EFFECTS OF MAJOR AND MINOR MODES TO EMOTIONAL PERCEPTIONS OF 'HAPPY' AND 'SAD' IN PIANO MUSIC AMONG STUDENTS AGED 9 – 17

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ABSTRACT

This quantitative study investigates the effects of major and minor modes, and contributing musical parameter of tempo, to the emotional perceptions of 'happy' and 'sad' in piano music among subjects aged 9-17 years old. Study was conducted in two phases; survey-questionnaire, and listening activity. Subjects (N=31) were sampled from piano music students' population in Bangi, Selangor.

In the survey-questionnaire, subjects answered 20 questions on demographic characteristics, music listening and preference, and understanding of emotional perception in music. In the listening activity, subjects listened to 20 untitled piano music excerpts and rated the emotion perceived for each excerpt, whether 'happy' or 'sad'. Results from survey-questionnaire show that most percentage of subjects are 11 years old, in Grade 1, of 3 years of learning piano, prefer classical music, always listen to music, prefer both major and minor modes' music, and find it easy to understand emotion in music, as well as major and minor modes. Results from listening activity show that 60 % of major mode music are perceived as 'major-happy', while 60 % too, of minor mode music are perceived as 'minor-sad'. However, Chi-square test of independence statistical analysis indicates that there are no association and significant relationship between modes (major and minor) and 'happy', as well as 'sad' perceptions (χ^2 (1, N = 20) = 0.80, p = 0.371), at the significance level of $p \leq 0.05$.

Contrastingly, there are association and significant relationship between tempo (fast and slow), and 'happy', as well as 'sad' perceptions (χ^2 (1, N = 20) = 9.899, p = 0.005). Therefore, it is concluded that tempo plays an important role in effects of major and minor mode to 'happy' and 'sad' emotional perceptions in piano music among subjects aged 9 to 17 in this study.

ABSTRAK

Kajian kuantitatif ini menyiasat kesan-kesan nada major dan minor dalam muzik, dan juga parameter muzik sampingan iaitu tempo (kelajuan), terhadap persepsi emosi 'gembira' dan juga 'sedih' yang diinterpretasikan melalui muzik piano, di kalangan subjek berumur 9-17 tahun. Kajian ini telah dijalankan dalam dua fasa; pertama soal selidik, dan kedua adalah aktiviti mendengar bunyi muzik. Subjek-subjek yang terlibat (N=31) telah disampel daripada populasi pelajar piano di Bangi, Selangor. Dalam soal selidik, subjek-subjek diminta menjawab 20 soalan dari segi demografik, tahap mendengar muzik dan jenis muzik kegemaran, dan juga kefahaman tentang persepsi emosi dalam muzik. Dalam aktiviti mendengar muzik, subjek-subjek tersebut diminta mendengar 20 keratan muzik piano dan perlu menandakan persepsi emosi untuk setiap keratan muzik, sama ada 'gembira' atau 'sedih'. Keputusan daripada soal selidik menunjukkan peratus tertinggi subjek berumur 11 tahun, dalam peringkat Gred 1, telah mempelajari piano selama 3 tahun, lebih meminati muzik klasikal, selalu mendengar muzik, lebih meminati kedua-dua nada major dan minor dalam muzik, dan senang memahami emosi dalam muzik, termasuk dalam nada major dan minor. Keputusan daripada aktiviti mendengar muzik menunjukkan bahawa 60 % daripada muzik nada major dipersepsikan sebagai 'major-gembira', dan 60 % juga daripada muzik nada minor dipersepsikan sebagai 'minor-sedih'. Walau bagaimanapun, analisis statistik Chi-square yang bertujuan mencari hubungkait antara pembolehubah, menunjukkan bahawa tiada hubungkait signifikan antara nada-nada major dan minor, dengan persepsi 'gembira' dan 'sedih' (χ^2 (1, N = 20) = 0.80, p = 0.371), pada kadar signifikan $p \leq 0.05$.

Tetapi, analisis Chi-square menunjukkan bahawa terdapat hubungkait signifikan antara tempo (kelajuan, merangkumi ‘laju’ dan ‘perlahan’) dengan persepsi ‘gembira’ dan ‘sedih’ (χ^2 (1, N = 20) = 9.899, p = 0.005). Kesimpulannya, tempo memainkan peranan penting dalam mempengaruhi kesan-kesan nada major dan minor terhadap persepsi emosi ‘gembira’ dan ‘sedih’ dalam muzik piano di kalangan subjek berumur 9 hingga 17 tahun dalam kajian ini.

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CHAPTER 1: INTRODUCTION

1.1 Background

In piano learning, it is often observed that emphasis is given on technical abilities, comprising from posture issues (examples are sitting straight, fingers curved, relax shoulders and arms) to mastery of basic musical structures, including pulse, rhythm, counting, notation, pitch, tempo, dynamics, articulation and other aspects. These factors are undeniably the building blocks of piano playing, but as a piano student's level develops, aspects beyond these need to be taken into account, namely the stylistic, interpretation, and expression to be communicated from the piano repertoire played.

One such way to look into interpretation and expression issues in piano playing is to emphasize on the emotion portrayed by the various piano repertoires. By knowing and understanding the emotional perception in music, piano students could develop and communicate their intended emotion through the different repertoires played. Understanding of emotional perception in music could be achieved by applying musical parameters of tempo (fast and slow), dynamics (loud and soft), pitch (high and low), and modes (major and minor) (Gerardi and Gerken, 1995; Lindström and Gabrielsson, 2001; and Karlsson, 2008).

1.2 Research Questions

Relating to objectives, firstly, this research questions whether major and minor music modes are always associated with 'happy' and 'sad' emotional perceptions in music, specifically in the number of each perception given by subjects, when presented with major and minor piano music excerpts for listening. Previous studies have indicated that major mode is mostly associated with happiness, while minor mode is mostly associated with sadness, for examples by Hevner (1935) as precursor study; Peretz et al. (1998); and Schellenberg and Von Scheve (2012). However, there are also studies that indicate 'major-sad' and 'minor-happy' associations, when musical modes are paired up with other musical parameters such as tempo and dynamics, as exemplified by mixed emotional cues in studies by Schellenberg and Von Scheve (2012), Ladinig and Schellenberg (2012), and Hunter et al. (2010). Therefore, this study aims to firstly discover the effects of major and minor modes, on whether 'major' is always perceived as 'happy', while 'minor' as 'sad', or vice versa, to contribute to research in music modes and emotions.

Secondly, this research also questions on the effects of tempo as contributing musical parameter, to emotional perceptions in music. Previous studies indicated that fast tempi generally evoked 'happy' tones while slow tempi, 'sad' tones (Hevner 1935); faster tempo used for performance of 'happy' emotion while slower tempo for 'sad' emotion (Palmer, 1997); and fast tempo represents happiness while slow tempo, sadness (Juslin and Laukka, 2004). Therefore, fast tempo with major mode result in mostly 'happy' emotions, while slow tempo with minor mode result in

mostly ‘sad’ emotions in music (Juslin and Laukka, 2004). However, Schellenberg and Von Scheve (2012) also found mixed emotional cues from their study of American pop music, where increase of tempo was found for minor key music, while decrease of tempo was found for major key music. Thus, it is asserted that mixed emotional perceptions of either ‘major-sad’ or ‘minor-happy’ could occur, and this study aims to discover this effect in the association between tempo (fast and slow) to emotional perceptions in music (‘happy’ and ‘sad’).

Thirdly, this research questions on the demographic and musical background data of piano music students in Bangi, Selangor, as there is a lack of study concerning music students in said population. Therefore, this study will enable data collection of subjects’ demographic, musical background, musical listening and preference, as well as understanding of emotional perception in music, by means of frequency and percentage. Previously, studies have investigated emotional response of children aged four to twelve years old, to music, relying on tempo and dynamics (Adachi and Trehub, 1998); ability of Western children aged six to twelve years old to perceive sadness and happiness in music (Kratus, 1993); and even ability of Western children aged three to five years old to detect affective difference between major and minor mode music (Kastner and Crowder, 1990). These studies mostly show data on Western subjects, but lacking on Eastern or Asian subjects. Therefore, this study hopes to contribute to the addition of data, specifically using Malaysian subjects of piano music students.

1.3 Definitions

According to *Oxford online dictionary* (2011), 'effects' are defined as the change or consequence of action. 'Mode' in music is defined as a scale or sequence of notes used as the basis for a composition. 'Major' and 'minor' are two examples of modes, referring to a collection of seven different pitches ordered in a specific pattern of whole and half steps (*iMusicdictionary,* 2011). The difference between major and minor modes is determined by the different patterns of whole and half steps in the pitches of each mode. Thus, 'effects of major and minor modes' in this study implies the consequence of two different sets of pitch patterns in whole and half steps which are applied into musical compositions.

Next, 'emotions' relate to instinctive or intuitive feeling (*Oxford online dictionary,* 2011). In detail, Juslin and Västfjäll (2008) defined 'emotions' as 'relatively intense affective responses involving subjective feelings, physiological arousal, expression, action tendency, and regulation, which are more or less synchronized'. Hence, this implies that emotions in music are the affective elements or feelings induced, expressed, or projected, including 'happy' and 'sad' emotions. In terms of 'perception', basic definition of it is the ability to see, hear, or become aware of something through the senses. Relating to psychological aspect, 'perception' is further defined as the way in which external stimuli is regarded, understood, or interpreted by means of intuitive understanding and insight (*Oxford online dictionary,* 2011). Therefore, it is derived that 'emotional perceptions of happy and sad' refer to the awareness, interpretation, and intuitive understanding of the external stimuli or the inducing factor, which are the affective elements of happiness and sadness. This

leads next to the medium in which the 'happy' and 'sad' emotional perceptions take place, which is the variety of piano music excerpts used in this research. The piano music in question consists of Baroque, Classical, Romantic, 20th Century, and Modern eras as based on Western classical periods in music, with addition of Folk/Ethnic genres, as based on current world music.

Leading to the subjects of research, piano students age 9 – 17 are selected and sampled from a music school as well as private learning in Bangi, Selangor. This age group includes primary and secondary school students with appropriate level of understanding in answering emotional perception questionnaire, as well as in perceiving emotion through piano music excerpts' listening activity. The students range from Grade 1 to Grade 5 levels in piano learning, undergoing lessons either for purpose of examination, syllabi including Associated Board of Royal Schools of Music (ABRSM), London College of Music (LCM), or for leisure playing (syllabi including Alfred's, Piano Town, and other piano technique and repertoire books).

In overall, definition and explanation of research title is 'the effects of two musical modes, major and minor, which are built up of different pitch patterns, to the awareness, interpretation and intuitive understanding of 'happy' and 'sad' affective elements, in the medium of various piano music, among Grade 1 to Grade 5 piano students in the primary and secondary school category level of age 9 to 17'.

