and *heavy electro*. For heavy rap/hip-hop and heavy electro, specific sub-genres were presented to provide a better understanding of which facets of electro (hardcore techno, hardhouse, power electronics...) and rap/hip-hop (hardcore hip-hop, gangster rap, horrorcore...) were the focus of this study. Concerning heavy music preference, participants were asked to rate their preference for each genre on a 6-point Likert scale ranging from “strongly dislike” to “strongly like”, resulting in five items, one for each genre. Quantity of listening was assessed by asking participants to estimate the number of hours they spent per week listening to each individual genre, resulting in five items as well. Lastly, three questions were incorporated, asking for mean number of years in the culture, number of hours spent listening to music per week (not just heavy music), and for the most preferred heavy music genre. This resulted in 14 items overall.

7.3.3 Alcohol Use Disorders Identification Test (AUDIT). The assessment of alcohol consumption has been accomplished with the AUDIT. It is a renowned and frequently used alcohol screening instrument to assess hazardous and harmful alcohol use, and alcohol dependence in the last 12 months (Babor, Higgins-Biddle, Saunders, & Monteiro, 2001; Saunders et al., 1993). The questionnaire consists of 10 evenly graded items, with three to five response options per item. The first 3 items are related to hazardous alcohol use, items 4, 5, and 6 are related to dependence symptoms, and the last four items measure harmful alcohol use. Each item is scored and a sum score over all items is calculated, ranging from 0 to 40 (Babor et al., 2001). A total score of 1 to 7 suggests low-risk consumption, scores from 8 to 14 suggest hazardous or harmful alcohol consumption, and a score of 15 or more indicates likelihood of alcohol dependence (Saunders, 2022). These values are particularly accurate for men, whereas more recent research suggests a cut-off value of 5 (or 6) for hazardous and harmful alcohol consumption for women (Reinert & Allen, 2007). The AUDIT showed high validity and reliability ratings in multiple studies and high internal consistency with ratings of Cronbach’s α around the .80’s or .90’s and can be considered a gold standard for assessing potentially

harmful alcohol consumption (Allen, Litten, Fertig, & Babor, 1997; Babor et al., 2001; Dybek et al., 2006; Reinert & Allen, 2007).

7.3.4 Substance Use Risk Profile Scale (SURPS). The SURPS is based on a model of personality risk for substance misuse in which four personality dimensions, hopelessness, anxiety sensitivity, impulsivity, and sensation seeking, are hypothesized to be related to patterns of substance misuse (Woicik et al., 2009). The SURPS directly assesses these four personality dimensions and does not directly assess substance use or misuse. The questionnaire spans 23 items, with respondents ranking each item on a 4-point Likert scale ranging from 1 (strongly disagree) to 4 (strongly agree). Items 1, 4, 7, 13, 20, and 23 are reverse scored. Total scores are then calculated for each of the four subscales. The SURPS has proven to be a valid and reliable assessment tool for identifying individuals vulnerable to substance misuse in clinical and subclinical samples while being independent of assessing actual drug use (Krank et al., 2010; Woicik et al., 2009), suggesting advantages in terms of social desirability over questionnaires directly asking about actual drug use. Still, ratings of internal consistency are not consistent and vary between questionable and good ratings of Cronbach's α with values between .62 and .90 across dimensions (Newton et al., 2016; Woicik et al., 2009). While all dimensions of the SURPS have been discussed in more detail in the theoretical part of this thesis, Table 1 lists sample items for each subscale/personality dimension of the SURPS.

Table 1. *Subscales and sample items of the SURPS*

Subscale	Sample item
Hopelessness	I feel that I'm a failure
Anxiety sensitivity	I get scared when I experience unusual body sensations
Impulsivity	I often don't think things through before I speak
Sensation seeking	I enjoy new and exciting experiences even if they are unconventional

7.3.5 Brief Symptom Inventory (BSI-53). The BSI-53 is a highly valid and reliable questionnaire to identify self-reported psychological distress by assessing multiple clinically relevant psychological symptoms (Derogatis, 1975; Franke & Derogatis, 2000). It is a short version of the SCL-R-90 (Derogatis, 1975, 1977) and consists of 53 items covering nine symptom dimensions. These dimensions are somatization, obsession-compulsion, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, and psychoticism. Respondents rank each item on a 5-point Likert scale ranging from 0 (not at all) to 4

(extremely). Rankings characterize the intensity of distress during the past seven days. The dimension scores are calculated by summing the scores for each item of the respective dimension and dividing by the number of items included in that dimension. Items 11, 25, 39, and 52 do not factor into any dimension, but are included for their specific clinical relevance. Of further relevance to this study is item 9, which is part of the dimension of depression and assesses *suicidal ideation*, referring to *thoughts of ending your life*. Additionally, within the BSI-53, three global indices of distress are covered, which measure current or past levels of symptomatology, intensity of symptoms, and number of reported symptoms, respectively. These global indices are the Global Severity Index (GSI), Positive Symptom Distress Index (PSDI), and Positive Symptom Total (PST). Out of these three indices, this study focuses on the Global Severity Index (GSI), since it represents the most sensitive indicator of the respondent's level of distress and allows assessments regarding the number of symptoms and the intensity of psychological distress. It is calculated by summing up all items of the questionnaire and dividing them by their number. For all scales, resulting raw scores are transformed into T-scores using a subclinical norm table for adults for this study, to enable a standardized interpretation of the results. The T-score has a mean of 50 and a range of scores between 20 and 80. The range, in which no clinical conspicuity is apparent, lies between 40 and 60. Outside this range, the clinical conspicuity of mental distress increases with the height of the T-scores. T-scores greater than or equal to 63 indicate clinical conspicuity for each dimension. Moreover, the respondent's overall distress level can be considered clinically conspicuous in the case of an GSI T-score of 63 or above, or if the T-scores of two or more dimensions are at 63 or above (Franke & Derogatis, 2000). The BSI-53 has shown acceptable to good internal consistency for all dimensions in the past, with Cronbach's α ranging from .71 on psychoticism to .85 on depression (Derogatis, 1975), whereas Franke and Derogatis reported an excellent value of .92 for the GSI. Table 2 illustrates sample items for each subscale of the BSI-53.

Table 2. *Subscales and sample items of the BSI-53*

Subscale	Sample item
	<i>During the past 7 days, how much were you distressed by:</i>
Somatization	Nausea or upset stomach
Obsession-compulsion	Difficulty making decisions
Interpersonal sensitivity	Your feelings being easily hurt
Depression	Feelings of worthlessness
Anxiety	Nervousness or shakiness inside
Hostility	Having urges to beat, injure, or harm someone
Phobic anxiety	Feeling nervous when you are left alone
Paranoid ideation	Feeling that you are watched or talked about by others
Psychoticism	Never feeling close to another person

7.3.6 Healthy-Unhealthy Uses of Music Scale (HUMS). The HUMS was developed to assess healthy or unhealthy musical engagement as an indicator of proneness for depression in adolescents (Saarikallio et al., 2015). The HUMS consists of 13 items that are to be answered on a 5-point Likert scale, ranging from 1 (never) to 5 (always). The scale is divided into two subscales, *HUMS Unhealthy*, containing eight questions and *HUMS Healthy*, containing five questions. Since all items are scored, this results in a possible sum score ranging from 5 to 25 for the HUMS Healthy subscale and a possible sum score ranging from 8 to 40 for the HUMS Unhealthy subscale (Riedl & Stegemann, 2018; Saarikallio et al., 2015). According to Saarikallio et al. (2015), the two subscales of the HUMS include several key components of healthy or unhealthy music uses, which are social connection, mood enhancement, and distractive relaxation for the HUMS Healthy and avoidant coping, rumination as well as mood worsening for HUMS Unhealthy. However, the authors recommend the HUMS to be used primarily as a measure of the healthy/unhealthy dimensions, rather than separating it into its embedded key components. Concerning scores of internal consistencies, the HUMS showed adequate ratings for both the HUMS Healthy (Cronbach's α .78) and HUMS Unhealthy (Cronbach's α .83) subscales in its original sample of young adolescents (Saarikallio et al., 2015). Furthermore, scores between .78 and .87 for HUMS Healthy and between .80 and .83 for HUMS Unhealthy scales could be found in three different adult samples (Silverman, 2020, 2021, 2022). Overall, even though the HUMS is a relatively new and unproven questionnaire, it can be considered a reliable and valid measurement tool for assessing musical engagement as an indicator for psychological wellbeing and proneness for depression (Riedl & Stegemann,

2018; Saarikallio et al., 2015; Silverman, 2021). However, thus far only the HUMS Unhealthy subscale can be considered an indicator of depression since the HUMS Healthy subscale showed a significant positive correlation with depression for adolescents as well. Table 3 shows sample items for both subscales of the HUMS.

Table 3. *Subscales and sample items of the HUMS*

Subscale	Sample item
HUMS Healthy	I feel happier after playing or listening to music
HUMS Unhealthy	Music gives me an excuse not to face up to the real world

7.4 Research questions and hypotheses

In the following, research questions and resulting hypotheses which are accordant to the presented aims of this study are presented. In line with the illustrated ambiguous state of research illustrated above and the number of previously unconsidered dimensions of this thesis, most hypotheses are formulated non-directionally. Directional hypotheses are exclusively formulated for difference of mean hypotheses for the factors of gender and/or heavy music fandom in the dimensions of alcohol consumption (AUDIT), sensation seeking (SURPS), anxiety sensitivity (SURPS, only for gender), as well as for correlation hypotheses for both HUMS scales and depression (BSI-53). The first two research questions refer to correlations between both scales of the HUMS and depression (BSI-53). Following that, the bulk of formulated research questions is presented. These relate to differences between heavy music fans and non-fans, as well as between genders, within the scales of the AUDIT, SURPS, BSI-53 and HUMS, as well as for item 9 of the BSI-53, measuring suicidal ideation. Possible interaction effects between these groups are of interest as well. Each of these research questions can be split into two questions for main effects, related to group differences, and one question for the interaction effect. Research questions 3 to 6 are formulated accordingly. Lastly, research questions 7 to 10 refer to differences between fan groups of heavy music concerning alcohol consumption (AUDIT), personality risk for substance misuse (all dimensions of the SURPS), psychological distress (GSI, BSI-53), and healthy/unhealthy musical engagement (both scales of the HUMS). These last four research questions were originally planned to be optional, since it was only partly foreseeable whether their scope and statistical requirements would fit into the framework of this thesis. Accordingly, they are listed at the bottom of this chapter.

7.4.1 Correlation hypotheses for musical engagement and depression:

Research question 1: Is there a positive relation between *healthy musical engagement* and *depression*?

H0 (1): There is a negative relation between scores of *healthy musical engagement* (HUMS) and scores of *depression* (BSI-53), or no relation at all.

H1 (1): There is a positive relation between scores of *healthy musical engagement* (HUMS) and scores of *depression* (BSI-53).

Research question 2: Is there a positive relation between *unhealthy musical engagement* and *depression*?

H0 (2): There is a negative relation between scores of *unhealthy musical engagement* (HUMS) and scores of *depression* (BSI-53), or no relation at all.

H1 (2): There is a positive relation between scores of *unhealthy musical engagement* (HUMS) and scores of *depression* (BSI-53).

7.4.2 Hypotheses for main effects and interaction effects of heavy music fandom and gender

Research question 3: Which influence does heavy music fandom and gender have on *alcohol consumption*? Are there differences between the groups? Are there interaction effects between fandom and gender?

Q (3.1): Do heavy music fans show higher ratings of *alcohol consumption* than non-fans?

Q (3.2): Do men show higher ratings of *alcohol consumption* than women?

Q (3.3): Is there an interaction effect between the groups regarding *alcohol consumption*?

H0 (3.1): Heavy music fans show equal or lower ratings of *alcohol consumption* compared to non-fans (AUDIT).

H1 (3.1): Heavy music fans show higher ratings of *alcohol consumption* compared to non-fans (AUDIT).

H0 (3.2): Men show equal or lower ratings of *alcohol consumption* compared to women (AUDIT).

H1 (3.2): Men show higher ratings of *alcohol consumption* compared to women (AUDIT).

H0 (3.3): There is no interaction effect between heavy music fandom (heavy music fans/nonfans) and gender (male/female) regarding *alcohol consumption* (AUDIT).

H1 (3.3): There is an interaction effect between heavy music fandom (heavy music fans/nonfans) and gender (male/female) regarding *alcohol consumption* (AUDIT).

Research question 4: Which influence does heavy music fandom and gender have on *personality risk for substance misuse*? Are there differences between the groups? Are there interaction effects between fandom and gender?

Q (4.1.1): Do heavy music fans differ from nonfans in ratings of *hopelessness*?

Q (4.1.2): Do men differ from women in ratings of *hopelessness*?

Q (4.1.3): Is there an interaction effect between the groups regarding *hopelessness*?

H0 (4.1.1): Heavy music fans do not differ from non-fans in ratings of *hopelessness* (SURPS).

H1 (4.1.1): Heavy music fans differ from non-fans in ratings of *hopelessness* (SURPS).

H0 (4.1.2): Men do not differ from women in ratings of *hopelessness* (SURPS).

H1 (4.1.2): Men differ from women in ratings of *hopelessness* (SURPS).

H0 (4.1.3): There is no interaction effect between heavy music fandom (heavy music fans/nonfans) and gender (male/female) regarding *hopelessness* (SURPS).

H1 (4.1.3): There is an interaction effect between heavy music fandom (heavy music fans/nonfans) and gender (male/female) regarding *hopelessness* (SURPS).

Q (4.2.1): Do heavy music fans differ in ratings of *anxiety sensitivity* compared to non-fans?

Q (4.2.2): Do women show higher ratings of *anxiety sensitivity* than men?

Q (4.2.3): Is there an interaction effect between the groups regarding *anxiety sensitivity*?

H0 (4.2.1): Heavy music fans do not differ from non-fans in ratings of *anxiety sensitivity* (SURPS).

H1 (4.2.1): Heavy music fans differ from non-fans in ratings of *anxiety sensitivity* (SURPS).

H0 (4.2.2): Women show equal or lower ratings of *anxiety sensitivity* compared to men (SURPS).