1.4 Scope of Study

1.4.1 Objectives. The objectives of this research are:

1) To look into the effect of major and minor modes, in association with the number of 'happy' and 'sad' emotional perceptions from subjects for piano music excerpts in this study.
2) To look into the effect of contributing musical parameter, tempo, in association with the number of 'happy' and 'sad' emotional perceptions in major and minor piano music excerpts.
3) To obtain frequency and percentage on subjects' demographic and musical background from the survey-questionnaire phase, specifically on age, gender, grade/level in piano, years in piano learning, other demographic factors, as well as factors of music preference and listening habits, and lastly, understanding of emotional perception in music.

1.4.2 Variables. Independent variables for this study are major and minor modes in the piano music excerpts. Apart from that, the contributing parameter of tempo is categorized into 'fast' or 'slow'. Dependent variables for this study are the 'happy' and 'sad' emotional perceptions in music. Thus, the study will examine specifically the effects of major and minor modes, with contributing effect of tempo, to whether each piano music excerpt is perceived as 'happy', or 'sad'.

1.4.3 Hypotheses. Based on previous research, for example Juslin and Sloboda (2001), and what is expected from this study, it is hypothesized that :

1) Major mode piano music will be associated with total of 'happy' emotional perceptions from subjects.
2) Minor mode piano music will be associated with total of 'sad' emotional perceptions from subjects.
3) Contributing musical parameter factor of tempo will be associated with the number of 'happy' and 'sad' emotional perceptions in major and minor mode piano music excerpts.

1.5 Significance of Study

Firstly, this research hopes to contribute in increasing piano students' awareness of emotion in music. It is a common occurrence that most piano students develop good technical abilities in piano playing but lacks emotional understanding and interpretation when communicating their piano performance in lessons, exams and recitals. Therefore, it is hoped that by exposure to emotional perception in music, simplified in 'happy' and 'sad' emotions first, students can understand these emotions better in piano music, and try to project either or both emotions when performing their repertoires. Secondly, more insight of demographics, music preference, listening, and understanding of emotion in music as related to emotional perception in piano music are also hoped to be gained, thus could contribute to the current variety

of research in this field, in drawing more connections between students' demographics and musical background and how they perceive emotions in music.

Relating to the effects of major and minor modes to emotional perception in music, this research also aims to investigate whether major key music is always perceived as 'happy', while minor key music is always perceived as 'sad'. Therefore, findings from this research could further approve or disprove the conventional Western music notions that label major key music as 'happy' while minor key music as 'sad'. Apart from that, overall effects of major and minor modes, as well as tempo, could further contribute to the research in emotional perceptions in music. Therefore in conclusion, more knowledge on how these musical parameters result in either 'happy' or 'sad' emotional perception in music, is hoped to be achieved, leading to utilizing these factors more effectively to help music students in overall, to improve in their perception and communication of emotions in music performances.

CHAPTER 2: LITERATURE REVIEW

2.1 Overview

This chapter reviews the sources that help in developing the research, beginning with the historical background of emotion in music and modes to explore the interest and importance of emotion in music. This leads to the theoretical foundation of music and emotion, and the structural basis of major and minor modes that link to emotional perception in music. The chapter then highlights several previous studies that explored emotional perception in music and the effects of musical parameters including major and minor modes, tempo, dynamics, and pitch, among others. Knowledge and information obtained from these researches help to shape up own research planning and objectives to be achieved, in effects of major and minor modes to emotional perception of 'happy' and 'sad' in music, among subjects aged 9 to 17 years old.

2.2 Historical Background

Questions about music and emotion have occupied humans ever since antiquity (Parncutt and McPherson, 2002). Indeed, it is historically traced that music and emotion have attracted interest since the period of ancient Greece (Juslin and Sloboda, 2001), where the Greeks argued that specific musical features were associated with specific emotions (Parncutt and McPherson, 2002). It is derived that the interest in emotion of music emerged as a result of how audiences witnessing

music performances were moved when music was played with such profound emotions. According to Thurmond (1982), since early years of music performance, great performers of music have been regarded as geniuses by most musicians and non-musicians alike, based on their ability to 'stir' audiences with emotion, as a result of their emotionally expressive instrumental playing as well as singing. Thus, based on the example, importance of emotional element in music can be seen from the communication and perception of emotion through performer and listener.

Since then, several studies were conducted to further find out the specific factors of musical structures that contribute to emotional perception in music. From these, scholars had identified factors such as tempo, dynamics, pitch, timbre, and other musical structures, to be among important contributors on emotion in music. However, an early study by Hevner (1935), about the affective values of major and minor modes in music, is considered to be an important precursor of empirical research on a specific musical factor that links music and emotion. Hevner was also one of the earliest researchers to discover the distinctive emotional qualities between major and minor key music, as based on several of her empirical studies relating modes to emotion in music. It is therefore derived from this that major and minor modes provide an interesting focus of study, in a quantitative research design, as important musical structures that influence emotional perception in music.

Focusing on modes, it is interesting to find out that aspect of music that has historically been associated with emotion is modality, as according to Gerardi and Gerken (1995). Manipulation of modality extends back to the modal system of the ancient Greeks (Gerardi and Gerken, 1995), attributed to Plato and Aristotle (Powers, 2001; in Temperley and Tan, 2013), where modes can be classified into several names such as Ionian, Dorian, Mixolydian and others, depending on whether the tones used are 'half-step' or 'whole-step'. Mathiesen (2002; in Temperley & Tan, 2013) explained that the terminologies in modes were used to distinguish pitch frameworks that combined scales with a host of other features, including range, and rhythmic patterns.

A detailed history on the major and minor musical modes can be traced as the following. Based on the significance of these modes in music and emotion, it has been stated by Meyer (1956) that the major and minor modes have been the predominant tonal systems for several centuries in Western music. According to Temperley and Tan (2013) from their studies about emotional connotations of diatonic modes, the term 'modes' was firstly used by the writers in Middle Ages to describe the category of liturgical chant melodies, where this is later known as "church mode", used synonymously with the recent term of "diatonic mode".

Collection of diatonic modes today was codified in the 16th century, beginning with Heinrich's "Dodechachordon", dated 1547. By mid-18th century, the term "mode" had come to mean "a collection of degrees of a scale (and its aggregate intervallic content), being governed by a single chief degree" (Powers, 2001;

Temperley and Tan, 2013). In the current research, "mode" is defined as a 'diatonic pitch framework with the tonic assigned to a particular position in the music scale'. In Western art music of the common-practice period (1600 – 1900), music pieces are categorized into major and minor keys, where these keys are known as "common-practice modes". Common-practice major is more or less the same as Ionian mode (Temperley and Tan, 2013), while common-practice minor key is considered to be equivalent to Aeolian mode (Gerardi and Gerken, 1995).

From the thorough explanation of the modes and their system, only the Ionian and Aeolian modes, known today as major and minor respectively, are commonly used in Western music. According to the stereotype or general convention today, major and minor modes convey positive and negative affective connotations, respectively (Gerardi and Gerken, 1995). Leading to more applications of major and minor modes to music and emotion, it was also traced historically (Tiemann and Huron, 2011) that since 16th century, firstly, there were assumptions in Western music that links minor mode with sadness (Zarlino, 1983), based on earliest records. Early empirical studies in modes and emotion in music include Heinlein (1928) and Hevner (1935), and specifically, the study by Hevner made use of short musical passages transposed into major and minor modes and the playing of these excerpts recorded and stored, where later listeners were asked to judge the affective content by means of affective vocabulary including happiness, sadness, excited, subdued, anger, aroused, and other words of emotions categorized into several columns. In application to my research, the study by Hevner has provided the information that listening experiment could be conducted to find out students' emotional perception to major or

minor key music. In addition to this, more insight on major and minor modes, other musical parameters' factors, and information on listeners' musical background and emotional perception in music, could be applied into my research involving piano music students by means of survey-questionnaire too.

Thus, it is derived from the interesting historical point of view in the factors of modes and emotion in music that, major and minor modes are one of strong factors in determining the emotions of 'happiness' and 'sadness', with contributing factors such as tempo and dynamics from musical structures. To further investigate whether the strongly-rooted Western classical music convention of 'major-happy' and 'minor-sad' mode-emotional perception relationships are always or mostly in that notion, information from the theoretical foundation and structural basis of major and minor modes are firstly elaborated below, followed by several past researches that relate major and minor modes, whether directly, or indirectly, to emotional perception in music.

2.3 Theoretical Foundation

2.3.1 Emotion and the GERMS' theory of expressivity in music. The scope of theoretical foundation will first highlight the basis of emotion in music, and how it is important in expression in music performance. According to Juslin (2003) through his theoretical framework of music expression, the basis of emotion in expressivity issue in music is illustrated through his proposed GERMS' model which explains five factors that contribute to music expression:

1) (G)enerative rules, which relate to rules that can convey musical structures to listeners as clearly as possible. These relate to application of musical elements from the score, for examples variations in timing, articulation, and dynamics (Gabrielsson, 1987; in Karlsson, 2008).

2) (E)motional expression, where it is connected to rendering the performance with a particular emotional expression, in other words conveying intended emotions from the music performed to the listeners (Karlsson, 2008). Karlsson (2008) also asserted that by manipulating overall features of the performance such as tempo, timbre, and loudness, a performer is able to play the same structure with different emotional expressions.

3) (R)andom variability, which refers to random fluctuations present in music expression, characteristic of humans' style of performing music and the sense that it is not too mechanical or controlled totally by motor-system. In other words, humans' music performance is not perfect and there will still be small and involuntary fluctuations in timing, for example, in their performance (Karlsson, 2008).

4) (M)otion principles, where this refers to biological motion of humans whether intentional or non-intentional, relating to dynamic patterns of movements in music performances. It is asserted that certain aspects of the performance, for example tempo, should be shaped in accordance with patterns of human movement, for example gesture (Karlsson, 2008).

5) (S)tylistic unexpectedness, where musical emotions often occur when musical expectations are violated in some way, not adhered to strict or consistent style of performing. This refers to performer's deliberate attempt to deviate, or move away

from stylistic expectations regarding performance conventions in order to add tension and unpredictability to the performance (Meyer, 1956).

Therefore, it is derived from the GERMS' theory that emotional element is one of the important factors in the expressiveness of a music performance, and it includes the emotion communicated by the performer, and the emotion perceived by the listener. Thus, this study focuses on the emotion perceived by the listeners in order to get insight on how performer could communicate intended emotion. Also, it is interesting to note that manipulation of factors from music structures such as tempo and dynamics are essential in order to convey the emotion communicated or perceived. In this study however, the underrated factors of major and minor modes are selected to be studied instead of tempo and dynamics, as modes are currently not widely studied in terms of more in-depth connection to emotional perception in music.