H1 (4.2.2): Women show higher ratings of *anxiety sensitivity* compared to men (SURPS).

H0 (4.2.3): There is no interaction effect between heavy music fandom (heavy music fans/nonfans) and gender (male/female) regarding *anxiety sensitivity* (SURPS).

H1 (4.2.3): There is an interaction effect between heavy music fandom (heavy music fans/nonfans) and gender (male/female) regarding *anxiety sensitivity* (SURPS).

The research questions Q (4.3.1) to Q (4.3.3) and hypotheses H (4.3.1) to H (4.3.3), concerning *impulsivity* are analogues to the depicted research questions Q (4.1.1) to Q (4.1.3) and hypotheses H (4.1.1) to H (4.1.3), respectively.

Q (4.4.1): Do heavy music fans show higher ratings of *sensation seeking* than non-fans?

Q (4.4.2): Do men show higher ratings of *sensation seeking* than women?

Q (4.4.3): Is there an interaction effect between the groups regarding *sensation seeking*?

H0 (4.4.1): Heavy music fans show equal or lower ratings of *sensation seeking* compared to non-fans (SURPS).

H1 (4.4.1): Heavy music fans show higher ratings of *sensation seeking* compared to non-fans (SURPS).

H0 (4.4.2): Men show equal or lower ratings of *sensation seeking* compared to women (SURPS).

H1 (4.4.2): Men show higher ratings of *sensation seeking* compared to women (SURPS).

H0 (4.4.3): There is no interaction effect between heavy music fandom (heavy music fans/nonfans) and gender (male/female) regarding *sensation seeking* (SURPS).

H1 (4.4.3): There is an interaction effect between heavy music fandom (heavy music fans/nonfans) and gender (male/female) regarding *sensation seeking* (SURPS).

Research question 5: Which influence does heavy music fandom and gender have on symptoms of *psychological distress*? Are there differences between the groups? Are there interaction effects between fandom and gender?

The research questions Q (5.1.1) to Q (5.11.3) and hypotheses H (5.1.1) to H (5.11.3), concerning the *GSI* and dimensions *somatization*, *obsession-compulsion*, *interpersonal*

sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, and psychoticism of the BSI-53, as well as *suicidal ideation* as measured by item 9 of the BSI-53, are analogues to the depicted research questions Q (4.1.1) to Q (4.1.3) and hypotheses H (4.1.1) to H (4.1.3), respectively.

Research question 6: Which influence does heavy music fandom and gender have on *musical engagement*? Are there differences between the groups? Are there interaction effects between fandom and gender?

The research questions Q (6.1.1) to Q (6.2.3) and hypotheses H (6.1.1) to H (6.2.3), concerning *HUMS Healthy* and *HUMS Unhealthy* are analogues to the depicted research questions Q (4.1.1) to Q (4.1.3) and hypotheses H (4.1.1) to H (4.1.3), respectively.

7.4.3 Hypotheses for differences between heavy music fan groups

In the following, research questions 7 to 10 are displayed, which relate to differences between heavy music fan groups *concerning alcohol consumption, personality risk of substance misuse, psychological distress, and musical engagement*. Since research questions and corresponding hypotheses are identical except for the corresponding dependent variable, all research questions and hypotheses are illustrated compendiously.

Research question 7: Do the individual subgenre-related heavy music fan groups differ in ratings of *alcohol consumption*?

H0 (7): Subgenre-related heavy music fan groups (hard rock, punk, metal, rap/hip-hop, and electro) do not differ in ratings of *alcohol consumption* (AUDIT).

H1 (7): Subgenre-related heavy music fan groups (hard rock, punk, metal, rap/hip-hop, and electro) differ in ratings of *alcohol consumption* (AUDIT).

The remaining research questions Q (8.1) to Q (10.2) and hypotheses H (8.1) to H (10.2), concerning the dimensions of the SUPRS, the BSI-53 (*GSI*), and HUMS, are analogues to the depicted research question Q (7) and hypotheses H (7), respectively.

7.5 Applied statistical analyses

All statistical analyses were performed using the IBM SPSS 27 statistics program. Descriptive data was analyzed via frequency tables for nominal data and via means and standard deviations for metric data. This included sociodemographic data, data concerning heavy music affiliation and cut-off related data of the AUDIT and BSI-53. For inferential statistical analysis, a significance level of $\alpha = 5\%$ was set, according to which a result is to be considered

statistically significant at $p < .05$ for two-sided testing. Moreover, all group sizes for each statistical analysis were at $n > 30$, meaning that according to the principles of the central limit theorem, the normal distribution of the data could be considered as given (Bortz & Schuster, 2010). Analysis of reliability was used to calculate values for Cronbach's α and values for corrected item discriminant power for the scales of each questionnaire.

For research questions 1 and 2, Pearson correlation analysis was conducted to test the bivariate correlation between HUMS Healthy, HUMS Unhealthy and depression, respectively. Normal distribution and metric scaling of variables was given, attributable to sample and item characteristics. The additional prerequisite of a linear relationship between the variables was prior tested by analyzing scatterplots. Correlation analysis measures the extent of the linear relation between two variables. The measure of this relationship is the correlation coefficient r , which can take values between -1 and 1, indicating a positive or negative relation between the variables. For the effect size, values $r > .10$ are considered small, values $r > .30$ are considered medium and values from $r = .50$ are considered large (Cohen, 1988).

The remaining research questions were tested using analysis of variance (ANOVA). For research questions 3 to 6, multiple 2x2 factorial ANOVAs were conducted, using the groups of gender (male/female) and heavy music fandom (fan/non-fan) as independent variables. For research questions 7 to 10, multiple one-way ANOVAs were conducted, using genre-based heavy music fan groups (hard rock/punk rock/metal/heavy electro) as independent variable.

The ANOVA offers information on whether the dependent variable differs systematically in terms of its mean scores in relation to one or more independent variable(s), which are referred to as factors. Factors can be seen as grouping variables as well. Expressions of a factor are called factor levels, which is synonymous to individual groups whose means are being compared. Significant main group effects imply that the factor levels of the independent variable differ from another and that the respective independent variable has a significant influence on the dependent variable. In the case of only two factor levels, this automatically implies that the two sub-groups of the factor differ significantly from another, making post-hoc analyses obsolete. By analyzing group means, the direction of the main effect can be evaluated. For more than two factor levels, post-hoc tests are necessary to determine which groups differ from one another. Post-hoc tests of Hochberg or Games-Howell were utilized for one-way ANOVAs in the case of different sample sizes or for unequal group variances, respectively (Field, 2017).

While the direct effect of a factor on the dependent variable is called the main effect, factorial ANOVAs, which include more than one factor, also measure possible interaction

effects between the factors. This examines whether the two factors interact in a complex way, meaning that the effect of one factor on the dependent variable depends on the expression of the other factor and vice versa. In the case of significant interaction effects, the specific way of interaction of the factors can be interpreted by graphical illustration of group means. A non-significant effect however allows for a clear interpretation of the main effect of the factors. This indicates that the influence of the factors on the dependent variable is independent from each other, making further graphical assessments obsolete (Bortz & Schuster, 2010).

Moreover, the principle of the ANOVA is to split the total variance of the dependent variable. This total variance is made up of the variance within groups and the variance between groups. These two proportions are compared within the framework of an ANOVA. Consequently, this method also provides information on the amount of variance within the dependent variable that can be explained by the factors (Bortz & Schuster, 2010). Partial Eta squared (η_p^2) is utilized to describe the effect size of ANOVA. Effect sizes can be divided into small ($\eta_p^2 \geq .01$), medium ($\eta_p^2 \geq .06$), or large ($\eta_p^2 \geq .14$) (Cohen, 1988).

The ANOVA also has various prerequisites. These prerequisites are independent groups, a metrically scaled dependent variable, normally distributed data within the groups and homogeneity of variance. Homogeneity of variance was tested using the Levene-test. In the case of the Levene-test being significant, Welch ANOVA can be used to analyze the data instead of one-way ANOVAs. For 2x2 factorial ANOVAs, SPSS does not provide non-parametrical alternatives, which makes the use of this method necessary despite possible compromised informative value if homogeneity of variance is not given.

Regarding factor compositions of conducted ANOVAs, for the factor of gender, only male and female participants could be included into analyses. This is because the number of diverse individuals was too low compared to male and female participants, which makes comparisons between all three groups problematic regarding the assumption of normal distribution and homogeneity of variance (Bortz & Schuster, 2010). Concerning the factor of heavy music fandom, to split the sample into a fan group and a non-fan group for factorial ANOVAs, two criteria were set. The first criterion required the participant to self-consider him/herself to be a fan of heavy music and the second criterion needed the participant to listen to at least ten hours of heavy music genres per week. The score of ten hours per week had to be set under self-consideration. These criteria were set to only assign participants who show considerable devotion to heavy music into the fan group, and to achieve more balanced group-sizes. Preference was not considered as a criterion since preference for the genres did not differ greatly between self-considered fans and non-fans. For the factor of genre-based heavy music

fan groups, participants of the fan group were further split into genre-based fan groups based on their most preferred heavy music genre. Only for the *hard rock*, *punk rock*, *metal*, and *heavy electro* groups the number of members was at $n \geq 30$. Thus, a *heavy hip-hop* fan group could not be considered into analyses for the same reasons as for the group of diverse individuals.

Lastly, for research questions 3, 4, and 5, concerning the dimensions of *alcohol consumption*, *anxiety sensitivity*, *sensation seeking*, *GSI*, *somatization*, *obsession-compulsion*, *interpersonal sensitivity*, *depression*, *anxiety*, *hostility*, *psychoticism*, as well as *suicidal ideation*, age has been inserted into 2x2 ANOVAs as a covariate, technically making these analyses 2x2 ANCOVAs. This has been done to factor out the influence of age on the dependent variable, since the groups significantly differed in age (see table A1 of the appendix). By checking the additional prerequisites of ANCOVA, only the named dimensions were deemed suitable for the insertion. The prerequisite of correlation between the dimensions and covariate was tested using Pearson correlations. The homogeneity of the regression slopes was tested using interaction terms (Bortz & Schuster, 2010). For one-way ANOVAs, it was refrained from utilizing age as covariate. Firstly, this is because no tested dimension offered homogeneity of the regression slopes except for *anxiety sensitivity*. Secondly, SPSS does not offer Hochberg or Games-Howell post-hoc tests for ANCOVA, which deemed to be necessary due to varying group sizes and occasional unequal group variances (Field, 2017).

7.6 Preparation of data

Two participants made invalid claims towards their age, stating to be 2 and 4 years of age, respectively, despite affirming to be at least 18 years old on the first page of the questionnaire. For these two participants, missing values have been inserted instead, to prevent distortion of data for the variable of age. Moreover, one individual provided missing data for the first item of the heavy music questionnaire, asking the participant whether he/she would consider oneself a fan of heavy music or not. Since this individual scored a mean score of 4.4 points out of 5 for heavy music preference, indicating high to very high preference, and stated to listen to relevant heavy music genres for 25h a week, it was deductively assumed that this participant is to be considered a fan of heavy music. Thus, the item was answered manually with *yes*. Another participant did not answer the two questions asking for hours spent listening per week for heavy electro and heavy hip-hop genres. Since preference for these genres was at *do not like at all*, a value of 0 was inserted for both items. This was coinciding with hours listened to relevant heavy music genres per week for this respondent.

Additionally, mean data imputation has been applied for 11 items in total. Substituted scores for two items concerning quantity of heavy music listening, five items of the SURPS,

two items of the BSI-53 and two items of the HUMS were inserted instead of missing values, by calculating means for the accordant subscale. For each scale, percentage of missing data never exceeded the 20 percent mark. Furthermore, no imputed item had more than one missing value throughout the data set, except for *hours of heavy hip-hop listened per week*, which has been imputed for two participants, respectively. This insures negligible negative influence on the validity of the data.

8. Results

In this chapter, descriptive data of sample characteristics, including descriptive and cut-off related data for heavy music fandom, alcohol consumption, and psychological distress, results of the reliability analyses of the measurement instruments used, and results of statistical analyses for testing of established hypotheses are depicted.

8.1 Sample description

This chapter is further split into response statistics, sociodemographic data, and distributions of the sample, related to gender and age, country of residence, level of education, and relationship status are presented. Furthermore, relevant data for heavy music fandom, as well as data concerning alcohol consumption and levels of psychological distress are illustrated.

8.1.1 Response statistics. 1136 individuals started to work on the questionnaire of which 820 (72.2%) filled out the questionnaire completely. After eliminating participants because of missing consent and/or high levels of missing data, 855 participants made it into the final sample. A possible reason for the drop-out rate of 27.8% might be the length of the questionnaire, spanning 117 items. Another reason might be the niche topic of this thesis. Participants might have felt to not be able to fully contribute to this study, if they are not affiliated with heavy music at all.

8.1.2 Gender and age. 566 participants (66.2%) reported being male, 271 (31.7%) reported being female, and 18 participants (2.1%) reported being diverse. The mean age of this sample was at 36.93 years of age ($SD = 11.02$). The youngest participant was 18 years old, whereas the oldest participant reported to be 71 years old. Men ($M = 39.18$, $SD = 10.69$) were on average 6.64 years older than women ($M = 32.54$, $SD = 10.50$) and 6.94 years older than diverse individuals ($M = 32.24$, $SD = 8.51$). Furthermore, age significantly and negatively correlated with all variables, except for hopelessness, impulsivity, phobic anxiety, paranoid ideation, and HUMS Healthy. For exact values consult table A2 of the appendix.

8.1.3 Country of residence. 710 participants stated to primarily reside in *Germany* (83.1%), 97 in *Austria* (11.3%), and 36 in *Switzerland* (4.2%). 12 participants (1.4%) lived in countries outside of the *D/A/CH* area. Two participants each stated to live in *Poland*, *Luxembourg*, and *Spain*. One person each lived in *France*, *Italy*, *Guernsey*, *Indonesia*, *Netherlands*, and *Sweden*.

8.1.4 Level of education and relationship status. Table 4 illustrates quantities and percentages for the level of education and relationship statuses of participants. The data is sorted in descending order by number of individuals per category.