2.3.2 Structural basis of major and minor modes and effects to emotional perception in music. In finding more about the effects of major and minor modes to emotional perception in music, the structural basis of these modes is investigated first. Several researches have interestingly highlighted structural basis in major and minor modes that relate these to the type of emotion perceived in music, and this is specifically investigated through emotional connotations as affected by major and minor triads, intervals and pitch height theory, connection between musical modes and speech, and valence and arousal theory.

Firstly, it is well-known that major and minor modes have positive and negative emotional connotations, respectively, as explained by Temperley and Tan (2013) through a number of experimental studies involving musicians, non-musicians, and children, and a variety of stimuli, for examples isolated major and minor triads (Crowder, 1984; Heinlein 1928, and Temperley and Tan, 2013), and pairs of pieces constructed or altered to differ only in the major or minor dimension (Gerardi and Gerken 1995; Hevner 1935; Kastner and Crowder, 1990; Peretz et al., 1998, and Temperley and Tan, 2013). In more specific explanation, Helmhotz (1954) asserts that different emotional connotations as according to modes, is due to the different levels of consonance between major and minor triads.

Temperley and Tan (2013) also stated that different emotion is connotated to each of the ancient Greek mode, namely Lydian, Ionian, Mixolydian, Dorian, Aeolian, and Phrygian. Through their listening experiment of melody in diatonic modes and subjects' ratings of emotion, it is found that in overall, the modes 'increase' in happiness as scale-degrees are raised, thus showing effects of intervals. Significant results that emerge from this experiment is that Ionian, also the major mode and the most common mode in both classical and popular music, is the 'happiest', and 'happiness' emotional judgment declines with increasing distance from Ionian. This also indicates the effect of 'familiarity' where major mode, being the well-known mode in various genres of music, is deemed the happiest so far. In application to research, this study supports that major mode is happier than minor mode, thus it is hypothesized that subjects will perceive major mode melody excerpts as happy, compared to sad.

In another source, Huron and Margulis (2012) asserted that the difference relating emotional connotation to major or minor mode may be a simple matter of interval and pitch height as related to speech, where lower pitch expresses sadness, and the minor scale contains lower pitches than the corresponding major scale. The pitch theory states that modes 'increase in happiness' as flats are removed (or sharps added) to the musical notes, since each alteration creates a rise in pitch (in relation to fixed tonic). Thus, 'happiness' emotion of a melody is due to the height of its scale, making common-practice major key 'happier' than the minor, because the third scale degree of the minor is lowered in relation to that of major, and possibly the sixth and seventh degrees as well, depending on which minor scale is used.

Juslin and Laukka (2004) further studied the connection between minor mode and speech, and asserted that the sad speech prosody is due to the lowering of pitches in the minor mode. Therefore, it is derived from the interval and pitch height theory that when a pitch is raised, portrayed by intervals in the major key scale, the mode 'increases in happiness', while when a pitch is lowered, portrayed by intervals in the minor scale, the mode 'decreases in happiness' or 'increases in sadness', and these are also similar to human's speech (higher pitch in the voice resembles happiness while lower pitch resembles sadness). These explanations contribute to the mode-emotional perception notions of 'major-happy' and 'minor-sad' as the most commonly perceived in music. In addition, Gerardi and Gerken (1995) affirmed that melodic contour (ascending and descending musical scales) as related to major and minor modes, evoke consistent emotional responses in adult listeners.

Apart from that, 'valence and arousal' theory as related to major and minor modes also plays an important role to the emotional perception of music. According to Lindström and Gabrielsson (2001), and Russell (1980), this theory emerges from various experimental researches on music and emotion, where multivariate techniques applied in analyzing emotional responses to music can be reduced effectively to two dimensions of framework, which are arousal, and valence. Previous research has shown that the emotional effects of common-practice mode (major vs minor), lie mainly along the 'valence' dimension.

Lindström and Gabrielsson (2001) stated that major mode is associated with happiness and serenity (positive valence), whereas minor mode is associated with sadness, tension and anger (negative valence). Leading to arousal, major and minor modes, with help of other musical factors such as tempo, pitch height, and dynamics, play a role in affecting the arousal dimension. It is asserted that a high pitch level is associated with both anger and happiness, both high in arousal but opposite in valence; and similar effects are found for both loudness and fast tempo. Thus, from this, apart from major and minor modes, contributing factors of musical structures like tempo, pitch and dynamics are also selected for study, in order to determine in detail, of musical factors that affect 'happy' and 'sad' emotions in music.

To further relate 'valence and arousal theory' to modes, a study is illustrated by Ramos et al. (2011), where excerpts of 3 melodies in seven diatonic modes, crossed with three different tempi, were played to the listeners of Brazilian musicians and non-musicians. The participants heard individual melodies and had to assign each melody to one of four emotional categories: "happiness", "sadness", "serenity" or "fear/anger". The authors interpret these categories in terms of valence and arousal dimensions, with happiness and serenity positive in valence, sadness and fear/anger negative in valence, happiness and fear/anger positive in arousal, and sadness and serenity negative in arousal. All of these factors explained in the structural basis of major and minor modes and how emotional perceptions would be affected, provide the framework in understanding these following previous researches on modes and emotional perception that can be applied in current research.

2.4 Survey of Research on Major and Minor Modes and Emotional Perception in Music

2.4.1 Physiological and psychological factors. Survey of previous research that relate major and minor modes to emotional perception in music result in identification of several factors of influence. Firstly, humans' physiological and psychological developments will also affect emotional perception in music. Thus, it would be important to physiologically and psychologically consider how emotion is perceived through music. Relating to psychological factor too, it is first explained how music listening induces emotions. According to Juslin and Västfjäll (2008) in

underlying mechanisms for emotional responses to music, it is discovered that the following factors could be the theoretical framework on how music listening may induce emotions, specifically brain stem reflexes, evaluative conditioning, emotional contagion, visual imagery, episodic memory, and musical expectancy. This shows the importance of music listening and the effects it has on the brains in emotional induction, firstly, that triggers visual imagery, musical expectancy and all the musical processes described by Juslin and Västfjäll (2008), as well as how music listening will affect emotional perception in music. Thus, the survey-questionnaire planned in research will include investigation on subjects' music listening habits too, to relate on how this would affect emotional perception in music.

In another psychological development effect, Nawrot (2003) stated that emotional perception to music may be caused by innate perceptual predispositions and learned associations that develop in childhood. This is derived as humans of different age groups, physiological, and psychological developments, experience emotional reactions and perceptions at a different level. Example of Nawrot (2003)'s study showed that infants especially preferred affectively concordant happy display but did not look longer to the affectively concordant sad display as predicted, while children and adults had more developed perception of emotional expression, varying in happy, sad, fear, or anger feelings.

In another study, Adachi and Trehub (1998) concluded from their study on children age 4 to 12 years old that in this stage of development, these children rely primarily on variations in tempo, dynamics and overall pitch as indicators to emotional perception in music. On the other hand, Kratus (1993) found that Western children 6 to 12 years old are able to perceive sadness or happiness in music very well, with only small differences between different age groups. Contrastingly, Kastner and Crowder (1990) asserted that Western children age 3 to 5 years old are already able to detect affective differences between music based on either major or minor modes, and if this is correct, could indicate truth in Western notion of minor-sadness and major-happiness.

To apply to research, firstly, it is derived that subjects' specific age groups should be taken into consideration, and based on these interesting age groups studied in the mentioned sources, it is realized that there is a lack of inclusion of teenagers' age group of subjects (around age 13 to 17 students). Therefore, this study will also include subjects age 13 to 17 in addition to more commonly studied group of subjects age 9 to 12, in order to obtain more varied results. Another physiological factor that could relate to demographics' factor of subjects, is illustrated by the study from Esposito and Serio (2007), which mentioned that the 6 years old subjects' emotional responses to orchestral extracts were found to be full of affective cues, similar to those demonstrated by adults and that there was no gender effect. Thus, it is also asserted that regardless of being male or female, similarities in emotional perception in music might occur.

For studies involving children's emotional perception to music, an example has been illustrated by Kastner and Crowder (1990), where the subjects were children age 3 to 12 years old, in the experiment of matching the melodies to the drawing of faces that best represented each emotion. Results showed that even the youngest subjects could differentiate by associating major melodies with happy or neutral faces, and minor melodies with sad or angry faces, which imply that the basis of musical affect appears quite early in stage. It is interesting to note from this research, that young children can differentiate between major-happy and minor-sad, generally. Also, Zajonc (1980) suggested from this, that positive responses of emotional perception to major key melodies, unaccompanied version specifically, was due to familiarity with these melodies. Therefore, it might be possible that young children are more exposed to major key music rather than minor key music, resulting in their tendency to choose happy emotion that associates major key music with familiarity.

In application to research, firstly, it is noted that major and minor modes both play a role in affecting emotional perception to music, among adults and children too, and that young children might be more familiar with major-happy association in music. However, teenagers' groups are seldom investigated, thus current research will include teenage as well as children subjects, to study their emotional perception to music, and it is hypothesized too that most of the children will tend to choose major-happy association as compared to sad.

2.4.2 Cultural factors. Cultural factors and learned associations also play a role on how either major or minor mode music may be emotionally perceived. On an interesting cross-cultural study related to modes and emotion in music, Bowling et al. (2012) investigated whether tonality and emotion were similarly linked in an Eastern music tradition, in this case Indian 'Carnatic' music, composed in 'ragas', which portrayed similar meaning to 'modes'. As the research basis, it has been asserted by Bowling et al. (2012) that different sets of tones and tone-relationship are used to convey particular emotions in a variety of musical cultures. In Western music, this phenomenon is evident in the association of major mode with positive/excited emotion; and minor mode with negative/subdued emotion. It is unclear whether the basis for these associations is intrinsic to tonal perception or the result of exposure to Western music. The researcher also questioned whether there were common denominators in the way musical tonality is used to convey emotion across cultures. Thus, the study compared classical music of South India, the Carnatic music, to Western music, in terms of how tones and tone-relationships were used to express emotion in different musical traditions.

In detail, the Carnatic music is made of 'ragas', or modes in that sense, and ragas are associated with specific emotional themes called 'rasas'. 9 rasas are defined, and two parallel the emotions associated with the major and minor modes, called 'Haasya' literally 'happiness', and 'Karunaa', which means 'sadness', thus suited to be chosen as cross-cultural comparison. The results indicated that tonal relationships used to express positive/excited and negative/subdued emotions in classical South Indian music are much the same as those used in Western music, and more

interestingly, tonal variations in prosody of English and Tamil speech uttered in different emotional states are parallel to the tonal trends in music. Therefore, results are consistent with hypothesis that association between musical tonality and emotion is based on universal vocal characteristics of different affective states (Bowling et al., 2012).