Table 4. *Quantities and percentages for the highest acquired level of education and relationship status*

Level of education	n	%
Master's degree or equivalent (e.g., Magister, Diploma...)	227	26.4
General matriculation standard (Matura, Abitur...)	224	26.2
Bachelor's degree	169	19.8
Apprenticeship	111	13.0
Mandatory school	53	6.2
PhD or Doctorate	28	3.3
Mastership examination	28	3.3
Vocational school (e.g., HAS/HASCH)	15	1.8
Total	855	100
Relationship status		
In a relationship	328	38.4
Married	260	30.4
Single	230	26.9
Separated/divorced	26	3.0
Other	11	1.3
Total	855	100

8.1.5 Descriptive data of heavy music fandom. 755 participants (88.3%) considered themselves to be fans of heavy music. Since in this study, being considered a fan of heavy music additionally required the participants to listen to at least 10 hours of heavy music per week, 511 participants who met both criteria were included into the fan group. Six participants could not be assigned to any group, because of missing data of *hours listened per week* for heavy music

genres. The fan group comprised of 395 men (77.3%), 107 women (20.9%), and 9 diverse fans (1.8%). The non-fan group ($n = 338$) comprised 166 men (49.1%), 163 women (48.2%), and 9 diverse participants (2.7%). On average, fans ($M = 38.02$ years, $SD = 10.13$) were 2.65 years older than non-fans ($M = 35.37$ years, $SD = 12.09$). Fans reported to listen to 28.37 hours of music per week ($SD = 17.15$), which is over twice as much as for non-fans ($M = 11.68$ years, $SD = 10.36$). Of these 28.37 hours, 24.10 hours were dedicated to heavy music genres ($SD = 15.64$). Moreover, fans reported to be part of the heavy music culture for 22.80 years on average ($SD = 10.84$).

Concerning favorite genres, 36 fans (7.0%) considered hard rock to be their favorite genre, 226 (44.2%) picked punk rock, 193 (37.8%) picked Metal, 7 (1.4%) picked heavy hip-hop, and 45 (8.8%) picked heavy electro. Three fans (0.6%) stated neither of these genres to be their favorite and one respondent made no statement (0.2%).

To conclude this chapter, table 5 shows means and standard deviations for preferences and hours listened of all heavy music genres for the fan group.

Table 5. *Means and standard deviations of preferences and hours listened per week for each heavy music genre within the fan group, $N=511$*

Genre	Preference		Hours per week	
	M	SD	M	SD
Hard Rock	4.41	1.33	4.05	5.88
Punk Rock	5.13	1.23	8.35	9.21
Metal	4.95	1.30	8.32	10.23
Heavy Hip-Hop	2.85	1.54	1.50	4.21
Heavy Electro	2.62	1.73	1.89	5.34

8.1.6 Descriptive data of alcohol consumption. The mean score of the AUDIT sum-score for the overall sample was 8.43 ($SD = 5.53$, $N = 855$), which is above the recommended cut-off value for hazardous or harmful alcohol consumption. 47 participants (5.5%) stated not to drink at all and could be considered primary or secondary abstinent within the last 12 months. 434 participants (50.7%) showed scores of 8 or above, indicating hazardous or harmful consumption and 114 (13.3%) showed scores of 15 or above, indicating likelihood of alcohol dependence.

Regarding gender, 56.5% of male participants ($n = 320$), 39.1% of female participants ($n = 106$), and 38.9% of diverse participants ($n = 7$) reported hazardous or harmful alcohol

consumption, categorized by a generic cut-off value of 8. Applying a more progressive cut-off value for hazardous or harmful consumption of 5 points for women, the percentage of female participants with hazardous or harmful consumption increased to 70.5 % ($n = 191$). Lastly, 16.6% of male ($n = 94$), 6.6% of female ($n = 18$) and 11.1% of diverse individuals ($n = 2$) exhibited scores that suggest alcohol dependence.

8.1.7 Descriptive data of personality risk for substance misuse. Table 6 depicts means, standard deviations, and number of valid cases for all scales of the SURPS.

Table 6. *Means, standard deviations and number of valid cases for the SURPS scales*

Subscale	M	SD	N
Hopelessness	13.70	3.94	855
Anxiety sensitivity	12.21	2.71	854
Impulsivity	9.63	2.36	854
Sensation seeking	14.66	3.51	855

8.1.8 Descriptive data of psychological distress. 253 of all respondents (29.6%) exhibited GSI T-scores of 63 or above and 365 (42.7%) exhibited scores of 63 or above in at least two subscales of the BSI-53, indicating clinical conspicuity of psychological distress for these individuals. The mean T-score of the GSI was 56.71 ($SD = 12.66$, $N = 855$).

The mean score of suicidal ideation, as measured by item number 9, was at 0.19 ($SD = 0.56$, $N = 855$). Note, that this score does not represent a T-score, since the BSI-53 only provides transformative values for entire subscales and not for single items. The lowest possible score for this item is 0, whereas the largest score is 4, as described in chapter 7.3.5.

Table 7 illustrates mean T-scores, standard deviations, as well as numbers and percentages of participants with scores of 63 or above for each subscale of the BSI-53.

Table 7. Means, standard deviations as well as numbers and percentages of participants showing conspicuous scores for each BSI-53 subscale, $N=855$

Subscale	M	SD	n	%
Somatization	51.25	10.39	146	17.1
Obsession-Compulsion	54.97	11.37	223	26.1
Interpersonal Sensitivity	55.62	11.68	229	26.8
Depression	57.69	11.65	255	29.8
Anxiety	53.35	11.21	155	18.1
Hostility	55.51	10.97	240	28.1
Phobic Anxiety	56.51	10.78	223	26.1
Paranoid ideation	54.45	10.67	188	22.0
Psychoticism	55.36	11.47	200	23.4

8.1.9 Descriptive data of musical engagement. The mean score for the HUMS Healthy scale was 19.53 ($SD = 3.27$, $N = 842$) for the entire sample. The mean score of the HUMS Unhealthy scale was 12.27 ($SD = 4.20$, $N = 842$).

8.2 Reliability analyses of measurement instruments

To appraise the reliabilities of the instruments used, internal consistencies were calculated for the scales of the AUDIT, SURPS, BSI-53, and HUMS. Reliability determines the measurement accuracy of a test and internal consistency is a commonly used measure of reliability. High internal consistency (calculated via Cronbach's α) is taken as an indication of high reliability of an instrument (Döring & Bortz, 2016). Values of $\alpha = .90$ can be considered excellent, values between $\alpha = .90$ and $\alpha = .80$ can be considered good, values between $\alpha = .80$ and $\alpha = .70$ are acceptable, and values between $\alpha = .70$ and $\alpha = .60$ are questionable. Values below .60 are considered low or unacceptable (Blanz, 2015; Döring & Bortz, 2016). In addition, the minimum and maximum of the corrected discriminant power of items are displayed. Item discriminant power is the correlation of an item with the total test score. This is used to estimate how well an item discriminates between individuals with high and individuals with low trait expressions. Values between 0.3 and 0.5 can be considered moderate and values greater than 0.5 can be considered high. Values below 0.3 are problematic (Döring & Bortz, 2016).

8.2.1 Reliability analyses of the AUDIT. The AUDIT displayed a good value of internal consistency with Cronbach's $\alpha = .802$ for the main scale (10 items, $N = 854$). All corrected item discriminant values are in a high to moderate range, CI [.321, .731].

8.2.2 Reliability analyses of the SURPS. Values of internal consistency for the SURPS scales are between a good and questionable range. Item number 22, which is part of the impulsivity subscale, was the only item that is to be considered problematic since the value for its discriminant power was at .191. Table 8 displays values for Cronbach's α , minima and maxima of corrected item discriminant power, and the number of valid cases for all scales of the SURPS.

Table 8. *Cronbach's α reliability coefficients minimum and maximum of corrected discriminatory power for the SURPS scales, and number of valid cases*

Scale	Number of items	Cronbach's α	Minimum	Maximum	N
Hopelessness	7	.886	.598	.763	855
Anxiety sensitivity	5	.671	.326	.528	854
Impulsivity	5	.611	.191	.511	854
Sensation seeking	6	.702	.308	.564	855

8.2.3 Reliability analyses of the BSI-53. Values of internal consistency for the BSI-53 subscales were within a good and acceptable range. The only exception posed the phobic anxiety subscale, which had questionable ratings of Cronbach's α . Additionally, the GSI showed excellent results. All values of corrected discriminant power were satisfactory as well. Table 9 displays values for Cronbach's α as well as minima and maxima of corrected item discriminant power for all scales of the BSI-53, excluding the global indices PST and PSDI.

Table 9. *Cronbach's α reliability coefficients, as well as minimum and maximum discriminatory power for the BSI-53 scales, N=855*

Scale	Number of items	Cronbach's α	Minimum	Maximum
GSI	53	.959	.333	.748
Somatization	7	.788	.394	.602
Obsession-Compulsion	6	.803	.441	.701
Interpersonal Sensitivity	4	.790	.574	.654
Depression	6	.877	.604	.777
Anxiety	6	.795	.496	.620
Hostility	5	.769	.499	.640
Phobic Anxiety	5	.678	.382	.570
Paranoid Ideation	5	.764	.367	.631
Psychoticism	5	.726	.333	.624

8.2.4 Reliability analyses of the HUMS. Ratings of internal consistency for both scales of the HUMS were acceptable. Values of corrected discriminant power were moderate to high. Table 10 displays values for Cronbach's α as well as minima and maxima of corrected item discriminant power for the scales of the HUMS.

Table 10. *Cronbach's α reliability coefficients, as well as minimum and maximum discriminatory power for the HUMS scales, N=842*

Scale	Number of items	Cronbach's α	Minimum	Maximum
HUMS Healthy	5	.754	.372	.614
HUMS Unhealthy	8	.787	.362	.604

8.3 Testing of hypotheses

In the following, the results for the respective hypotheses of the research questions from chapter 7.4 are given.

8.3.1 Correlation hypotheses for musical engagement and depression. To test the first two research questions, Pearson correlation was conducted to examine the relation between both HUMS scales and depression (BSI-53). All prerequisites were met. The calculated significance values were halved due to directional testing. For the first research question, the HUMS Healthy scale negatively correlated with depression ($r = -.070$, $p = .021$, $N = 842$). This can be considered a small effect size. The result is antithetical to the predicted relation

between the variables. Thus, the null hypothesis H0 (1) was retained.

For the second research question, the HUMS Unhealthy scale negatively correlated with depression ($r = .492, p < .001, N = 842$). This can be considered a large effect size. In line with this result, the null hypothesis H0 (2) was rejected and the alternative hypothesis H1 (2) was assumed.

8.3.2 Hypotheses for main effects and interaction effects of heavy music fandom and gender. This chapter illustrates the results of all hypotheses concerning group differences and interaction effects of gender and heavy music fandom for all scales of alcohol consumption, personality risk for substance misuse, psychological distress, and healthy/unhealthy musical engagement. Concerning group sizes for all analyses, the factor of fandom consisted of 502 fans and 329 non-fans and of gender consisted of 561 men and 270 women. Furthermore, this resulted in 395 male fans and 166 male non-fans. For women, this resulted in 107 female fans and 163 female non-fans. The respective group sizes only varied slightly throughout all analyses.

8.3.2.1 Hypotheses of main effects and interaction effect for alcohol consumption. To test the main effects as well as the interaction effect of fandom and gender on alcohol consumption, a 2x2 ANCOVA was performed. Age was used as a covariate. All prerequisites of 2x2 ANCOVA were met, except for homogeneity of variance, as the Levene-test was significant ($p < .001$). Since SPSS does not provide a non-parametrical alternative to 2x2 ANCOVA, the analysis was conducted anyway ($N = 829$). The covariate, age, was significantly related to alcohol consumption $F(1, 824) = 39.355, p < .001, \eta^2_{part} = .046$. Thus, the covariate had a small to medium effect on the dependent variable.

After controlling for age, no significant main effect was found for fandom $F(1, 824) = 2.208, p = .069$. Thus, fans ($M = 8.31$) did not significantly differ from non-fans ($M = 7.69$) in alcohol consumption ($M_{diff} = 0.62$). Accordingly, the null hypothesis H0 (3.1) was retained.

In contrast, there was a significant main effect of gender on alcohol consumption $F(1, 824) = 33.989, p < .001, \eta^2_{part} = .040$. This means that male ($M = 9.26$) and female ($M = 6.75$) participants significantly differed in alcohol consumption ($M_{diff} = 2.51$) with a small to medium effect size. Consequently, the null hypothesis H0 (3.2) was rejected and the alternative hypothesis H1 (3.1) was accepted.

There was no significant interaction effect between gender and fandom $F(1, 824) = 0.084, p = .773$. Therefore, the null hypothesis H0 (3.3) was retained.

8.3.2.2 Hypotheses of main effects and interaction effects for personality risk for substance misuse. To test the main effects as well as interaction effects of fandom and gender on the personality traits of the SURPS, two 2x2 ANCOVAs for anxiety sensitivity and sensation seeking and two 2x2 ANOVAs for hopelessness and impulsivity were performed. Age was used as a covariate for ANCOVAs. All prerequisites were met. The sample size varied slightly for analyses concerning hopelessness ($N = 831$), anxiety sensitivity ($N = 829$), impulsivity ($N = 830$), and sensation seeking ($N = 830$). Table 11 shows main effects and interaction effects of heavy music fandom and gender regarding all SURPS scales, including group means, group differences, F-values, significance values, and effect sizes for significant effects. For models containing age as covariate, suitable parameters are presented as well.