As a result of cultural factors in mode-emotional perception in music, the aspect of 'familiarity' also plays an important role in determining whether emotion in music is perceived as 'happy' or 'sad'. This is exemplified by several studies in music familiarity, suggesting that one's familiarity to particular music will lead to enjoyment or happiness in listening to music (Temperley and Tan, 2013). Familiarity breeds happy emotional induction in listening to music, but induction can also affect recognition or perception of the listener, to the music being listened to.

Therefore, a feeling of happiness due to a familiarity of the piece may cause the piece to be perceived as 'happy' as well, vice versa with sadness (Temperley and Tan, 2013). Thus, to relate to major and minor modes with emotional perception, it is possible that when the listener recognizes a music as being happy or sad as related to his or her familiarity with the music, even including personal experience from the music, then this may cause the music to be perceived as happy according to the listener's experience even though the music might be in major or minor key. Either mode of music may also be perceived as sad if this relates to specific familiarity and experience of the listener. Therefore, this foundation provides interesting possibility

of which emotional perception might be answered by subjects through music of different modes, in the listening experiment of this research.

It is also generally well-known that Western musical culture plays a strong role for most musicians, and as a result of more tendency and familiarity towards Western music, example of a study by Tillman and Bigand (1996) indicated that from their investigation, subjects could perceive the emotions of Western musical excerpts, even though the excerpts were cut into very short segments, played backwards and forward during the experiment. This implies that regardless of coming from different backgrounds, subjects who are trained in Western musical culture are able to perceive the emotions in well in Western music. This has been further emphasized by Feld and Fox (1994), stating that all meaning perceived in music is socially constituted through experiences of sounds in our listening histories, thus enculturation effect can be seen clearly through Western music education. Since Western music notion also commonly emphasizes that major key music are 'happy' while minor key music are 'sad', it is also asserted that most of the subjects studied by previous research as mentioned, would strongly perceive major key music as being happy, and minor key music as being sad, following the notion.

The strong influence of Western musical culture also leads to the question of, are most subjects studied from previous research, trained solely in Western classical music? McKay (2002) answered this by indicating that in most studies, Western listeners are involved in the listening experiment and emotional perception in music. Thus, this implies that most studies investigated Western subjects who, by right, are

mostly trained in Western classical music roots, and would therefore tend to perceive 'major-happy' and 'minor-sad' music. From this, question arises on the lack of non-Western subjects, or at least, subjects who are not trained in Western classical music. To apply to study, non-Western subjects (with some are not currently trained in Western classical music roots) are investigated, in this case subjects from Bangi, Selangor, Malaysia, which would be of significantly different niche from Western subjects. Thus, it would be interesting to find out whether Western notion of 'major-happy' and 'minor-sad' could still apply to non-Western subjects in terms of emotional perception to music. This has indeed been stressed by McKay (2002), that comparative studies of music of multiple cultures should be done in order to discover if similar psychophysical cues evoke similar responses across cultural boundaries.

In relation to this, several studies have interestingly explored emotional responses to music from subjects of either non-Western, or not trained in Western classical music culture, and even, emotional responses to music from other cultures. For example, Gregory and Varney (1996) comparatively studied Indian and British subjects, where the subjects were instructed to listen to short excerpts of Western classical, Indian classical, as well as new age music, and later described the mood of the excerpts. In results, it was found that interestingly, there was high level of agreement between responses of Indian and Western subjects. In detail, Western classical music are mostly perceived as 'major-happy' and 'minor-sad' by both Indian and Western subjects regardless of their training and background and surprisingly, Indian classical music, where music that has almost-major key characteristic, are perceived as mostly happy, and music that has almost-minor key characteristic are

perceived as mostly sad, by both groups of subjects (Indian and Western). This might suggest some common thread in 'major-happy' and 'minor-sad' happening in other than Western cultures.

Also, a study by Balkwill and Thompson (1999) indicated that when Western listeners were presented with Hindustani ragas, each traditionally associated with joy, sadness, peace or anger, and were asked to rate the emotional perception of each music, the subjects were sensitive to intended emotions of joy, sadness and anger. Thus, a similarity is drawn in perception of Western and Hindustani music. In another comparative cultural study, Hoschino (1996) showed that adult Japanese subjects associate Western and traditional Japanese versions of major and minor mode music, with various colors that indicate similarity to 'major-happy' and 'minor-sad' indications. From these examples, it is interesting to derive the similarity between Western, Indian, and Japanese music and emotional perceptions, where major or almost-major music is perceived as happy, and minor or almost-minor music is perceived as sad. This might suggest that 'major-happy' and 'minor-sad' apply to various other cultures apart from Western, therefore further supporting the Western classical music notion of which mode to which emotion.

However, there is a lack of study concerning other Asian subjects apart from Indian and Japanese subjects as mentioned. Thus, this research includes subjects from Malaysia, where the majority of subjects obtained are Malay, who make up the most in Bangi population in Selangor. In Bangi, most of the piano students are also Malay. Thus, inclusion of Malay subjects might add to the new insight of emotional

perception in music, as this has rarely been included before. McKay (2002) too asserted that empirical cross-cultural research is important and can include many methodologies, for example listeners from many cultures should be monitored for emotional responses to music from other cultures too. McKay has suggested that there is a need for research involving large variety of pieces from various cultures, and that research should focus on types of music intended to carry emotional content. Studies should involve musically naive subjects and also musically sophisticated subjects for comparison of innate learning, analytical patterns, and other factors. Based on these previous research and suggestions, it is applied to current research that subjects of other than Western culture are included, and in terms of musically naïve or musically sophisticated, subjects are varied from beginner to grade 5 level of stages in piano learning, in order to find out how their levels of emotional perceptions to music will be, with regards to their musical backgrounds.

In recent studies, many ethnomusicologists found that minor scale did not have sad connotations in a number of non-Western cultures (Tiemann and Huron, 2011). This interestingly posits another issue in minor mode and emotion, where culture might be the factor in this case. It is asserted from this that minor mode is generally linked to sadness as in the music of Western culture, but it might not link to sadness, in the case of music of other cultures. It is also widely assumed that affective content associated with minor mode must be due to enculturation and also developmental psychology, as found in the studies of Crowder (1984), where minor mode music was perceived to be 'sad', by both adults and children as young as 3 years old, at least in the Western culture.

2.4.3 Contextual factors. Apart from psychological and cultural factors, the medium or environment in which emotional perception in music takes place is also important to be investigated, hence illustrated by these following studies, categorized into different contexts of musical mediums. The first main category relates to the factor of composer-performer-listener in communicating and perceiving emotion in music. Juslin and Västfjäll (2008) firstly illustrated, between the performer and listener, where factors such as visual imagery and musical expectancy could be used by performers, for example in visual imagery, by giving a brief description of the story behind the piece performed, and later portraying the scene through performance, encoding a particular emotion associated with it that would later be decoded by the audience or listeners. Ferguson (1960) supported this by stating that musical elements such as tone or rhythm are capable of arousing extramusical imagery, in functioning as elements of expression. In terms of musical expectancy, a performer could use this factor through resolution of chords and harmonies from the piece performed that would meet listeners' expectation of the flow of music, thus evoking a sense of release in the audience. Ferguson (1960) also questioned whether elements of tension and motion could be manipulated by the composer and performer in communicating specific emotions to the listeners.

In another case, Lehmann et al. (2007) asserted too that musical expression and interpretation, including emotions, involved communication from performer to listener. This has been explained in detail by Scherer and Zentner (2001), firstly stating that factors of the listening situation in which emotion could be induced, involve musical structure, interpretation by the performer, and relevant state and trait

characteristics of the listener. Two variables were also identified, where the input variables concern aspects in listening to a piece of music that were involved in induction of emotion, categorized under structural, performance, listener, and context features, whereas output variables were relate to the emotions evoked by the music itself. Regarding the emotions evoked, the composer's role could also be seen, as according to Kopiez (2002) that musical communication firstly consisted of the structural layer which was given by the composer's score, and secondly consisting of the expressive layer which was added by the performer's realization of the score. Kopiez (2002) also stressed that musical communication, relating to emotions for instance, until the structural and expressive layers were related, implemented, and communicated to the listener.

In a more detailed study, Scherer and Zentner (2001) explained how variables stated play an important role in emotional communication, consisting of structural factors such as segmental features (acoustic characteristics of building blocks of musical structure, including individual sounds or tones produced by singing voice or specific musical instruments); and suprasegmental features (systematic configurational changes in sound sequences over time, such as melody, tempo, rhythm, harmony, and other aspects of musical structure and form, also iconic coding, for example rising or falling contours of melody). It is also asserted that suprasegmental features have emotional information through symbolic coding involved.

Next, performance features involve the way a piece is executed, including variables under performance state such as interpretation, concentration, motivation, mood, stage presence, and contact with audience; listener features involve symbolic and associative coding, as based on individual and sociocultural identity of listener; and last but not least contextual features , referring to certain aspects of performance and/or listening situations, for instance location of music listening, which could affect communication of emotion in performance (Scherer and Zentner, 2001).

In application of all these studies into the current research, the context of composer-performer-listener factor in emotional communication and perception could be portrayed in the piano music excerpts selected for study, in which all the detailed musical elements, visual imagery, musical expectancy from the composition and based on the composer's and performer's intentions, play an important role in how the emotion of the music is to be perceived by the listener. Also, the medium of situation and features in which the emotional communication and perception are taking place, is considered in the listening experiment stage for the subjects, where the venue, tools and equipment would provide focused listening. This is to ensure that the emotion communicated from the music could be perceived as clearly as it can by the subjects, during the processes in the listening experiment.

2.4.4 Musical parameters' factor. Last but not least, the musical parameters which affect emotional perception in music, such as tempo, dynamics, pitch, and others, are also investigated. Historically, Post and Huron (2009) traced the history of musical periods as based on tempo, and found that music in minor mode was associated with slower tempo, which was evident in the samples of Baroque and Classical music, but there was a reverse correlation in the early Romantic period (where music in minor mode could be faster in tempo). In terms of 'sadness', it was also found that in the era of 'Sturm und Drang' in late Classical period, compositions from the late 18th century indicated that loud minor mode musical passages conveyed "passion" rather than "sadness" (Brook, 1970; in Post and Huron, 2009).

In an interesting pioneer study of modes, expression and emotion in music, Hevner (1935) asserted that adults associate major and minor modes with specific emotions. She arranged different versions of five short piano pieces, each rendered in both major and minor, so as to leave other parameters constant, where tempo, dynamics and other musical structures are kept almost similar. Subjects rated the different pieces by using checklists of emotion-related adjectives. Minor pieces were rated as pathetic, doleful, sad, and all other negative or somber connotations, while major versions of the same pieces were rated as merry, joyous, gay, and all other positive connotations. It is also noted from this study that pieces were reproduced in either major or minor key, while other parameters were kept constant.

Empirically, there are also several studies that relate musical parameters, including major and minor modes, to emotional perception in music. For example, Wapnick et al. (2004) applied the parameter of tempo (slow versus fast) in their study of the effects of selected variables on musicians' ratings of high-level piano performances, to find out whether judgments of solo performances recorded at a well-known international piano competition would be affected by differences in tempo. Apart from that, an interesting study from brain sciences by Chapin et al. (2010) on dynamic emotional and neural responses to music, involved participants listening to a skilled music performance that included the natural fluctuations in timing (tempo) and sound intensity, as related to dynamics, that musicians use to evoke emotional response.

In another study, Esposito and Serio (2007) found that performance variables in music, for examples like speaking rate and pitch contour for vocal expression; or tempo and mode for music, play a leading role in governing the rise and fall of emotional feelings. It is derived that the musical structures of tempo and mode, and dynamics are important factors that affect the range of emotional feelings or perception in music. To support the notion, Canazza et al. (2011) found that part of the emotional response to music results from the cognitive processing of musical structures such as key, modalities, and rhythm, which are known to be expressive in Western musical system.

Another study by Peretz et al. (1998) demonstrated that rhythm and modality (major vs minor) contribute to happiness and sadness. On an earlier study by Hevner (1935), tempo was directly relevant for emotional interpretation in music, where fast tempi generally evoked happy tones while slow tempi evoked sad ones. In studies by Balkwill and Thompson (1999), Gabrielsson and Juslin (1996), Behrens and Green (1993), and Campbell (2000), it was found that localized or specific psychophysical parameters such as timbre, tempo, timing patterns, pitch, dynamics and other factors, could elicit specific emotional responses. Also, certain emotions are harder to evoke and perceive than others, thus only a number of emotions have been consistently tested, for examples including anger, fear, happiness, and sadness.

To relate to emotional perception in music, the study by Peretz and Gagnon (1999) on a music agnostic woman, who sustained bilateral brain damage, was observed, in terms of her ability to recognize familiar music and also emotional perception of music. Purpose of the study was to document experimentally regarding the possibility that music agnostic patients recognize the emotional tone of melodies, despite their bilateral brain damage. Results found were, regardless of her brain damage, the patient was able to classify each melody given as 'happy' or 'sad'. et al., (1982) and Mazzoni et al., (1993), also noted from their studies that several brain-damaged patients whose recognition abilities seemed intact, complained about having lost interest in music that sounded 'flat' or without emotion.

Similar study by Peretz et al. (1998) too, explored emotional responses to music in the context of severe deficits in music processing after brain damage in a non-musician, was carried out by through six experiments to explore the perceptual basis of emotional judgments in music. In each experiment, excerpts from the classical repertoire which intended to convey a happy or sad tone were presented under various transformations and with different task demands. Based on the results, it was interestingly found that emotional judgments were highly consistent across subjects and resistant to brain damage; and that the response was determined by musical structure, including mode and tempo.

This implies that non-musicians, even those encountering health problems, could also respond to emotional expression in music. Examples of factors that contribute to inducing the emotions could also be identified, where slow tempi, or few beats per minute, evoked sad moods whereas fast tempi, or many beats per minute, evoked happy moods (Peretz et al., 1998). Therefore, importance of musical structures in affecting emotional perception in music is also evident. It is interesting to note from these studies that despite losing other recognition abilities in music, patients could still perceive different emotions in music, and that 'happy' and 'sad' emotions are commonly perceived. This shows the importance of emotional perception in music, as well as deriving two strong emotions of 'happy' and 'sad', to be studied in this research on the listening experiment and emotional perception in music.

Further into survey of previous research, a technical study by Schubert (2004) demonstrated the investigations by means of continuous response of subjects, as well as time series analysis, which are used to find out the relationship between musical features and perceived emotion. The researchers applied univariate linear regression models of valence and arousal. In the study, 67 participants took part, where they responded to 4 pieces of Romantic period music that expressed different emotions, on a two-dimensional emotion space model method used, 'happy-sad' valence and also 'aroused-sleepy' arousal factors. Musical feature variables include loudness, tempo, melodic contour, and texture.

The results from the experiment indicated that tempo and loudness changed positively with arousal. The loudness factor was dominant, and melodic contour varied positively with valence, while other factors were not consistent. It was also found that subjects responded within 1 to 3 seconds' time during the experiment, after the changes of emotion were detected in the music. This implies that emotional perception could be detected by subjects in a short period of time, and dynamics is a strong musical parameter in this case.

In another study, Juslin (2003) also stated that factors of acoustic variables played a role in affecting emotional perception in music. For example, the effects of slow tempo, as well as low sound level, legato, and soft timbre of music, as means of communicating the feeling of 'tenderness'. Juslin (2003) concluded as advice based on several studies that, mainly, purpose of research involved investigation of either listener's agreement on perceived emotional communication, or factors in the musical

structure, as according to the notation, that influenced the perceived expression. In terms of the methods used, mainly, participants listened to pieces of music given, and reported perceived emotional communication through free descriptions, choice among descriptive terms, or ratings of how well such descriptions applied to the music in question. This provides good information on factors to be investigated in the current research of emotional perception, as well as the suitable methodology to be used.

Based on analysis and synthesis of music performances, Juslin (2000) stated that performers used a number of variables in the performances, such as tempo, sound level, and articulation, to express specific emotions. The emotions were later decoded or recognized by listeners who used the same cues to judge emotional expression. This was also evident in his study of professional guitarists' utilization of acoustic cues in communication of emotions in music performance, where tempo, sound level, articulation and other elements from musical notation were used. In terms of methodology involved, listening experiment and quantitative ratings were applied, and results indicated that the cues from performers through said musical factors matched the cues received and perceived by the listeners in detecting emotional expression (Juslin, 2000).

Palmer (1997) also supported the importance of structural and emotional factors that contribute to performers' interpretations of music, for examples faster tempo and larger dynamic range were used for performances of happy and angry emotions, while slower tempo and smaller dynamic range were used for sad emotions. In addition, the emotional content of music had also been examined in terms of narrative, with emphasis on dramatic characterization, thematic content, and conceptions of large-scale structures (Schmalfeldt 1985, Shaffer 1995; in Palmer, 1997). Therefore, it is asserted that a wide range of musical structures and interpretative elements also play a role in communicating and perceiving of emotions in music.

In terms of more detailed parameters in music that could affect emotional perception, Meyer (1956) further connected emotional expression to deviations in music as based on principles of pattern perception, which emphasized continuation, or the flow and movement of music as based on melody and phrases, rhythm, and harmony. In addition, factors including musical dissonance, consonance, chromaticism, and ornaments from the music score were also important in conveying emotional expression. According to Kopiez (2002), timing or tempo had been chosen as the dominant parameter, as well as dynamics, in understanding of expressive intentions, as these factors were the most widely investigated in performance research. Therefore, a wide support from empirical research made the structures of tempo and dynamics a performer's priority to be applied to emotional communications to the audience (Kopiez, 2002). Palmer (1997) has stated the importance of tempo and dynamics, exemplified in faster tempo and larger dynamic

range for happy and angry emotions, while slower tempo and smaller dynamic range are used for sad emotions. Peretz et al. (1998) also stated that slow tempo evoke sad moods, while fast tempo evoke happy moods.

Next, Juslin (in Hargreaves, 2012) enclosed summary of musical features which correlated with discrete emotions in musical expression. From the summary, it is found that the emotion of happiness has fast tempo and medium to high sound levels; sadness has slow tempo and low sound level; anger has fast tempo and high sound level; while fear has fast tempo and low sound level. In a more detailed study by Juslin and Laukka (2004) through professional pianists' renditions of 12 emotions in performances of a theme by Haydn, results of 4 main emotions communicated (happiness, sadness, fear and anger) were obtained in more specific differences in tempo and sound levels (dB) which were related to dynamics. It was found that in terms of tempo, emotion of happiness is the fastest, followed by anger, fear, and emotion of sadness had the slowest tempo. Concerning sound levels, emotion of anger had the loudest sound, followed by happiness, while sadness had the softest sound, followed by fear.

In implication, importance of tempo and dynamics to communicate the four basic emotions was applied in other research too. Firstly, Bhatara et al. (2011) asserted that in piano performance, timing (tempo) and amplitude (dynamics) were the principal parameters that the performer could vary, as conveyed in their study of perception of emotional expression in piano performance. Specifically, the way variation could communicate emotion by manipulating timing and amplitude was

investigated through experiments on performances of classical piano pieces, where listeners rated the emotional expressivity of performances and their manipulated versions.

In another study, Yamasaki (2004) interestingly demonstrated children's communication of emotion in music as conveyed through tempo and rhythm, using the percussive instrument of tambourine. There were two experiments involved, where firstly, 20 kindergarten children played the tambourine improvisationally, based on two types of rhythm; simple duple-time and triple-time, to induce listeners to feel 'happy', 'angry', and 'sad', hence the experiment in performing. These performances were analyzed in terms of the duration, number of beats, sound density, sound level, and rhythm patterns. Results revealed that intended emotion correlated with sound density and sound level, for examples, the sound level of 'anger' was significantly higher than 'sadness'.

The second experiment involved perception of emotion; whether adults could interpret the intended emotions conveyed by said subjects from the first experiment. 31 adults participated, and they were presented with listening of excerpts arranged with random order of 'happiness', 'sadness' and 'anger', and asked to answer which emotion was intended for each performance in forced-choice method questions. It was found from the results that the highest rates of correct responses were of 'sadness' (51.3 %), as compared to 'happiness' (43.9%), and 'anger' (43.7%).

Next, Schellenberg and Von Scheve (2012) stated that musical characteristics cue to happiness were fast tempo and major mode, while for sadness, slow tempo and minor mode. It is asserted from this, that mode and tempo correlate with each to result in happy or sad emotional perceptions. Interestingly however, inconsistent emotional cues lead to mixed feelings and perceptions, or simultaneous happy and sad responding. This is exemplified in their study of the mode and tempo of American pop music, sampled from 1000 top 40 recordings from 25 years, spanning 5 decades. In results, it was found that there were increase in the use of minor mode and decrease in average tempo of the music, confirming that the music has become progressively more sad-sounding and emotionally ambiguous over time. Apart from that, decrease of tempo was also evident in major key music. These results lead to increase of mixed emotional cues (Schellenberg and Von Scheve, 2012).

It is asserted from this that mixed cues between tempo and mode, can lead to the mixed emotional perceptions of either major-sad or minor-happy. This interesting notion is also stated by other studies, where music composed with conflicting cues to happiness and sadness (fast to minor and slow to major) leads to mixed emotions or simultaneous happy and sad emotional responding, both in terms of listeners' perceptions as well as their feelings, as according to Hunter et al. (2010); and Ladinig and Schellenberg (2012).