Table 11. *Main effects and interaction effects of heavy music fandom and gender for all scales of the SURPS*

Factor(s)	M	M diff	F (df1, df2)	p	η^2_{part}
Hopelessness					
Fan vs. non-fan	13.66 / 13.67	- 0.01	0.214 (1, 827)	.644	
Male vs. female	13.77 / 13.44	0.33	1.445 (1, 827)	.230	
Fandom $\times$ gender			0.068 (1, 827)	.795	
Anxiety sensitivity					
Fan vs. non-fan	12.33 / 12.54	- 0.21	1.025 (1, 824)	.312	
Male vs. female	11.90 / 12.97	- 1.07	25.405 (1, 824)	< .001***	.030
Fandom $\times$ gender			0.802 (1, 824)	.371	
Age			5.210 (1, 824)	.023*	.006
Impulsivity					
Fan vs. non-fan	9.79 / 9.40	0.39	5.875 (1, 826)	.016*	.007
Male vs. female	9.60 / 9.70	- 0.10	1.702 (1, 826)	.192	
Fandom $\times$ gender			0.042 (1, 826)	.838	
Sensation seeking					
Fan vs. non-fan	14.66 / 14.42	0.24	0.884 (1, 825)	.174	
Male vs. female	14.98 / 14.10	0.88	10.694 (1, 825)	< .001***	.013
Fandom $\times$ gender			2.210 (1, 825)	.138	
Age			81.153 (1, 825)	< .001***	.090

Note: * $p < .05$, ** $p < .01$, *** $p < .001$

One significant main effect occurred for fandom and impulsivity. Fans exhibited significantly higher expressions of impulsivity compared to non-fans. The effect size is to be considered small. No further main effects for fandom were found for all SURPS scales. According to this result, only H0 (4.3.1) was rejected, and H1 (4.3.1) was adopted. The remaining null hypotheses regarding main effects for fandom, H0 (4.1.1), H0 (4.2.1), and H0 (4.4.1) were retained.

There was a significant main effect of gender for anxiety sensitivity and sensation seeking. Age was controlled for both variables and significantly related to the variables with a small to medium effect. As predicted, women scored significantly higher on anxiety sensitivity whereas men scored significantly higher on sensation seeking. Effect sizes are small to medium for anxiety sensitivity and small for sensation seeking. Consequently, the null hypotheses H0 (4.2.2) and H0 (4.4.2) were rejected and the alternative hypotheses H1 (4.2.2) and H1 (4.4.2) were accepted. No more significant main effects were found for gender, meaning that H0 (4.1.2) and H0 (4.3.2) were retained.

Since no interaction effects for the groups were significant, the null hypotheses H0 (4.1.3) to (4.4.3) remain valid.

8.3.2.3 Hypotheses of main effects and interaction effects for psychological distress.

Multiple 2x2 AN(C)OVAs were conducted to test main effects and interaction effects of fandom and gender for all dimensions of psychological distress of the BSI-53. Age was used as a covariate for all dimensions except for phobic anxiety and paranoid ideation, for reasons described in chapter 7.5. The sample size varied slightly for analyses concerning phobic anxiety and paranoid ideation ($N = 831$) and the remaining variables ($N = 830$). All prerequisites were met for AN(C)OVAs, except for homogeneity of variance for three dimensions. This is apparent by the Levene-test being significant for obsession-compulsion ($p = .008$), hostility ($p = .011$), and psychoticism ($p = .011$). For these dimensions the analyses were conducted anyway for the lack of a non-parametrical alternative. Table 12 shows main effects and interaction effects of heavy music fandom and gender regarding the dimensions of psychological distress with significant effects. The table displays group means, group differences, F-values, significance values, and effect sizes for significant effects. For models containing age as covariate, suitable parameters are presented also. For a more exhaustive illustration of results of the BSI-53, including all dimensions and suicidal ideation as measured by item 9, consult table A3 of the appendix.

Table 12. *Main effects and interaction effects of heavy music fandom and gender for the scales of the BSI-53 including significant effects*

Factor(s)	M	M diff	F (df1, df2)	p	η^2 part
Depression					
Fan vs. non-fan	57.37 / 57.22	0.15	0.029 (1, 825)	.865	
Male vs. female	58.42 / 56.18	2.24	5.937 (1, 825)	.015*	.007
Fandom $\times$ gender			0.014 (1, 825)	.906	
Age			32.738 (1, 825)	< .001***	.038
Paranoid Ideation					
Fan vs. non-fan	55.14 / 53.38	1.76	4.034 (1, 825)	.045*	.005
Male vs. female	54.73 / 53.83	0.90	0.229 (1, 825)	.632	
Fandom $\times$ gender			0.001 (1, 825)	.981	

Note: * $p < .05$, *** $p < .001$

Age was significantly related to all independent variables of all models of ANCOVAs with small to medium effect sizes.

Regarding main effects of fandom, one significant group difference was found for paranoid ideation, with fans showing higher expressions than non-fans. The effect size is small and the influence of age was not factored out for this dimension. No other main effects for fandom were detected. Therefore, only the null hypothesis H0 (5.9.1) was rejected and H1 (5.9.1) was accepted. The null hypotheses H0 (5.1.1) to H0 (5.8.1), H0 (5.10.1), and H0 (5.11.1) remain valid.

One significant main effect of gender was found for depression. Men scored significantly higher on depression with a small effect. Age was controlled for this variable. In line with this result, the null hypotheses H0 (5.4.2) was rejected and the alternative hypotheses H1 (5.4.2) was accepted. Since no additional significant main effects for gender concerning all remaining variables were found, the null hypotheses H0 (5.1.2) to H0 (5.3.2) and H0 (5.5.2) to H0 (5.11.2) were retained.

No interaction effects for the groups were significant for any variable. Accordingly, all null hypotheses H0 (5.1.3) to (5.11.3) remain valid.

8.3.2.4 Hypotheses of main effects and interaction effects for musical engagement.

Two 2x2 ANOVAs were conducted to test main effects and interaction effects of fandom and gender for HUMS Healthy and HUMS Unhealthy. All prerequisites were met, except for

homogeneity of variance for HUMS Healthy, as the Levene-test was significant ($p = .027$). 2x2 ANOVA was conducted anyway for the lack of a non-parametrical alternative. Table 13 shows main effects and interaction effects of heavy music fandom and gender for both scales of the HUMS. The table displays group means, group differences, F-values, significance values, and effect sizes for significant effects.

Table 13. *Main effects and interaction effects of heavy music fandom and gender for both scales of the HUMS, N= 820*

Factor(s)	M	M diff	F (df1, df2)	p	η^2 part
HUMS Healthy					
Fan vs. non-fan	20.08 / 18.64	1.44	42.507 (1, 816)	< .001***	.050
Male vs. female	19.54 / 19.47	0.07	2.586 (1, 816)	.108	
Fandom $\times$ gender			0.915 (1, 816)	.339	
HUMS Unhealthy					
Fan vs. non-fan	12.43 / 12.06	0.37	3.475 (1, 816)	.063	
Male vs. female	12.07 / 12.73	- 0.66	6.651 (1, 816)	.010*	.008
Fandom $\times$ gender			0.005 (1, 816)	.946	

Note: * $p < .05$, ** $p < .01$, *** $p < .001$

A significant main effect of fandom on HUMS Healthy was found. Fans showed significantly higher expressions of healthy musical engagement compared to non-fans with a medium effect size. Regarding HUMS Unhealthy, no significant effect emerged for fandom. Coherently, H0 (6.1.1) was rejected, and H1 (6.1.1) was adopted, while H0 (6.2.1) remains valid.

Contrarily to the results of fandom on the scales, there was a significant main effect of gender for HUMS Unhealthy, but no significant effect for HUMS Healthy. Women showed significantly higher ratings of unhealthy musical engagement compared to men, with a small effect size. Consequently, the null hypothesis H0 (6.2.2) was rejected and the alternative hypotheses H1 (6.2.2) was accepted. H0 (6.1.2) was retained.

No interaction effects for the groups are significant. Both null hypotheses H0 (6.1.3) and H0 (6.2.3) remain valid.

8.3.3 Hypotheses for differences between heavy music fan groups

This chapter shows the results of all hypotheses concerning differences between the respective heavy music fan groups for alcohol consumption, personality risk for substance misuse, psychological distress (GSI), and musical engagement. Group sizes comprised 36 hard rock fans, 226 punk rock fans, 193 metal fans, and 45 heavy electro fans. Heavy hip-hop fans could not be included as referenced in chapter 8.1.5. All group sizes only differed slightly throughout all analyses and never went below the critical value of $n = 30$.

8.3.3.1 Hypotheses of differences between heavy music fan groups for alcohol consumption. One Welch-ANOVA was conducted to test group differences between heavy music fan groups for alcohol consumption, because of a significant Levene-Test ($p = .047$). All other prerequisites were met. Table 14 shows the main effect and fan group comparisons of Welch-ANOVA, including differences of means, significance values, F-values, and effect size for alcohol consumption (AUDIT).

Table 14. *Heavy music fan group comparisons of for the AUDIT, N = 500*

Scale	Comparison (X vs. Y)	M diff (X - Y)	p	F (df1, df2)	η^2_{part}
AUDIT			< .001***	10.421 (3, 110.980)	.059
	E vs. HR	5.283	< .001***		
	E vs. PR	2.398	.116		
	E vs. M	4.333	.001**		
	HR vs. PR	- 2.886	.003**		
	HR vs. M	- 0.950	.634		
	PR vs. M	1.935	.003**		

Note: *E* = heavy electro fans, *HR* = hard rock fans, *PR* = punk rock fans, *M* = metal fans

* $p < .05$, ** $p < .01$, *** $p < .001$

The heavy music fan group affiliation had a significant effect on alcohol consumption. 5.9% of the dispersion of the AUDIT scores around the overall mean could be explained by the group affiliation, which is to be considered a medium effect. Because of this, H_0 (7) was rejected and H_1 (7) was accepted. The Games-Howell post-hoc test revealed that not all groups significantly differed from one another. Hard rock fans did not differ from metal fans and punk rock fans did not differ from heavy electro fans. Heavy electro fans and punk rock fans significantly differed from all other groups, however. Both heavy electro fans and punk rock

fans scored significantly higher on alcohol consumption with heavy electro fans showing the largest differences to all other groups. The biggest difference was found between the scores of hard rock fans and heavy electro fans. Figure 1 further illustrates the respective group means of the individual heavy music fan groups, including a cut-off reference line for the recommended cut-off value of 8 for symptoms of hazardous and harmful alcohol consumption.

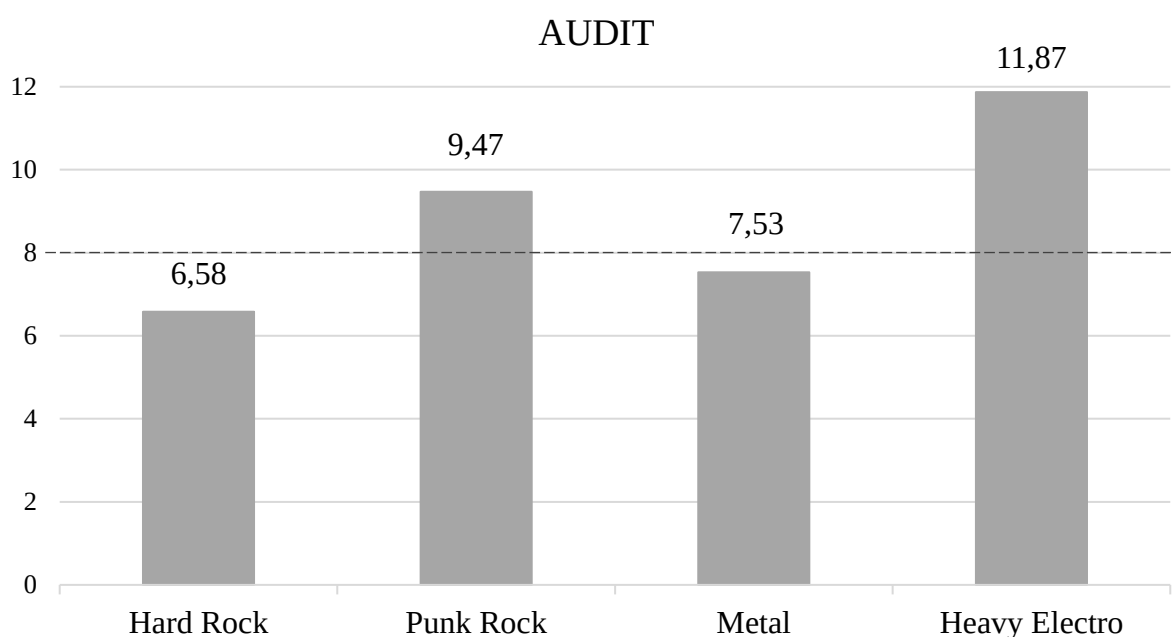


Figure 1. Group means of individual heavy music fan groups for scores of the AUDIT with cut-off reference line

The means of both hard rock and metal fans were below the cut-off value of 8, which suggests no hazardous and harmful alcohol consumption for these groups. On the contrary, heavy electro fans and punk rock fans showed mean scores above the cut-off value, indicating hazardous and harmful alcohol consumption for those groups.

8.3.3.2 Hypotheses of differences between heavy music fan groups for personality risk for substance misuse. Multiple one-way ANOVAs were conducted to test group differences between heavy music fan groups for all scales of the SURPS. All prerequisites were met. The number of valid cases was at $N = 500$ for hopelessness and sensation seeking, and $N = 499$ for impulsivity and anxiety sensitivity. Table 15 shows main effects and fan group comparisons of one-way ANOVAs, including differences of means, significance values, F-values, and effect sizes for significant effects for all SURPS scales.

Table 15. *Heavy music fan group comparisons for all SURPS scales*

Scale	Comparisons (X vs. Y)	M diff (X - Y)	p	F (df1, df2)	η^2_{part}
Hopelessness			.195	1.572 (3, 496)	
	E vs. HR	0.872	.891		
	E vs. PR	- 0.095	1.000		
	E vs. M	- 0.551	.946		
	HR vs. PR	- 0.967	.649		
	HR vs. M	- 1.423	.224		
	PR vs. M	- 0.456	.784		
Anxiety sensitivity			.732	0.533 (3, 495)	
	E vs. HR	0.456	.973		
	E vs. PR	0.062	1.000		
	E vs. M	0.401	.938		
	HR vs. PR	- 0.393	.961		
	HR vs. M	- 0.055	1.000		
	PR vs. M	0.338	.742		
Impulsivity			.017*	3.411 (3, 495)	.020
	E vs. HR	0.711	.679		
	E vs. PR	0.964	.068		
	E vs. M	1.209	.011*		
	HR vs. PR	0.253	.991		
	HR vs. M	0.497	.807		
	PR vs. M	0.244	.867		
Sensation seeking			< .001***	12.814 (3, 496)	.072
	E vs. HR	3.372	< .001***		
	E vs. PR	2.847	< .001***		
	E vs. M	3.444	< .001***		
	HR vs. PR	- 0.525	.948		
	HR vs. M	0.072	1.000		
	PR vs. M	0.596	.368		

Note: *E* = heavy electro fans, *HR* = hard rock fans, *PR* = punk rock fans, and *M* = metal fans

* $p < .05$, *** $p < .001$

The heavy music fan group affiliation had a significant effect on scores of impulsivity and sensation seeking. The group affiliation explained 2.0% of variance of scores impulsivity scores and 7.2% of variance of sensation seeking scores, which represents a small and a medium effect, respectively. Therefore, H0 (8.3) and H0 (8.4) were rejected and H1 (8.3) and H1 (8.4) were adopted. For impulsivity, Hochberg post-hoc tests revealed that for this scale, the effect was limited to a significant difference of mean scores with heavy electro fans showing significantly higher scores than metal fans. No other fan groups significantly differed. Regarding sensation seeking, Hochberg testing revealed heavy electro fans to have scored significantly higher compared to all other groups. No further significant differences between the remaining groups were found for this scale. The biggest difference is found between heavy electro and metal fans, but the differences in means are close to each other for heavy electro fans compared to all other fan groups.

No significant effect of group affiliation was found on scores of hopelessness and anxiety sensitivity. In accordance with these results, the null hypotheses H0 (8.1) and H0 (8.2) were retained. Figure 2 and 3 illustrates the group means of the individual heavy music fan groups for impulsivity and sensation seeking, respectively.

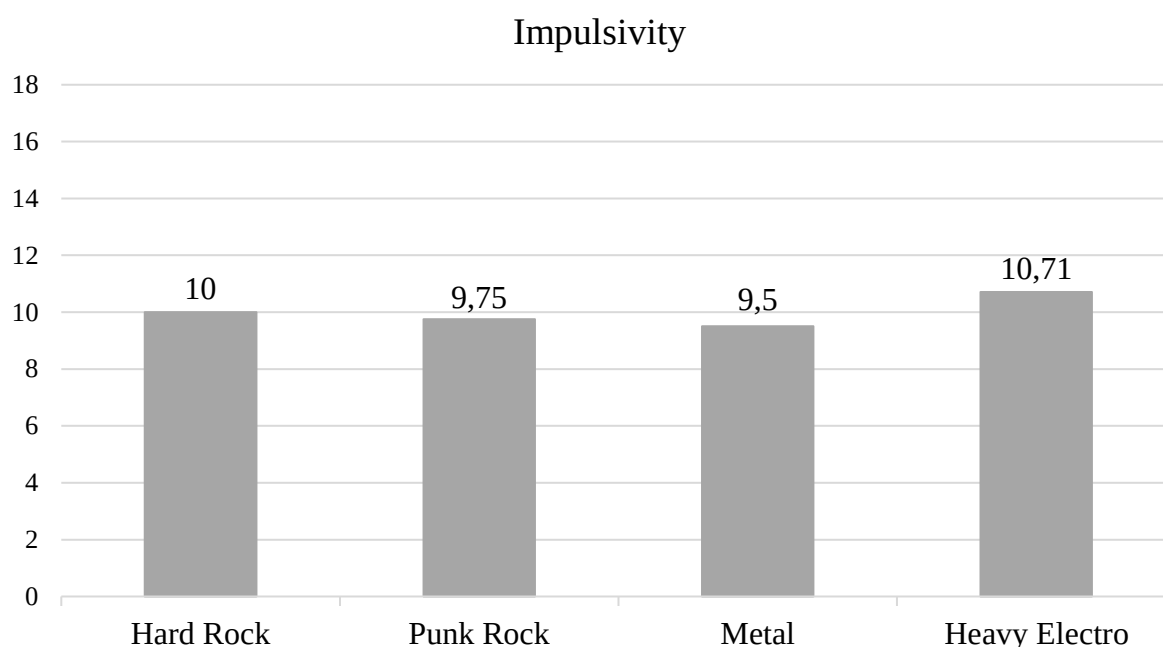


Figure 2. *Group means of individual heavy music fan groups for scores of impulsivity*

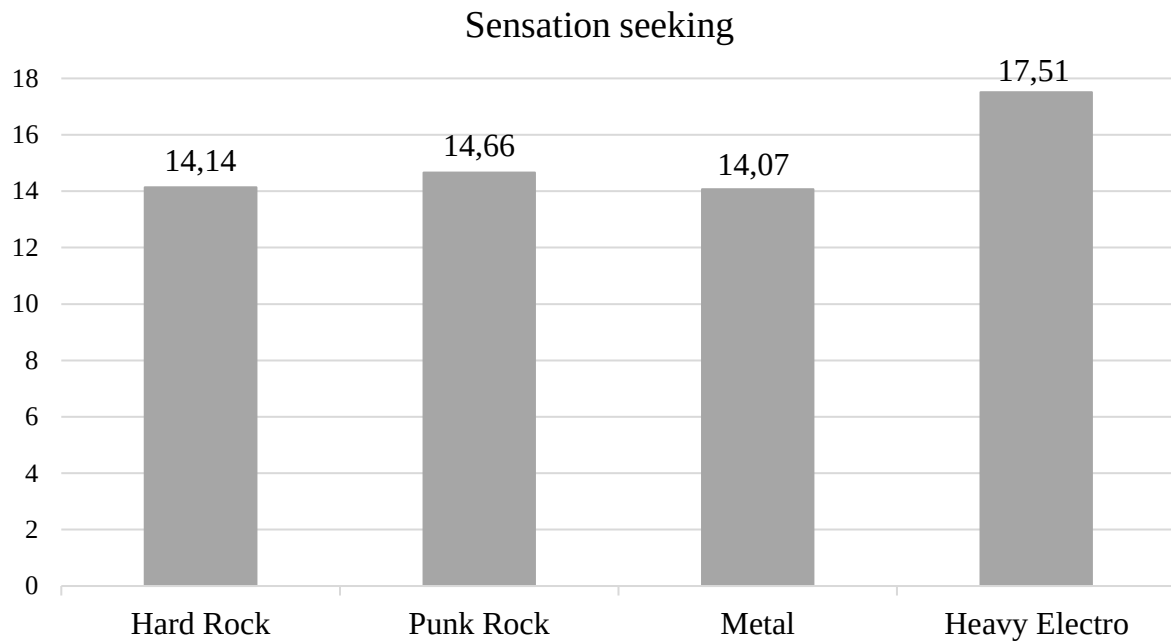


Figure 3. Group means of individual heavy music fan groups for scores of sensation seeking

8.3.3.3 Hypotheses of differences between heavy music fan groups for psychological distress. A single one-way ANOVA was conducted to test the group differences between heavy music fan groups for the GSI. All prerequisites were met. Table 16 shows main effects and fan group comparisons of one-way ANOVAs, including differences of means, significance values, F-values, and a value for the effect size.

Table 16. Heavy music fan group comparisons for the GSI of the BSI-53, $N = 500$

Scale	Comparisons (X vs. Y)	M diff (X - Y)	p	F (df1, df2)	η^2 part
GSI			.005**	4.336 (3, 496)	.026
	E vs. HR	7.578	.039*		
	E vs. PR	6.889	.005**		
	E vs. M	6.996	.004**		
	HR vs. PR	- 0.688	1.000		
	HR vs. M	- 0.518	1.000		
	PR vs. M	0.107	1.000		

Note: *E* = heavy electro fans, *HR* = hard rock fans, *PR* = punk rock fans, and *M* = metal fans

* $p < .05$, ** $p < .01$

There was a significant effect of the factor on the scores of GSI. In more detail, 2.6% of the variation of GSI scores was attributable to the group affiliation, which is to be considered a small effect. Hence, H0 (9) was rejected and H1 (9) was accepted. The Hochberg post-hoc test revealed that heavy electro fans showed the only significant group differences and exhibited higher scores than all other groups. The extent of all significant differences was similar, but the largest difference was found between heavy electro and hard rock fans. Figure 4 graphically depicts the respective group means of the individual heavy music fan groups, including a cut-off reference line for the recommended cut-off T-score of 63 for clinical conspicuity.

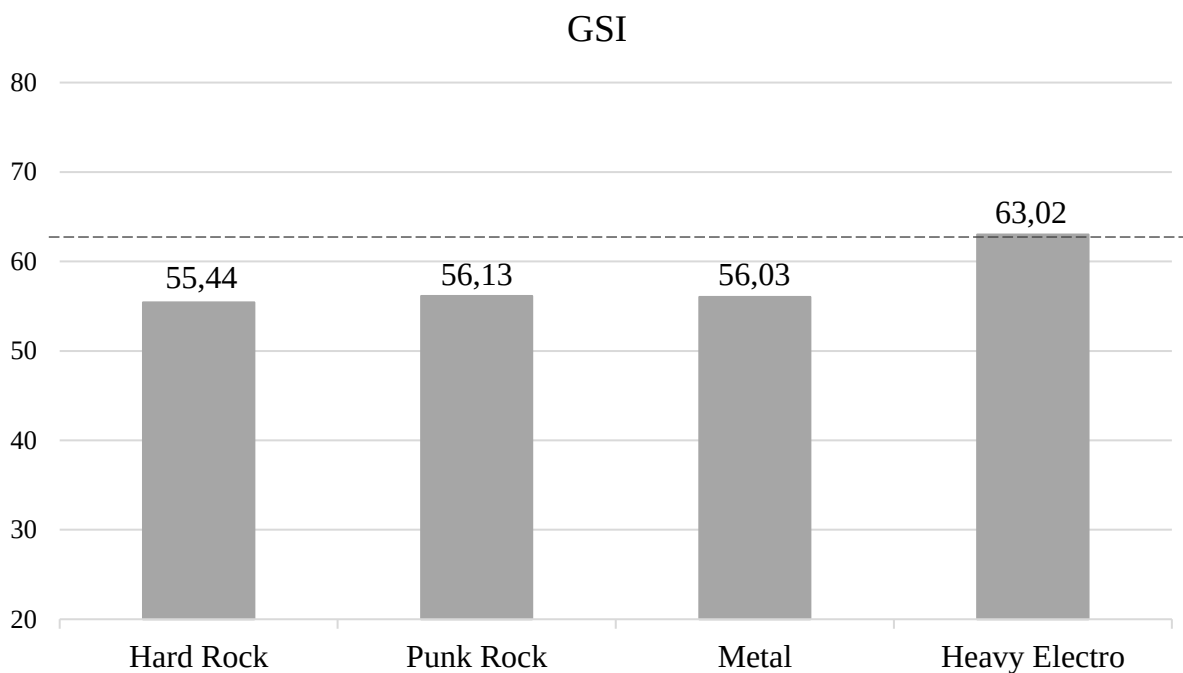


Figure 4. *Group means of individual heavy music fan groups for scores of the GSI*

The difference of means between heavy electro fans and all other groups is clearly visible. Moreover, while all other group means are below the threshold of clinical conspicuity, the group mean of heavy electro fans exceeds the cut-off value slightly. This result suggests the group of heavy music fans to be psychologically conspicuously burdened on average.

8.3.3.4 Hypotheses of differences between heavy music fan groups for musical engagement. Two one-way ANOVAs were used to test the group differences between heavy music fan groups for both scales of the HUMS. All prerequisites were met. Table 17 shows main effects and fan group comparisons of one-way ANOVAs, including differences of means, significance values, F-values, and effect sizes for significant effects for HUMS Healthy and HUMS Unhealthy.

Table 17. *Heavy music fan group comparisons for both HUMS scales, N = 493*

Scale	Comparisons (X vs. Y)	M diff (X - Y)	p	F (df1, df2)	η^2 part
HUMS Healthy			.635	0.571 (3, 489)	
	E vs. HR	- 0.235	1.000		
	E vs. PR	- 0.581	.812		
	E vs. M	- 0.558	.847		
	HR vs. PR	- 0.346	.988		
	HR vs. M	- 0.342	.992		
	PR vs. M	0.023	1.000		
HUMS Unhealthy			< .001***	7.345 (3, 489)	.043
	E vs. HR	4.239	< .001***		
	E vs. PR	2.498	.003**		
	E vs. M	2.896	< .001***		
	HR vs. PR	- 1.741	.143		
	HR vs. M	- 1.343	.424		
	PR vs. M	0.398	.921		

Note: *E* = heavy electro fans, *HR* = hard rock fans, *PR* = punk rock fans, *M* = metal fans

** $p < .01$, *** $p < .001$

A significant effect was found for the influence of the factor on scores of the HUMS Unhealthy scale. The factor explained 4.3% of the overall variance of the scores of the HUMS Unhealthy scale, which is to be considered a small to medium effect. Accordingly, H0 (10.2) was rejected and H1 (10.2) was accepted. The result of the Hochberg post-hoc test showed that heavy electro fans were the only group to exhibit significant group differences. They showed higher scores than all other groups. The largest difference was found between heavy electro and hard rock fans.

No significant effect of the group affiliation was found on the scores of HUMS Healthy. H0 (10.1) was retained accordingly. Figure 5 illustrates the respective group means of the individual heavy music fan groups for HUMS Unhealthy.