According to Gabrielsson (1999), there were many cues to emotion in music such as melodic structure, pitch height, dynamics, and rhythm, but tempo and mode were among the most reliable and well documented. It is well-established that happy-sounding music tends to be composed with fast tempo and major mode while sad-sounding music tends to be composed in slow tempo and minor mode. The contributing effect of tempo to the mode was further stated by Hunter et al. (2010), where fast tempo and major mode contributed to happiness, while slow tempo and minor mode evoked sadness.

In another study, Tiemann and Huron (2011) investigated relationship between modality (major/minor) and dynamics (piano/forte) on four affects, namely sadness, happiness, passion, and tenderness. 40 excerpts from solo vocal works were used, where 10 were in major mode, forte; 10 major mode, piano; 10 minor mode, forte; and 10 minor mode, piano. These excerpts were all tonal works from Western vocal repertoire. Without hearing the music, 60 subjects were asked to judge the lyrics according to sadness, happiness, passion, and tenderness. The results indicated consistency with predicted associations between minor-piano (soft dynamics) and sadness, major-forte (loud dynamics) music and happiness, and minor-forte music and passion (additional emotional perception detected). The other emotions were found to be not statistically significant. Therefore, it is asserted from these studies mentioned that tempo and dynamics play important roles too as contributing parameters to major and minor modes, in emotional perception in music.

From the sources mentioned, I derived several information, ideas, and focus of research to be undertaken. Firstly, the historical perspective of music and emotion (Parncutt and McPherson, 2002); and as emphasized by GERMS' model of music expression (Juslin, 2003; and Karlsson, 2008), indicated that emotional element is important in music. Therefore, I selected emotional perception as focus of study. Next, the important precursor study of Hevner (1935) applied early empirical study in the investigation of major and minor modes towards affective values in music. There was also a scarce of early studies that involved major and minor modes, as well as in quantitative design, thus I decided to investigate further on effects of major and minor modes to emotional perceptions in music, quantitatively.

To understand more on effects of major and minor modes towards emotional perceptions, the underlying structures of said modes must be preliminarily understood first. Such information was conveyed in detail in terms of high and low pitch intervals (Temperley and Tan, 2013) where major has higher interval than minor, thus corresponding to speech (Huron and Margulis, 2012) where lower pitch, related to subdued speech, expresses sadness, hence the connection between minor mode and sad emotion. On the other hand, Lindström and Gabrielsson (2001), Russell (1980) and Ramos et al. (2011) stated the valence and arousal theory, where major mode is associated with positive valence such as happiness, and minor mode is associated with negative valence, such as sadness. These determined whether subjects perceived emotion as 'happy' or 'sad', as based on valence, on major and minor music listening. In application, I looked into the high pitch interval and positive valence of major mode piano music, when 'major-happy' results occurred, as well as low pitch

interval and negative valence of minor mode piano music, when 'minor-sad' results occurred, in order to explain the results.

Leading to physiological and psychological factors, I firstly applied the information of music listening induce emotion, which relates to musical expectancy, as based on the study by Juslin and Västfjäll (2008). Thus, I designed the listening activity for subjects, to the major and minor modes' piano music excerpts. In different stages of physiological and psychological development in perceiving emotion from music, I looked into the results obtained by Nawrot (2003) on infants, children, and adults; Adachi and Trehub (1998) on 4 to 12 years old children; Kratus (1993) on 6 to 12 years old children; Kastner and Crowder (1990) on 3 to 12 years old children; and Esposito and Serio (2007) on 6 years old children. I discovered that 'major-happy' perception in music is developed first in younger subjects, and as the age grows older, subjects could perceive 'minor-sad' and differentiate this from 'major-happy' too. It was also found that children are more exposed to 'major-happy' music from young, and therefore tend to perceive 'major-happy' better than 'minor-sad' first as a result of familiarity, as based on Zajonc (1980). I asserted from this information that most of my children subjects (aged 9 to 12 years old) might have more tendency to perceive 'major-happy'. I also noticed the lack of teenager subjects involved in these previous studies, and therefore I included subjects aged 13 to 17 too, expanding my investigation of subjects from age 9 to 17 years old in emotional perception of major and minor modes' piano music. Therefore, it would be interesting to discover and add into research, on how teenagers too, would perceive major and minor modes' music.

In cultural factors, I compiled from studies by Bowling et al. (2012), Tillman and Bigand (1996), Feld and Fox (1994), McKay (2002), Gregory and Varney (1996), Balkwill and Thompson (1999), and Hoschino (1996) and discovered that regardless of different structures and tone-relationships in music of different cultures, either Western or non-Western, there was a similarity in music of major mode to be perceived as positive, 'happy', or 'excited', while minor mode music as negative, 'sad' or 'subdued'. Temperley and Tan (2013) too contributed that 'familiarity' plays an important role, and I learned that if subjects are more exposed to 'major-happy' music in their culture for example, they will have more tendency to rate major music as 'happy' due to familiarity. The same case could apply to 'major-sad', 'minor-sad', and 'minor-happy'. I also took note of the study by Tiemann and Huron (2011) too that minor mode is not perceived as 'sad' in several non-Western cultures. However, there is a consideration of non-Western subjects who are trained strongly in Western musical tradition, in that they might perceive more 'major-happy' and 'minor-sad' too. Thus, I took all these points into reference and consideration for results' discussion of my data, which involved Malaysian piano music students, rooted and familiarized by Malaysian music scenes, but trained in Western music on their piano learning.

In contextual factors, I firstly took into brief account of the composer-performer-listener factors on musical expectancy, tension and motion put into music performed as explained by Juslin and Västfjäll (2008), Ferguson (1960) and Kopiez (2002) to find out that different ways of performing and recording music would result in different emotional perception of the music, by the listeners. I used this

information too, to carefully select sources of piano music performance from CDs, online music with free downloads, and others, which contain clear projection yet varied elements in the performance of the music, to be further selected on music excerpts for the purpose of my study. I also took note of the information on the medium and music setting as conveyed by Scherer and Zentner (2001), on acoustics of music listening, therefore selecting music studio and individual listening activity with headphone, on emotional perception of music for each subject. This could reduce distractions and make each subject focus towards emotional perception to be rated on each excerpt.

Finally, from musical parameter factors, I firstly derived from studies by Hevner (1935), Balkwill and Thompson (1999), Gabrielsson and Juslin (1996), Behrens and Green (1993), Campbell (2000), Juslin (2003), and Peretz et al. (1998), that musical parameters such as modes, tempo, pitch, and dynamics, among others, could affect emotional perception in music. Based on these and various other studies, I selected major and minor modes as my main factors of study to develop further on the discovery of modes in affecting emotions, as I found that there was a lack of studies that emphasized on modes. A valuable information from Esposito and Serio (2007), stating that performance variables such as tempo and mode for music play a leading role in governing the rise and fall of emotional feelings, has helped in making my decision to select major and minor modes as main factors, while tempo as contributing music parameter, to investigate emotional perceptions in piano music.

Meanwhile, information gathered from studies by Schubert (2004) on continuous response of subjects to emotional perceptions in music, Juslin (2003) in method of listening experiment to music, Juslin (2000) for quantitative design in experiment on music and emotion, as well as experiment in communication of emotion in music by Yamasaki (2004), have helped provide ways on construction of my research design, subjects, and data collection. I also gained knowledge from previous studies' results on musical parameters and emotion, where mostly major mode, fast tempo, loud dynamics and high pitch are associated with happiness, while minor mode, slow tempo, soft dynamics and low pitch are associated with sadness, exemplified by Palmer (1997), Peretz et al. (1998), and Gabrielsson (1999), among other sources. Contrastingly, information from the study by Schellenberg and Von Scheve (2012) stated that mixed cues between tempo and mode lead to mixed emotional perceptions, and I could base on this source when explaining my results of 'major-sad', and 'minor-happy', as differentiated from 'major-happy' and 'minor-sad'. In conclusion, all the sources in this literature review helped shape my research, variables, data collection, results, discussion, and conclusion as systematically and specifically as possible.

CHAPTER 3: METHODOLOGY

3.1 Overview

This is the method and procedure section of the research. It discusses objectives to be achieved in effects of major and minor modes to subjects' emotional perception to music through survey-questionnaire and listening activity, followed by variables of research, development of hypotheses, population and sampling of data, instrumentation, preparation of research phases, and conduct of research phases and data collection.

3.2 Objectives

The objectives for this research are:

1) To look into the effect of major and minor modes, in association with the number of 'happy' and 'sad' emotional perceptions from subjects for piano music excerpts in this study.
2) To look into the effect of contributing musical parameter, tempo, in association with the number of 'happy' and 'sad' emotional perceptions in major and minor piano music excerpts.
3) To obtain frequency and percentage on subjects' demographic and musical background from the survey-questionnaire phase, specifically on age, gender, grade/level in piano, years in piano learning, other demographic factors, as well

as factors of music preference and listening habits, and lastly, understanding of emotional perception in music.

3.3 Research Design

Research design is quantitative. It consists of two phases; the survey-questionnaire, and the listening activity. According to Sloboda (1991), survey research that includes questionnaire is very useful in finding information about music structures and emotional response, as exemplified in his study to gather information on a range of physical reactions while listening to music. Therefore, to apply to research, the survey-questionnaire method is selected to firstly collect subjects' nominal and ordinal data of demographic factors including age, gender, grade level, and years of training, musical background and habits, as well as students' understanding of emotional perception in music. Questions designed in the survey-questionnaire paper are short subjective, forced-choice, and multiple-choice to ensure clarity and convenience in answers given by the subjects.

Leading to the second phase, it is designed as listening activity. This mode is selected as it is a convenient, simplified activity based on experiment to gather data on subjects' emotional perceptions to piano music excerpts, in which there has been a scarce number of emotional perceptions' data among local piano students currently, let alone be an in-depth study in Malaysia concerning said matter. In one source, Juslin (2000) used listening experiment method, where participants were asked to judge the emotional expression of each performance investigated in his study of cue

utilization in communication of emotion in music performance, relating performance to perception. Juslin (2000) also argued that useful questions, hypotheses and ways of evaluating data from performance analyses and listening experiments could help strengthen the theoretical foundation in emotional communication and perception in music performance. Therefore, the listening activity method is selected in this research to investigate subjects' emotional perception of whether 'happy' or 'sad', to the major and minor modes' piano music excerpts given. The activity involves listening of short-duration of each piano music excerpt given, and rating of either 'happy' or 'sad' emotion in the column provided on the rating paper. Quantitative measurement of data obtained from these two phases (survey-questionnaire and listening activity) is used to find the correlation between subjects' demographics, musical, and emotional perception's backgrounds; and the patterns of emotional perception chosen (whether 'happy' or 'sad') towards the music excerpts.