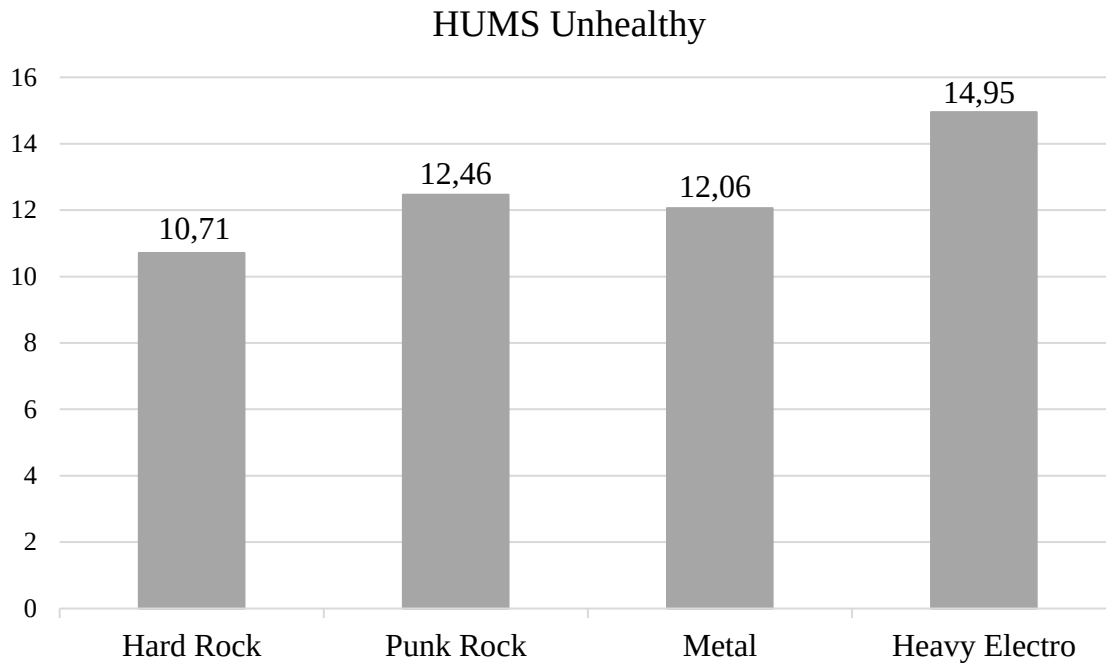


Figure 5. *Group means of individual heavy music fan groups for scores of the HUMS Unhealthy scale*

9. Conclusion

Below, the discussion and summary of results are presented. This is followed by the limitations of this study, as well as an outlook for future research, and practical implications.

9.1 Discussion

In the following, the results of the research questions are discussed and compared to current literature. First, research questions 1 and 2 are discussed. These first two research questions were set out to replicate and validate existing results of the relation between musical engagement and depression in an adult sample. This is followed by the discussion of research questions 3 to 6, which relate to the main goal of this study. Thus, these research questions refer to differences between heavy music fans and non-fans, as well as between men and women, for alcohol consumption, personality risk for substance misuse, psychological distress, and musical engagement. Here it was aimed to clarify whether fans of heavy music pose a possible risk group for these dimensions, compared to the general population, while considering the gender of participants, as well as possible interaction effects of both fandom and gender. Lastly, research questions 7 to 10 are discussed, which are connected to the second goal of this study. Accordingly, these questions relate to differences between the respective heavy music fan

groups for alcohol consumption, personality risk for substance misuse, psychological distress, and musical engagement.

9.1.1 The relation between musical engagement and depression. On this topic, *the first research question* examined whether there is a positive relation between healthy musical engagement and symptoms of depression. Contrary to the expected results, healthy musical engagement correlated negatively with depression. While this result contradicts the current state of research and the results of Saarikallio et al. (2015), it further supports the postulated use of the HUMS to accurately assess musical engagement as proneness for depression for the healthy subscale. Since healthy musical engagement has been postulated to foster positive mood states and consists of the key components social connection, mood enhancement, and distractive relaxation (Saarikallio et al., 2015), the negative relation to scores of depression is plausible and should be of logical consequence. Thus, within this study, healthy musical engagement has shown to be a protective factor for depression, be it with a small effect.

One major reason for the discrepancy between the results of this study and the creational study of the HUMS (Saarikallio et al., 2015) might be found within the age of participants. In the creational study, the sample consisted exclusively of adolescents, while this study was conducted on the adult population. It is possible that the listening patterns assessed by the HUMS effect adults in a different way than adolescents concerning feelings of depression. Further explanations can be found in the fact that this sample differs in two additional aspects from the sample of Saarikallio and colleagues. Firstly, this sample consists mainly of self-proclaimed heavy music fans and the overall level of education can be considered high. Further differences of the impact of healthy listening habits on depression might be attributable to these two factors. However, since no further comparative data exists in contemporary research yet, these explanations are speculative at this point.

Concerning unhealthy musical engagement, *the second research question* explored whether there is a positive relation between unhealthy musical engagement and symptoms of depression. As predicted, a positive relation between both variables was found and the effect size can be considered large. This finding is in line with the findings of Saarikallio et al. (2015) and further supports unhealthy musical engagement to be an indicator of depression, not just for adolescents, but for adults as well. Consequently, this question can be answered with yes.

9.1.2 Heavy music fandom, gender, and alcohol consumption. *Research question 3*, which is the first of four research questions examining the influence of heavy music fandom and gender by measuring group differences on all included variables, was specifically related to alcohol consumption. Surprisingly, no significant difference was found between fans and

non-fans for alcohol consumption. This contradicts various results of existing literature on the topic, which found a positive link between alcohol consumption and the preference for heavy music (Arnett, 1991b; Chen et al., 2006; Lacourse et al., 2001; Vuolo et al., 2014). Consequently, this result is more in line with the results of Mulder et al. (2009a, 2009b) and ter Bogt et al. (2012), even though these studies were uniformly conducted on adolescents aged around 15 years old and not on the adult population.

The factor of age is a possible first explanation for the discrepancy of results. For the analysis of this research question, the influence of age was factored out and the mean age of this study is higher than in all previously listed comparative studies. It is possible that age interacts in a unique way with heavy music fandom, because young heavy music fans might be at a greater risk to develop heightened or harmful use patterns. Another possible explanation can be found when considering the methodical approach of this study. This study is the first to set multiple criteria for the inclusion into the fan group. Thus, the results are not just based on heavy music preference, but actual fandom. It is possible that the affiliation with the heavy music scene might mitigate heightened harmful alcohol consumption over time, for example by means of the strong social connectivity and cathartic experiences which are described by fans and members of the scene (Ahmadi, 2009; Henry & Caldwell, 2007; Riches, 2011; Rowe, 2017; Rowe & Guerin, 2018). Moreover, this study did not consider whether fans are practicing musicians, which could explain some discrepancy of results, since some studies which showed problematic alcohol use on the topic of heavy music were exclusively centered around musicians (Butkovic & Rancic Dopudj, 2017; Oksanen, 2012, 2013).

Concerning gender differences of alcohol consumption, men showed higher alcohol consumption than women with a small to medium effect size. This outcome was anticipated and supports the well-established results in respective literature of men being a risk group for hazardous and harmful consumption (Bachmayer et al., 2021; Erol & Karpyak 2015, Hoyer & Knappe, 2020). This outcome also indicates representativeness of the sample for the influence of gender on alcohol consumption.

Lastly, it is important to note that the overall level of alcohol consumption within the sample of this study can be considered high, with an overall mean score of 8.43, indicating harmful and hazardous alcohol consumption for the entire sample. Also, while the difference of the AUDIT scores between fans and non-fans was non-significant, only the mean score of heavy music fans ($M = 8.31$) was above the cut-off score of 8 for harmful and hazardous alcohol consumption, while the mean score of non-fans was slightly below the cut-off score ($M = 7.69$). Thus, while heavy music fans are at no significantly higher risk for alcohol misuse compared

to non-fans, only fans clearly indicated hazardous and harmful alcohol consumption based on the mean score of the group. Furthermore, the mean score for male participants ($M = 9.26$) was above the commonly recommended cut-off score of 8, while the female mean score ($M = 6.75$) was below the cut-off score. This only indicates harmful consumption for men on average. However, applying the more recently recommended cut-off of 5 for women (Reinert & Allen, 2007), female participants clearly were at risk for harmful consumption too. The high overall AUDIT score of the sample might be attributable to the time in which the data of this survey was gathered. The data collection started during the winter of the year 2021 and continued over the Christmas vacations and New Year's Eve, which took during the SARS-CoV-2 pandemic. Therefore, heightened alcohol consumption could be expected (Kushnir, & Cunningham, 2014).

9.1.3 Heavy music fandom, gender, and personality risk for substance misuse.

The influence of heavy music fandom and gender on personality risk for substance misuse was examined by *research question 4*. The overall influence of fandom on personality risk for substance misuse can be considered low. This is apparent by the lack of significant differences between the fan group and the non-fan group within the traits of hopelessness, anxiety sensitivity, and sensation seeking. These findings conflict with the established state of research on heavy music and substance use. While multiple authors depicted a clear positive link between the preference for heavy music and substance use (Arnett, 1991b; Chen et al., 2006; Lacourse et al., 2001; Vuolo et al., 2014), the non-significant findings of this study within three of the four personality traits of the SURPS are contraindicated of a heightened risk for substance misuse for fans. However, the informative value of the results of the SURPS is limited to personality related risk for substance misuse, meaning that fans might still be at a heightened risk for substance misuse, for reasons outside of the assessed personality traits.

Moreover, for the traits of hopelessness and anxiety sensitivity this result represents the first quantitative data on the topic of heavy music, providing explorative value. Consequently, the outcome cannot be directly discussed and compared to existing research yet. Regarding sensation seeking however, the non-significant difference between fans and non-fans was unsuspected and contradicted expectations based on respective research. This is because higher levels of sensation seeking have successfully been linked to the preference of heavy music genres before (Arnett, 1991b; Weisskirch & Murphy, 2004), as well as to the tendency to seek out more arousing music (McNamara & Ballard, 1999; Miller & Quigley, 2012).

Since no literature exists that confirms a missing or negative link between heavy music preference and sensation seeking, it is challenging to categorize this result. Nevertheless,

similarly to the null findings of heavy music fandom and alcohol consumption, the age of participants, the fan group formation, and the lack of consideration of musicianship are possible explanatory factors for the divergence of results. Concerning age and fandom, higher levels of sensation seeking could possibly explain the preference for heavy music for younger participants, due to the urge to seek out extreme music as a new and intense stimulus. The initially exciting medium of heavy music could lose its appeal over time due to habituation. This could explain the findings of Arnett (1991b) and Weisskirch and Murphy (2004), whose studies were conducted on adolescents and college students, respectively. Older participants, who consider themselves to be fans, might list a broader array of reasons for their preference of heavy music. Furthermore, the lack of consideration of musicianship could be partly responsible for the discrepancy of results towards the study of Miller and Quigley (2012), meaning that heavy music musicians might be at a higher risk for substance misuse than listeners. Still, these explanations are highly speculative since the state of research is very scarce.

Outside of the non-significant differences between fans and non-fans, ratings of impulsivity significantly differed between both groups. Fans showed higher ratings than non-fans with a small effect. This indicates a slightly higher risk for substance misuse based on the expression of impulsivity of fans, suggesting a tendency for elevated overall substance use and frequent stimulant drug use, based on the tendency to give in to impulsive desires (Krank et al., 2010; Lee-Winn et al., 2018; Verdejo-García et al., 2006; Woicik et al., 2009). This outcome is a first for heavy music and impulsivity.

For the influence of gender on personality risk for substance misuse, a more cohesive result emerged. As predicted, women showed significantly higher ratings of anxiety sensitivity compared to men, whereas men showed significantly higher ratings of sensation seeking compared to women. The effect size was small to medium for anxiety sensitivity and small for sensation seeking. This result strengthens the unambiguous findings of contemporary research on gender differences for both traits (Cross et al., 2013; Navas et al., 2019; Olatunji & Wolitzky-Taylor 2009). Consequently, it is indicative that male participants are at a higher risk for binge drinking (Chen et al., 2006; Sargent et al., 2010), as well as for polysubstance use and continuative substance use based on their desire to experience new and intense stimuli (Dubey & Arora, 2008; Krank et al., 2010; Woicik et al., 2009). For women, this suggests a higher risk to develop future alcohol use disorders to cope with feelings of anxiety towards stress inducing body sensations (Schmidt et al., 2007). Hopelessness and impulsivity showed no significant gender differences, which is also in line with the ambiguous results of existing literature (Cross

et al., 2011; Memetovic, et al., 2013; Pössel & Smith, 2019). These outcomes indicate representativeness of the sample for gender differences of personality risk for substance misuse.

9.1.4 Heavy music fandom, gender, and psychological distress. *Research question 5* was devoted to investigating the influence of fandom and gender on psychological distress. The overall influence of fandom on psychological distress can be considered negligible. This is apparent by the lack of significant differences between fans and non-fans throughout ratings of the GSI, as well as throughout eight of the nine tested symptom clusters of psychological distress. Concerning the GSI, which measures the respondent's comprehensive distress level, the result depicts no significantly elevated psychopathological symptoms of fans compared to non-fans on average. This coincides with the results of the previously unconsidered symptom clusters somatization, obsession-compulsion, interpersonal sensitivity, phobic anxiety, and psychoticism which showed no significant effect either. Hence, the data does not highlight these dimensions to be of further relevance for contemporary research. Regarding the respective symptom clusters of psychological distress that were examined before, the null findings of this study contribute to the ambiguous findings of previous research.

For symptoms of depression and anxiety, the findings are in line with the results of Recours et al. (2009), whose sample of metal fans did not show any salience of depressive or anxious symptoms. Furthermore, the evaluations of Rowe and Guerin (2018) are supported, who found no indices of symptoms of depression or anxiety throughout their sample of heavy music fans. In contrast to research depicting positive relations between heavy music preference and symptoms of depression and anxiety (Miranda & Claes, 2009; Shafron & Karno, 2013), this study was conducted on the adult population and was not limited to the interrogation of adolescents or college students. Thus, the link between heavy music, depression, and anxiety could exclusively be an indication of the vulnerability of young adults and might not be transferable to a more mature audience.

This is backed by the additional findings of the item specific analysis of suicidal ideation, showing no effect. Hence, the previously found vulnerability for suicidal thoughts only appears to be effective for heavy music affiliated adolescents and not for adult fans. Therefore, it is possible that heavy music affects underaged listeners differently towards feelings of depression, anxiety, and suicide, or that adolescents who experience such symptoms are drawn to heavy music more frequently than adults.