3.4 Source of Data

3.4.1 Population. There are 31 subjects involved in the research. They are all piano music students, sourced from the population in Bandar Baru Bangi, Selangor. Piano music students are chosen because this research uses piano music excerpts to specifically investigate emotional perception of this group of students. Their age range from 9 to 17 years old, and are primary and secondary school students. Subjects consist of mainly females (n = 25), in contrast to only 6 males (n = 6). This is due to lack of male piano students in said area overall.

In terms of grade or level, subjects range from Grade 1 level to Grade 5 level of piano learning. Higher grade of students (Grade 6 to 8) are originally meant to be included in the research too, but they could not be approached due to busier commitment in school examinations and activities, in addition of the lack of number for these group of students. Subjects are currently taking piano lessons for either examination or leisure purposes. Syllabi for piano lessons they take range from Associated Board of Royal Schools of Music (ABRSM), and London College of Music (LCM) for those taking piano for examinations, to the piano technique series including Alfred's, Piano Town, Pauline Hall, and other lesson books, for those taking piano for leisure.

3.4.2 Sampling. Sampling method is convenient sampling mode, non-random. It was done by approaching individually piano music students in the academy as well as nearby private learning area, asking for their availability to participate in the research. Several piano teachers were also approached in order to gain permission to involve their students in the research. This method was used due to the scarce number of overall piano music students in Bangi, but insight on their emotional perception towards major or minor key music was not previously known, therefore propelling the interest in studying their emotional perceptions. Upon agreement from the teachers and subjects involved, specific date and time were arranged for each subject for research appointment. Date and time arranged were based on subjects' availability either before or after their piano lessons. Each subject went through individual survey-questionnaire and listening experiment phases, taking up the average total

time duration of 30 minutes each to complete both phases. The research phases took place within several months to ensure enough subjects gathered.

3.5 Variables

Variables identified from these two research phases are explained in the following:

3.5.1 Variables from phase I : survey-questionnaire.

3.5.1.1 ***Independent variables.*** The independent variables from survey-questionnaire phase come from the categories of demographics and also music preference and listening habits. In the demographics, independent variables include the nominal factors of gender (female/male), objective of learning (leisure/examination), and syllabus (ABRSM, LCM and others) of piano learning; and also the ordinal factors of subjects' age (range is from 9 to 17 years old), grade/level in piano learning (range is from grade 1 to grade 5 levels), and years of learning (ranging from 2 to 10 years overall). In the music preference and listening habits' category, the independent variables are the nominal factors of music preference (including favourite music and piano music), music listening habits ('always', 'sometimes', or 'seldom'), and also major or minor key music preference. All of these factors provide the musical background of subjects, and therefore playing important role in affecting the dependent variables as explained in the next points.

3.5.1.2 ***Dependent variables.*** On the other hand, the dependent variables from the survey-questionnaire phase come from the factors of subjects' emotional perception in music, on their understanding and levels of perception. These include feeling of emotion when listening to general music or piano music ('yes' if able to feel, or 'no' if unable to feel anything), understanding of emotion from listening to music (whether 'easy' or 'difficult'), level of emotional perception to music (easy or difficult to perceive), projection of emotion in piano playing (easy or difficult to project), and whether subjects find it easy or difficult, to understand emotion in music of major key or minor key.

It is therefore derived from the independent and dependent variables explained in the survey-questionnaire stage that, subjects' answers on their demographics, and music preference and listening habits' background, will determine their answers in the understanding and level of emotional perception in music section. For example, subject of older age or higher grade/level in piano playing would answer 'easy' to understand emotion from music and piano music listening, due to their longer or more mature experience in music background, as a contrast to perhaps 'difficult' answer to same question, from subject of younger age or in lower grade/level in piano learning, due to having had not enough experience yet in music background.

3.5.2 Variables from phase II : listening activity.

3.5.2.1 ***Independent variables.*** In the listening activity, the independent variables are the 20 piano music excerpts (10 in major key while 10 in minor key), of various genres, musical periods, and tempo (fast/slow). These piano music excerpts are pre-selected from compilations of sources such as free online sources of piano music, as well as music CDs. Therefore, all these pre-selected music and factors of major/minor key, genres, musical periods, and tempo, will determine the dependent variables explained in the following.

3.5.2.2 ***Dependent variables.*** The dependent variables are the emotional perceptions to music, categorized into two emotions of 'happy' and 'sad'. Upon listening to the pre-selected piano music excerpts given in the experiment, subjects will rate whether on 'happy' or 'sad' column in the rating paper to determine on whether they perceive each music as 'happy' or 'sad'.

3.6 Hypotheses.

Based on previous research, for example Juslin and Sloboda (2001), and what is expected from this study, it is hypothesized that :

1) Major mode piano music will be associated with total of 'happy' emotional perceptions from subjects.
2) Minor mode piano music will be associated with total of 'sad' emotional perceptions from subjects.

3) Contributing musical parameter factor of tempo will be associated with the number of 'happy' and 'sad' emotional perceptions in major and minor mode piano music excerpts.

3.7 Preparation of Research Phases

3.7.1 Instrumentation.

3.7.1.1 *Materials.*

- 31 copies of questionnaire on demographic factors of demographics, music preference and listening, and emotional perception to music.
- 31 copies of rating paper of 'happy' or 'sad' for emotional perception during piano music listening experiment.
- 20 excerpts of piano music, compiled from free online sources, for example freescores.com and IMSLP Petrucci Online Music Library, and music CDs. Excerpts are of variety of periods, including Baroque, Classical, Romantic, Traditional, and New Age, among others.

3.7.1.2 *Tools.*

- Blank music CD
- ASUS laptop
- An iPhone 4S
- SONY headphones
- Cubase music software for computer, to convert and compile recordings into MP3 excerpts and burned into CDs, later transferred to iPhone 4S.

- Steinway Metronome application from App Store, version 1.1.4 (developed by Steinway Musical Instruments)

3.7.2 Preparation for survey-questionnaire.

3.7.2.1 ***Sources and criteria for questionnaire.*** In preparing the survey-questionnaire, several sources have provided foundation on deciding the questions to be asked. According to Juslin and Laukka (2004), research of emotional responses, perception and induction in music frequently need to collect subjects' demographics information in order to relate to how they respond to music, as these factors play a role in students' level of exposure and understanding to emotional perception in music. For example, higher grade students will have had more experience in analyzing and listening to piano scores, thus might be able to differentiate emotions between different piano pieces better than lower grade students. Also, years of learning and stream of piano lessons might determine students' perception too, for example classical piano students tend to categorize major key piano music as happy, while minor key piano music as sad, as they are rooted in the Western classical music convention of major-happy and minor-sad. It will also be interesting to know how students of leisure piano stream perceive different emotions in music, as they are learning a variety of piano music genres other than classical, which might not necessarily be major-happy or minor-sad.

3.7.2.2 ***Preparation of questionnaire.*** On the basis of said sources and considerations, the survey-questionnaire phase was prepared as the following. It is divided into three sections of questions, altogether consisting of 20 questions. The first section consists of the demographics and musical background information, starting from Questions 1 – 7. Questions are to be answered by either filling in the blanks, or multiple-choice, by circling or underlining answer(s) that best describes each subject's opinion. Questions from this demographics and musical background section include age, gender, grade/level in piano learning, years of learning, objective of learning whether examination or leisure purpose, syllabus of piano lessons taken, and lesson type, whether classical stream, jazz, pop, and other answers.

The second section concerns the factors of musical habits, preference, and listening. It consists of Questions 8 – 13. Answers for these questions are either multiple-choice or forced choices. Subjects were required to select one answer for some questions, as well as more than one answers for other questions as needed. Questions for this section include which type of music preferred from classical, jazz, pop, rock or other answers, how often does one listen to music and also piano music (always, sometimes, or seldom), favourite genre of music, as well as piano music, and also whether major key, minor key, or both major and minor key of music is preferred.

Meanwhile, the third section concerns the understanding and level of emotional perception in music, consisting of Questions 14 – 20. Answers in this section are forced-choice. Examples of questions are, can emotion be felt from music listening (‘yes’/ ‘no’ answers), can emotion be understood from music listening (easy/difficult), can emotion be felt from piano piece playing (yes/no), is it easy or difficult to perceive emotion, can emotion be felt and projected in piano playing (easy or difficult), can emotion be understood in major key (easy or difficult), and can emotion be understood in minor key (easy/difficult).

All the questions categorized into each section were designed in straight-forward, approachable, and convenient manner, in which it was prepared to fit only one page of 20 questions. Filling in the blanks’ mode, forced-choice (between 2 answers) and also multiple-choice answers were also prepared for each question. These approaches enabled subjects to focus, understand, and answer the questions given in the survey-questionnaire, for convenient short-time duration. After finalization of questions and page, the questionnaire page was made into 31 copies to be distributed to subjects. Shown in the following, Figure 3.1, is the finalized survey-questionnaire, consisting of 20 questions, in one page.

QUESTIONNAIRE (DEMOGRAPHICS ON EMOTIONAL PERCEPTION TO MUSIC)

Please fill in the blanks or circle your answer where required.

1) Age : _____

2) Gender : (Male / Female)

3) Current level in piano playing : Level / Grade _____

4) Years of learning piano : _____

5) I am currently taking piano lessons for (examination / leisure).

6) The current piano syllabus that I am doing is (Associated Board of Royal Schools of Music – ABRSM / London College of Music – LCM / Trinity Guildhall/ Others, please specify_____)

7) I am currently taking (classical / jazz / pop) piano lessons.

8) My music preference(s) is / are: (You may circle more than one answer)

(classical / jazz / pop / others, please specify_____)

9) I (always / sometimes / seldom) listen to music.

10) I (always / sometimes / seldom) listen to how the piano pieces sound like first before

I practice them.

11) The genre of music that I listen to the most is (classical / jazz / pop/ others, please

specify_____)

12) My favourite piano music comes from (baroque / classical / romantic / 20th century/

modern) era.

13) I enjoy listening to music of (major / minor / major & minor) key or mode.

14) Listening to music make me feel variety of emotions. (Yes / No)

15) I find it (difficult / easy) to understand the emotion of music that I listen to.

16) Listening to music makes me aware to the emotion of piano piece that I am

practicing. (Yes / No)

Figure 3.1 : The Survey-Questionnaire Sheet

17) I find it (difficult / easy) to perceive and understand the emotion of piano music that I am practicing.

18) I find it (difficult / easy) to feel and project the emotion of piano music that I am practicing.

19) I find it (difficult / easy) to understand the emotion of music in major key.

20) I find it (difficult / easy) to understand the emotion of music in minor key.