Regarding hostility, the lack of a significant influence of fandom contradicts the assumption of heavy music having lasting consequences on the listeners real-life aggression,

which was presented by some studies on the topic (Fischer & Greitemeyer, 2006; Slade et al., 2019). Moreover, it challenges key aspects of the GAM. Based on the postulated effective mechanism of the GAM, long term exposure to aggressive content should persistently alter cognitive dispositions of fans towards a more hostile state and lead to more aggression (Anderson & Bushman, 2002). Since fans stated to listen to over 24 hours of heavy music per week on average, the regular exposure to aggressive cues consequently should lead to heightened ratings of hostility. This was not the case for this sample.

The explanation for this outcome can be found within the fact that this study examined the *hostility of fans*, as opposed to the general population or individuals who solely indicate to like a certain heavy music genre. This is important since heavy music needs to be perceived as irritating, threatening, or arousing in order to trigger the feedback loop postulated by the GAM. Hence, it is possible that due to the aforementioned factor of habituation, fans do not perceive heavy music to be irritating, threatening, or arousing enough to trigger lasting alternations towards their cognition or behavior. This assumption is in line with the findings of Ollivier et al. (2019) and Thompson et al. (2019), who concluded that fans frame their engagement with heavy music on an aesthetic level that differs from real-life circumstances, positively affecting their mood state. The outcome also further supports existing literature that found exposure to violent media to have trivial effects or no effects at all on outcomes of aggression or hostility (Ballard & Coates, 1995; Ferguson, 2015; Ferguson & Kilburn, 2009; Sharman & Dingle, 2015; Sprankle et al., 2012; Unsworth et al., 2007).

When considering further reasons for the divergence of results towards literature that indicates heavy music to foster hostility or aggression, three major factors can be named. The first two factors are the consistently missing assessment of fandom or even preference of heavy music and the lacking measurement of long-time effects of heavy music exposure in experimental designs (Anderson et al., 2003; Brodsky et al., 2018; Brummert Lennings, & Warburton, 2011; Fischer & Greitemeyer, 2006; Mast & McAndrew, 2011; Rubin et al., 2001). The third major factor is related to the sample composition of previous research conducting correlative studies on the relation between heavy music preference and hostility/aggression. Comprehensively, these studies are applied on college students or adolescents, possibly skewing results based on age and the educational level of participants (Coyne & Padilla-Walker, 2015; George et al., 2007; Selfhout et al., 2008).

For psychoticism, the non-significant influence of fandom supports the findings of Lester and Whipple (1996), while contradicting findings depicting a positive link between the preference for heavy music and psychoticism (North et al., 2005; Rawlings et al., 1995;

Robinson et al., 1996). The examination of this symptom cluster was primarily intended to contribute modern data to the small state of research of psychoticism, which is focused on the trait-related definitions of Eysenck as opposed to the clinically relevant expressions of psychoticism. Consequently, it can be concluded that psychoticism, as characterized by feelings of isolation, interpersonal alienation, and psychotic episodes, appears to be of no particular importance to the distress level of heavy music fans in the present day.

Finally, assessments of clinical conspicuity based on the mean T-scores for both groups also revealed no psychopathological vulnerability for *any dimension*. This further illustrates neither fans nor non-fans of this sample to be at an elevated risk for symptoms of psychological distress.

The only significant difference between fans and non-fans within any dimension of psychological distress was found for paranoid ideation. Fans showed significantly higher ratings than non-fans. Still, the effect was barely significant ($p = .045$), with the factor explaining only 0.5% of the total variance of the scores of the dependent variable. The small effect size and the fact of this being the only significant result throughout all tested variables of psychological distress further supports the negligible influence of fandom on scores of the BSI-53. Still, the higher scores of fans for paranoid ideation need to be considered and provides new insight on the topic of heavy music and mental health. While paranoid ideation has not been part of any study on the topic before, some parallels can be drawn for the relevance of the dimension regarding heavy music. This can be illustrated by the lyrical expression of heavy music artists. As elaborated by Cheung and Feng (2021), lyrical themes of insecurity and fear, as well as the tendency to narratively project individual and social problems into fictitious worlds is a key element of heavy music lyricism, showing some intersections with symptoms of paranoid ideation. Still, it needs to be stated that the artistic expression of such feelings cannot be seen as a clear indication of psychopathological symptoms of the artist. Any explanations for the link between paranoid ideation and heavy music are highly speculative at this point and need further investigation.

Concerning the influence of gender, no significant gender differences were found between men and women for scores of the GSI. Moreover, no significant differences were found for eight of the nine respective symptom clusters of psychological distress. These findings can be explained by the gender-specific conversion of the raw scores of the BSI-53 into T-scores. Thus, the correction and standardization of means based on the gender of participants explains the result. For both genders, mean T-scores were slightly heightened across dimensions compared to the German reference sample of Franke and Derogatis (2000). This may be

explained by the challenging living conditions during the SARS-CoV-2 pandemic (Brühlhart, Klotzbücher, Lalive, & Reich, 2021; Dadaczynski, Okan, Messer, & Rathmann, 2022; Giuntella, Hyde, Saccardo, & Sadoff, 2021). No significant gender differences were found for suicidal ideation either, even though this result has not been standardized based on the gender of participants since it represents the analysis of one item and not a validated scale. The only significant gender difference was found between men and women for scores of depression, with males showing higher scores than females. However, the effect is small, with gender explaining only 0.7% of variance of scores of depression. Conclusively, the factor of gender only had a minor overall influence on psychological distress.

9.1.5 Heavy music fandom, gender, and musical engagement. The influence of heavy music fandom and gender on musical engagement is related to *research question 6*. Fandom only significantly predicted scores of healthy musical engagement, which is evident by fans showing significantly more healthy engagement than non-fans with a medium effect size. In fact, this represents the largest effect of fandom on any variable tested in this thesis. Consequently, the continuing narrative of heavy music fans claiming heavy music to be beneficial to their psychological wellbeing is supported by the quantitative data of this survey (Ahmadi, 2009; Bodner & Bensimon, 2015; Quinn, 2019; Rowe, 2017; Rowe & Guerin, 2018; Sharman & Dingle, 2015; Thompson et al., 2019). The fact that heavy music fans stated to listen to 24.10 h of heavy music genres out of 28.37 total music listening hours per week, clearly illustrates heavy music to be the predominant factor of the positive impact.

No significant influence of fandom was found for unhealthy musical engagement. Hence, previous concerns of heavy music negatively influencing the listeners mood states and fostering feelings of depression (North & Hargreaves, 2006; Shafron & Karno, 2013) are unsubstantiated, based on this outcome. Furthermore, this result is paralleled by the previously illustrated null findings of heavy music fandom for hopelessness and depression.

Results for the influence of gender on both scales of musical engagement were contrary to the results of fandom. Here, gender only significantly predicted scores of unhealthy musical engagement as opposed to healthy musical engagement. Female listeners showed significantly more unhealthy musical engagement. This coincides with the original study of Saarikallio et al. (2015) and accordingly substantiates their results for an adult sample. Furthermore, it objects the findings of Miranda and Claes (2009), who revealed gender differences regarding coping strategies by music listening, with female adolescents showing more overall coping independent from the coping style being considered adaptive or maladaptive. The comparability

of the results is limited however, since Miranda and Claes examined the application of coping strategies by music listening and not explicitly musical engagement as measured by the HUMS.

9.1.6 Interaction effects of heavy music fandom and gender. The complete lack of significant interaction effects between fandom and gender on any tested variable of research questions 4 to 6 identifies both factors to be independent from each other. It also allows for a clear interpretation of all main effects. Consequently, no specific effects could be detected for any respective subgroup of male or female fans/non-fans concerning ratings of alcohol consumption, personality risk for substance misuse, psychological distress, and musical engagement. Consequently, existing findings illustrating a specific risk for male or female heavy music fans for any of these dimensions are not supported by the data.

9.1.7 Differences between heavy music fan-groups. For the remaining *research questions 7 to 10*, which examined differences between the individual heavy music fan groups within the categories of alcohol consumption, personality risk for substance misuse, psychological distress, and musical engagement, the mean scores of hard rock-, punk rock-, metal-, and heavy electro fans were compared, effectively measuring the influence of the heavy music fan group affiliation on the respective variables. Throughout all research questions a more consistent pattern of results emerged. The group affiliation significantly influenced at least one dimension of each category. While the effect sizes of the overall influence were small to medium, the effects are nearly entirely attributable to the scores of heavy electro fans. Concerning alcohol consumption, heavy electro as well as punk rock fans showed significantly higher ratings than all other groups. Furthermore, the mean scores of the AUDIT exceeded the cut-off value of 8 for both heavy electro and punk rock fans, suggesting hazardous and harmful alcohol consumption for both subgroups.

By examining the respective dimensions of the remaining categories, a similar picture emerged, which further indicates heavy electro fans to be at a higher risk for personality risk for substance misuse, psychological distress, and unhealthy musical engagement compared to the other fan groups.

Regarding the dimensions of the SURPS, heavy electro fans showed significantly higher ratings of sensation seeking than all other groups. Moreover, heavy electro fans exhibited the highest ratings of impulsivity of all groups. Yet, this difference was only significant in comparison to metal fans. Accordingly, the heightened urge to seek out new and exciting stimuli, as well as the slightly increased tendency to give in to one's own impulses, suggests a higher risk for frequent overall drug use and more specifically, the use of stimulant and hallucinogenic drugs for heavy electro fans compared to other fan groups (Dubey & Arora,

2008; Krank et al., 2010; Woicik et al., 2009). It could also explain the measured hazardous and harmful alcohol consumption of heavy electro fans. Moreover, these results are in line with previous research examining the international clubbing and rave scene (Hitzler, 2002; Hunt & Evans, 2003; Maxwell, 2005), as they also support the heightened risk of electro fans for substance misuse. In addition, the notion of ter Bogt et al. (2012), who suggested to regard electronic and dance music as the more relevant deviant music for adolescents regarding substance use, is further substantiated and might in fact be valid for the adult *heavy* electro scene as well.

Apart from heavy electro fans being at a higher risk for substance misuse, the analyses of GSI scores also revealed the heavy electro fan group to be psychologically burdened to a significantly greater extent than all other groups. In fact, the heavy electro fan group was the only subgroup which exhibited a mean score that indicates clinical conspicuity of psychopathological symptoms.

This coincides with the results of the last tested category, musical engagement. Again, heavy electro fans showed significantly higher ratings of unhealthy musical engagement, whereas the fan groups did not differ significantly within ratings of the healthy dimension. Accordingly, it can be concluded that heavy electro fans are at risk of a clinically conspicuous symptom load and that their musical engagement might play a relevant role in creating or maintaining these symptoms.

Although the depicted risk for substance misuse of (heavy) electro fans has been illustrated in previous studies before, the findings of heightened psychological distress and unhealthy musical engagement are entirely new for sub-genre related research of heavy music and need to be reinvestigated in subsequent surveys.

9.2 Summary of results

The main goal of this study was to investigate whether adult fans of heavy music pose a risk group compared to non-fans for alcohol consumption, personality risk for substance misuse, and psychological distress, as well as to determine whether there are differences towards their musical engagement, while considering the gender of participants. In summary, adult heavy music fans are not to be considered a risk group for alcohol consumption, personality risk for substance misuse, and psychological distress compared to non-fans. This is evident by the lack of significant differences between fans and non-fans throughout 13 of the 15 tested scales of these categories. Fans only showed significantly higher ratings in the dimensions of impulsivity and paranoid ideation with small effect sizes. Furthermore, fans did not differ towards non-fans in ratings of unhealthy musical engagement, indicating no particular

risk of their music listening habits to negatively affect their mood states or foster feelings of depression. On the contrary, heavy music fans showed significantly higher ratings of healthy musical engagement which is indicative of fans using music to positively affect their psychological wellbeing to a greater extent than non-fans. Hence, a problem-oriented approach of research on the topic is unsubstantiated for adults, as illustrated by the results. Still, the heightened scores of impulsivity and paranoid ideation need further investigation, as they are new to contemporary research. Concerning gender, the findings showed no major anomalies either. In fact, the complete lack of significant interaction effects between heavy music fandom and gender demonstrates both factors to be completely independent from each other. Consequently, neither fans nor non-fans showed any gender specific effects for any tested variable.

The second goal of this study was to compare the individual heavy music fan groups within the same categories. Here, heavy electro fans elicited significantly higher ratings than all other fan groups in sensation seeking, the GSI, and unhealthy musical engagement. Ratings of impulsivity were heightened to a small extent as well, with a significant difference to metal fans. Scores of the GSI even exceeded the cut-off score of 63 points, indicating clinical conspicuity for heavy electro fans. Moreover, heavy electro fans and punk fans showed significantly higher AUDIT scores above the cut-off, indicating harmful and hazardous consumption for both groups. In summary, this result reveals heavy electro fans to be at a heightened risk for harmful alcohol consumption and for substance misuse based on two of the four personality traits of the SURPS, a conspicuous overall symptom load of psychological distress, and unhealthy music listening habits. Further research is needed to investigate reasons for this result, since this study is the first to unveil this outcome to this extent.

Lastly, reexamining the relation between the HUMS Healthy and HUMS Unhealthy scales and depression revealed a significant negative correlation between HUMS Healthy and depression and a significant positive correlation between HUMS Unhealthy and depression. While the positive link between scores of unhealthy musical engagement and depression was expected, the negative link between HUMS Healthy and depression has not been found before. While the finding for HUMS Healthy is contradictive to existing results, it confirms the HUMS to accurately assess proneness for depression by music use for adults, not just for the Unhealthy scale, but for the Healthy scale as well.

9.3 Limitations

The first set of limitations of this study is related to the high item count of the questionnaire, spanning 117 questions. Due to concerns about an excessive completion time

and a resulting high dropout rate, it was refrained from including certain items. This includes items assessing the change in drinking behavior and psychological distress during the SARS-CoV-2 pandemic. It also includes an item assessing whether the participant was previously diagnosed with a psychiatric disorder. The descriptive value of these questions would have been desirable to better evaluate the results of alcohol consumption and psychological distress and to get a better understanding of the sample characteristics. Another item-related limitation of this study lies within the complications of considering more specific subgenres into the survey, described in chapter 1.5. Feedback that has been received from multiple participants was related to the desire for more heavy music subgenres being included to represent more individual preferences. It would also have been a chance to demonstrate a more inclusive and sophisticated approach towards the topic. The last limitation that arose from concerns towards the scope of the questionnaire is that this study only measured personality risk for substance misuse, making any assessments towards the risk for substance misuse entirely based on the expression of certain personality traits of the participants. Thus, the appraisal of actual illicit drug use was not possible for this thesis. Additional analyses related to the link between the measured alcohol consumption of respondents and the traits of the SURPS would have been desirable as well but would have exceeded the scope of this thesis.

Further limitations are linked to the methodical characteristics of this study. This thesis was conducted in the form of a cross-sectional online study design, allowing for no appraisals towards possible intraindividual changes over time or any causal conclusions. Additionally, the whole questionnaire is based on self-assessment, possibly skewing the results based on the subjective appraisals of the respondents. This is especially relevant for the questions of the AUDIT and BSI-53, since both instruments inquire socially undesirable states or behaviors, including suicidal ideation for the BSI-53. Consequently, understatements towards alcohol consumption and psychological distress are to be expected, despite the assured anonymity. Furthermore, the conditions under which the participants took part in the study were not standardized and possible questions of understanding could not be clarified, introducing a possible bias of results which could be minimized in a more controlled setting. Another challenge was posed by the necessity to self-prepare the heavy music questionnaire, since no comparative questionnaires could be found throughout the entire research on heavy music. Hence, regardless of the careful considerations of the development of the heavy music questionnaire, some arbitrariness was inevitable for the inclusion of the items for this instrument.

The next set of limitations concern the representativeness of the sample and the resulting

limited degree of generalizability of results. The first major factor in this context is the level of education of the sample, which is to be considered high, making any conclusions towards the general population problematic. Additionally, men were overrepresented in this sample, accounting for 66.2% of participants. This uneven gender distribution can lead to a bias of results, especially for those analyses that did not consider the influence of gender. It also especially affects the representativeness of results for the non-fan group, since the larger proportion of men could only be expected for the heavy music fan group. Regarding diverse individuals, the results of *research questions* 3 to 6, which were directly related to the influence of gender, do not represent this group. This is because the group of diverse individuals unfortunately was too small for the statistical comparison to the other groups. Another major factor which restricts the generalizability is presented by the fact that this sample was build using an ad-hoc sampling method. Consequently, it needs to be assumed, that the survey predominantly reached people who spent a considerable amount online and are particularly interested in the topic of heavy music and mental health. Since the questionnaire was posted on various social media platforms and was supported by popular heavy music online-magazines, individuals who commonly use these mediums were more directly approached.

Further limitations arose from the peculiarity of the data set and the resulting group sizes. Firstly, even though the size of no subgroup fell below the critical value of 30 people and despite the use of robust post-hoc analyses, the large discrepancy of group sizes still might have affected the statistical power and robustness to unequal variance of ANOVAs (Field, 2017). This is especially relevant for the analyses related to the influence of heavy music fandom and gender on alcohol consumption, obsession-compulsion, hostility, psychoticism, and the HUMS Healthy scale, since for these analyses the prerequisite of homogeneity of variance was violated. Consequently, the results of these analyses need to be interpreted cautiously. Moreover, no comparisons could be made for the heavy hip-hop fan group, since the group size was too small. For the comparisons of the remaining heavy music fan-groups, age was not included as a covariate, for reasons described in chapter 7.5. Hence, the results might possibly be partly attributable to a lower age of electro fans compared to the other fan groups, since age negatively correlated with most variables. Additionally, the analysis of psychological distress was limited to the GSI, making more differentiated evaluations on possible differences of the fan groups concerning the specific symptom clusters of psychological distress impossible at this point.

The screening instruments bring some limitations as well. First, it needs to be noted that while the AUDIT and BSI-53 represent reliable and valid screening instruments, they can in no way replace clinical diagnostics for harmful and hazardous alcohol consumption or the

psychological burden of disorder-specific symptom clusters. They only provide tentative appraisals. Besides, any results concerning suicidal ideation are to be interpreted cautiously as well, since they are related to the analyses of a single item of the BSI-53 and not of a validated scale.

Moreover, some ratings of internal consistency for the SURPS and BSI-53 need to be critically considered. Regarding the SURPS, item number 22, which is part of the impulsivity scale, must be regarded as problematic since the value for its discriminant power was at .191. The wording of the item is *I feel I have to be manipulative to get what I want*, which raises the question to what extent the item is necessary to measure the impulsivity of respondents. For the sake of comparability of results, the item was not eliminated, however. Additionally, the ratings of both the anxiety sensitivity and impulsivity scales were in the questionable range, which is in line with previous findings (Krank et al., 2010; Woicik et al., 2009). Both results suggest the need for a revision of the SURPS.

For the BSI-53, only the phobic anxiety subscale was in the questionable range, which might be attributable to item number 43 which is part of this subscale. The item possibly introduces a bias in terms of appraising the reliability of the subscale due to the fact that Cronbach's α would increase from .678 to .715 if the item was to be eliminated from the scale. This might be because of its wording. The item inquires the feeling of *uneasiness in crowds, in the store or in the cinema*. Since the questionnaire was administered in times of the SARS-CoV-2 pandemic, it can be expected that scores for this item have been augmented because of the potentially health threatening situation in crowds and closed facilities and thus do not accurately represent phobic anxiety as a symptom complex of psychological distress in a clinical sense. Yet, since the value of corrected discriminant power was still acceptable and for the sake of interpretability of the T-scores, the item was not eliminated from the subscale. Any results concerning phobic anxiety are impaired, nonetheless.

Lastly, the heterogeneity of definitions and methodical approaches of comparative research, as well as the fact that a vast proportion of the studies on the topic are conducted on adolescents, as opposed to adults, further generally limits the comparability of results.

9.4 Outlook

This thesis provides an overarching, genre- and attribute-based definition of heavy music, taking into account modern trends and developments. Future research could benefit from this elaborated definition, and, through more precise nomenclature, could counterbalance the grave definitional heterogeneity of this field of research. This would greatly benefit the comparability of results.

Regarding recommendations deviating from the results of this study, further research is needed to replicate findings of the significantly elevated expressions of impulsivity and paranoid ideation of heavy music fans. Despite these differences being small in scale, reasons for this outcome need to be investigated, since no comparative data that derives from a similar methodical approach exists for these dimensions on the topic yet. Another implication for contemporary research arises from the results concerning the main goal of this study, wherein heavy music fans were not identified to be a risk group throughout all remaining variables. Consequently, it is recommended for studies investigating the effect of heavy music on hostility in an experimental design to include items assessing preference or fandom of heavy music, as well as whether the music is perceived as irritating or threatening. This can help to appraise the validity of the GAM and to draw more differentiated conclusions on the effect of heavy music on the listener based on the listeners preferences and perception. It is also strongly recommended to refrain from the application of the term *problem music* in the future, especially since fans showed healthier musical engagement than non-fans. This evaluation is in line with the previous recommendations of Lozon and Bensimon (2014). Moreover, further research is needed to investigate reasons for heavy electro fans reporting alarming ratings of alcohol consumption and psychological distress, as well as significantly higher ratings of impulsivity, sensation seeking, and unhealthy musical engagement compared to the other heavy music fan groups. The inclusion of a heavy hip-hop fan group into the group comparisons is recommended as well. This was statistically problematic for this study based on the group size, which consequently made any appraisals towards this group impossible.

Some additional improvements for subsequent studies can be deduced from the previously presented limitations of this thesis. Hence, a survey period less affected by the pandemic and the holidays, the consideration of intraindividual changes over time and a more balanced gender ratio are desirable. Future longitudinal study designs are well fitted to implement these propositions. Especially the investigation of the psychological and behavioral development of heavy music fans from adolescents into adulthood would be a topic of interest that could be ideally examined with a longitudinal approach. Alternatively, cross sectional studies could implement comparisons between different music fan groups, since it remains unclear whether the heightened healthy musical engagement of heavy music fans is exclusive for the heavy music fan group. Fan groups of other genres like jazz or classical music might use music in a similarly healthy way, revealing the passion for music to be the decisive factor, independent from the musical style.

Finally, some propositions for the therapeutical praxis of music therapy can be made

based on the data. The heightened healthy musical engagement of heavy music fans is a promising resource that can potentially be of use in heavy music therapy. The joint discussion of the individual listening habits in the therapeutic setting based on the approach of the HUMS-based music therapy session might be a meaningful extension to existing elements. By implementing such sessions into the early phase of heavy music therapy, clients could become more aware of the ways heavy music is beneficial to their health and in which areas there is room for improvement. The insights gained from the joint discussions could then be used to guide subsequent sessions and the ongoing supervision of the therapist facilitating a healthy musical engagement of the client. In the case of heightened unhealthy musical engagement, which appears to be relevant for the subgroup of heavy electro fans, the identification and discussion of unhealthy listening habits might be a pivotal first step for further interventions. It could also facilitate the mutual exploration of the interconnectedness of these listening habits with other substance-related issues or psychopathological conditions.

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Appendix

Table A1. *Main effects of heavy music fandom, gender, and fan groups on age*

Factor	F (df1, df2)	p
Fandom (a)	11.072 (1, 630.396)	.001**
Gender	71.911 (1, 834)	< .001***
Heavy music fan groups (a)	34.898 (3, 108.536)	< .001***

Note: a = Welch-Test, ** $p < .01$, *** $p < .001$

Table A2. *Pearson correlations and number of valid cases for age and all scales, as well as for item 9 of the BSI-53*

Scale	Age	N
AUDIT	- .149**	852
Hopelessness	- .043	853
Anxiety sensitivity	- .140**	852
Impulsivity	- .057	852
Sensation seeking	- .274**	853
GSI	- .207**	853
Somatization	- .073*	853
Obsession-Compulsion	- .255**	853
Interpersonal Sensitivity	- .182**	853
Depression	- .173**	853
Anxiety	- .219**	853
Hostility	- .097**	853
Phobic Anxiety	- .055	853
Paranoid ideation	- .032	853
Psychoticism	- .231**	853
HUMS Healthy	.018	840
HUMS Unhealthy	- .268**	840
Suicidal ideation (Item 9, BSI-53)	- .166**	853

Note: * $p < .05$, ** $p < .01$, *** $p < .001$

Table A3. *Main effects and interaction effects of heavy music fandom and gender for all dimensions of psychological distress (BSI-53) and suicidal ideation (item 9). Group differences, F-values, significance values, and effect sizes for significant effects are displayed. For models containing age as covariate, suitable parameters are presented as well.*

Factor(s)	M	M diff	F (df1, df2)	p	η^2 part
GSI					
Fan vs. non-fan	56.95 / 56.12	0.83	0.735 (1, 825)	.392	
Male vs. female	56.89 / 56.18	- 0.71	0.514 (1, 825)	.474	
Fandom $\times$ gender			0.235 (1, 825)	.628	
Age			39.912 (1, 825)	< .001***	.046
Somatization					
Fan vs. non-fan	51.43 / 51.14	0.29	0.129 (1, 825)	.720	
Male vs. female	51.36 / 51.20	0.16	0.036 (1, 825)	.850	
Fandom $\times$ gender			1.045 (1, 825)	.307	
Age			5.141 (1, 825)	.024*	.006
Obsession-Compulsion					
Fan vs. non-fan	54.94 / 54.58	0.36	0.180 (1, 825)	.671	
Male vs. female	55.31 / 54.21	1.10	1.547 (1, 825)	.214	
Fandom $\times$ gender			0.888 (1, 825)	.346	
Age			60.535 (1, 825)	< .001***	.068
Interpersonal Sensitivity					
Fan vs. non-fan	55.73 / 55.46	0.27	0.091 (1, 825)	.763	
Male vs. female	55.35 / 55.84	- 0.49	0.289 (1, 825)	.591	
Fandom $\times$ gender			0.027 (1, 825)	.870	
Age			26.113 (1, 825)	< .001***	.031
Depression					
Fan vs. non-fan	57.37 / 57.22	0.15	0.029 (1, 825)	.865	
Male vs. female	58.42 / 56.18	2.24	5.937 (1, 825)	.015*	.007
Fandom $\times$ gender			0.014 (1, 825)	.906	
Age			32.738 (1, 825)	< .001***	.038
Anxiety					
Fan vs. non-fan	53.13 / 53.21	- 0.08	0.008 (1, 825)	.928	

Male vs. female	53.46 / 52.88	0.58	0.441 (1, 825)	.507	
Fandom × gender			0.066 (1, 825)	.798	
Age			42.817 (1, 825)	< .001***	.049
Hostility					
Fan vs. non-fan	55.74 / 54.87	0.87	1.055 (1, 825)	.305	
Male vs. female	55.99 / 54.63	1.36	2.406 (1, 825)	.121	
Fandom × gender			0.189 (1, 825)	.664	
Age			11.133 (1, 825)	.001**	.013
Phobic Anxiety					
Fan vs. non-fan	56.55 / 56.16	0.39	0.868 (1, 825)	.352	
Male vs. female	56.29 / 56.61	- 0.32	0.328 (1, 825)	.567	
Fandom × gender			1.003 (1, 825)	.317	
Paranoid Ideation					
Fan vs. non-fan	55.14 / 53.38	1.76	4.034 (1, 825)	.045*	.005
Male vs. female	54.73 / 53.83	0.09	0.229 (1, 825)	.632	
Fandom × gender			0.001 (1, 825)	.981	
Psychoticism					
Fan vs. non-fan	55.43 / 55.29	0.14	0.027 (1, 825)	.870	
Male vs. female	55.07 / 55.64	- 0.57	0.416 (1, 825)	.519	
Fandom × gender			0.357 (1, 825)	.550	
Age			43.112 (1, 825)	< .001***	.050
Suicidal ideation / Item 9					
Fan vs. non-fan	.19 / .19	0.00	< 0.001 (1, 825)	.995	
Male vs. female	.18 / .21	- 0.03	0.393 (1, 825)	.531	
Fandom × gender			< 0.001 (1, 825)	.984	
Age			2.832 (1, 825)	< .001***	.027

Note: * $p < .05$, ** $p < .01$, *** $p < .001$.