Figure 3.1 (continued) : The Survey-Questionnaire Sheet

3.7.3 Preparation for listening activity.

3.7.3.1 ***Criteria for music excerpts.*** Next, the search and selection for suitable piano music excerpts were carried out in order to be used for the listening experiment. Several criteria were considered in the selection of excerpts. Firstly, the excerpts must be tonal, and of major and minor modes to portray 'happy' or 'sad' emotion. Thus, atonal piano music was excluded from the selection. Secondly, the number of major mode excerpts must be balanced with the number of minor mode excerpts. Thirdly, the tonal piano music excerpts must clearly present major or minor modes, without too many modulations or ambiguity. Thus, piano music with too many key changes was avoided in the search.

Next, the piano music excerpts must be of different variety of genres or musical styles. This was to ensure variety in the listening experiment, as well as exposing subjects to less familiar piano music. Therefore, the piano music excerpts were sourced from musical periods of Baroque, Classical, Romantic, 20th Century, leading towards Folk, Traditional, New Age, Jazz, and Modern. Apart from that, the excerpts

must include musical parameter factors of tempo too, contributing to the main factors of major and minor modes in affecting emotional perception to music. Thus, the excerpts included in the search have fast or slow tempo too.

3.7.3.2 ***Sources for music excerpts.*** Based on the criteria explained, the piano music excerpts for the listening experiment were gathered from a variety of sources. The first type of source came from piano music CDs. These include CDs of classical composers' works performed by famous pianists, such as 'Arthur Rubinstein Collection Vol.38 – Brahms', 'Chopin – Famous Piano Works', 'Mozart – Favourite Works for Piano', 'Horowitz plays Rachmaninov & Liszt', and several piano music compilation CDs. Apart from that, excerpts were also gathered from free online sources, where these provided many tracks for free listening and downloading. The online sources include Freescores.com, A-M Classical.com, and IMSLP – Petrucci Online Music Library, among others. Possible selections from the piano music CDs were burned and copied into Windows Media Player application on the computer, and saved into several folders as according to CD titles. Selections from the free online music sources were downloaded and saved into several folders marked according to the online sources' names.

3.7.3.3 ***Selection process for music excerpts' list.*** After sources were gathered, the search to compile major and minor mode piano music excerpts began. Criteria for the selection were referred to throughout the process. Preliminary listening was done for each excerpt in order to decide and select suitable ones to the list. The first list compiled consisted of 16 major and 16 minor mode piano music

excerpts. The excerpts ranged from Baroque, Classical, Romantic, 20th Century music to a wide variety of New Age Music for distinctiveness, including a few Jazz, Folk and Traditional genres.

Returning to the criteria and after further edit of music selection, it was determined that the most suitable music to be chosen were mostly in strict form and development, adhering true to either major or minor key represented, while having fast or slow tempo features. This resulted in the high number of selections from Baroque, Classical, and Romantic piano music, as well as a small number of clear-to-define music from 20th Century, Folk, Jazz, Traditional, and New Age genres. The number of excerpts was also edited and cut to consist of 10 major and 10 minor modes' piano music.

3.7.3.4 ***Finalization of the 20 piano music excerpts' list.*** Finally, the selection of 20 piano music excerpts (10 in major mode; 10 in minor mode), was confirmed and finalized. The excerpts were from Baroque, Classical, Romantic, 20th Century piano music, and also Folk, Traditional, and Jazz genres. The titles were noted down. The music excerpts were compiled in Windows Media Player, where the 20 tracks were arranged in a playlist entitled 'Research Excerpts'. To ensure randomness in arrangement of the excerpts, the 20 tracks were shuffled 8 times in the media player, and the order of arrangement was finalized.

Tables 3.1 and 3.2 in the following describe the major and minor mode piano music excerpts selected, the composer, musical period or genre, and the order of arrangement for each excerpt in the listening track playlist:

Table 3.1 : Major Mode Piano Music Excerpts

Excerpt Title (Composer) / Genre / Order of Excerpt
1) La Cucaracha (Anon.)/Folk & Jazz/Excerpt No.2
2) Berceuse in D flat major Op.57 (Chopin)/Romantic/Excerpt No.6
3) Rondo from Piano Sonata No.58 (Haydn)/Classical/Excerpt No.7
4) Grande Valse Brilliante in E flat major, Op.18 (Chopin)/Romantic/Excerpt No.8
5) Renaissance No.1/Early 20th Century (Godowsky)/Excerpt No.9
6) March from the Magic Flute (Mozart)/Classical/Excerpt No.12
7) Claire de Lune (Debussy)/20th Century Impressionistic/Excerpt No.13
8) Little White Boat (Anon.)/Traditional/Excerpt No.16
9) Allemande from Partita in B flat major BWV825 (Bach)/Baroque/Excerpt No.17
10) Les Baricades Misteriuses (Couperin)/Baroque/Excerpt No.18

Table 3.2 : Minor Mode Piano Music Excerpts

Excerpt Title (Composer) / Genre / Order of Excerpt
1) Intermezzo No.2 in B flat minor, Op.117 (Brahms)/Romantic/Excerpt No.1
2) Rhapsody Op.79 No.2 in G minor (Brahms)/Romantic/Excerpt No.3
3) Moonlight Sonata, Op.72 No.2, 1st Movt (Beethoven)/Romantic/Excerpt No.4
4) Sakura (Cherry Blossoms) (arr. Dittrich)/Traditional/Excerpt No.5
5) Tango (Smit Maarten)/Folk/Excerpt No.10
6) Gymnopedie No.3 (Satie)/20th Century Ambient/Excerpt No.11
7) Sonata in G minor, Movt 1 (Anna Bon)/Nu Baroque/Excerpt No.14
8) Sonata Pathetique Op.13, 1st Movt (Beethoven)/Romantic/Excerpt No.15
9) Sunset (Frederik Magle)/New Age/Excerpt No.19
10) Piano Sonata No.14 in C minor, K 457. 1st Movt (Mozart)/Excerpt No.20

In detailed explanation, there were 2 Baroque piano music excerpts (No.17 and 18, all in major mode), 3 Classical (No.7 and No.12 in major mode, and No.20 in minor mode), 1 music in Nu Baroque style (modern but composed in Baroque style, which is No.14 in minor mode, 6 Romantic (No.6 and No.8 in major mode; No.1,3,4,15 in minor mode), 3 music excerpts of 20th Century (Ambient, with No.11 in minor mode; Impressionistic with No.13 in major mode; and Early 20th Century with No.9 in major mode), 2 types of Folk music with No.3, major mode in combination of folk and jazz style, and No.10 in minor mode, Traditional music with No.5 (Japanese tune) in minor mode and No.16 (Chinese tune) in major mode, and last but not least New Age music, exemplified in No.19, in minor mode.

Regarding the contributing parameter selected, namely tempo, these piano music excerpts were also selected to portray fast or slow tempo. In determining the tempo, the application of Steinway Metronome version 1.1.4 (developed by Steinway Musical Instruments) was downloaded from the App Store in the iPhone device, and tempo measurement of beats per minute (bpm) was implemented. Each excerpt selected was listened to, and with help of the device, the bpm for each excerpt was recorded. Excerpts with 100 bpm and above were categorized as fast tempo, while excerpts with 99 bpm and below were categorized as slow tempo.

3.7.3.5 ***Preparation of 20 piano music excerpts' list for listening activity.*** Next, detailed and careful listening observation of the 'Research Excerpts' playlist in the Windows Media Player was made again to each of the selected music excerpt, now in order to determine the specific duration of time where excerpt will be edited and cut. Upon discussion with supervisor and as based on sources from various studies on music listening, the duration of time was agreed to be about 1-minute average, for each music excerpt. This duration of time must include clear phrasing of music which showed clear tonality, dynamics, tempo, and pitch characteristics. Due to this, the specific time duration needed for each excerpt varied as according to beginning and ending of the particular phrases containing the musical details needed. This resulted in certain excerpts having less than 1-minute time duration, while other excerpts had slightly more than 1-minute time duration. For examples, Excerpt No.2's time duration needed was 58 seconds from specific musical phrases selected, while Excerpt No.17's was 1-minute-and-2-seconds' time duration.

After focused listening observation, each piano music excerpt's specific 1-minute average duration of time was selected and labeled carefully on the paper, following each finalized order of the excerpt. After the time duration details were recorded, the playlist was burned into a blank music CD. This CD was labeled with the order of excerpts and time duration needed for each. Title for each excerpt was not included, as the finalized list was meant as anonymous for the listening experiment, where the titles were not informed to the subjects. This was to avoid subjects' bias towards familiar music titles which might affect their emotional perception to the music.

Afterwards, with help of a colleague, the software of Cubase was used to edit and cut each piano music excerpt in the CD, into the specific time duration needed for the listening experiment. Each excerpt was also arranged to be played continuously, with added 5-seconds' silence gap between each track. After the cut, the new playlist containing an average time duration of 1-minute excerpt, alternated with 5-seconds' silence gap, was burned into a different blank music CD.

The finalized playlist in music CD was later burned and copied into the Asus laptop, and afterwards, the playlist was transferred to the iPhone 4S via iTunes application, by means of syncing between the laptop's software and the iTunes application. The finalized playlist of 20 piano music excerpts was now saved, untitled, in the iPhone music player, and the total duration of the continuous tracks alternated with silence gap, was 22 minutes and 44 seconds. A Sony headphone was also prepared, in order to be plugged into the iPhone, for purpose of concentrated listening as subjects were to be approached individually. A rating paper containing the order of anonymously titled excerpts with the indication to tick on either 'happy' or 'sad' emotion box at the right side, was also prepared for the emotional perception in the music listening experiment.

Table 3.3 in the following shows the specific details of the 20 finalized piano music excerpts, in terms of their original titles, order of arrangement in the listening track, sources, composer, musical periods and styles, and importantly, the mode for each (major or minor). Also included were the tempo (fast/slow), and the specific time duration selected for each excerpt.

Table 3.3 : Data of the 20 Piano Music Excerpts

No	Title	Genre	Composer	Source	Mode	Tempo (fast / slow)	Time Duration Selected
1	Intermezzo No.2 in B flat minor, Op.117	Romantic	Brahms	CD- Arthur Rubinstein Collection Vol.38 – Brahms	Minor	Slow	0:00-1:05
2	La Cucaracha	Folk + jazz	Anonymous	Freescores.com	Major	Fast	0:00-0:58
3	Rhapsody Op.79 No.2 in G minor	Romantic	Brahms	CD – Arthur Rubinstein Collection Vol.38 – Brahms	Minor	Fast	3:33-4:41
4	Moonlight Sonata, Op.72 No.2, 1st Movt	Romantic	Beethoven	IMSLP – Petrucci Online Music Library	Minor	Slow	0:00-1:08
5	Sakura (Cherry Blossoms)	Traditional (Japanese)	Rudolf Dittrich (arranger)	Freescores.com	Minor	Slow	0:10-1:18
6	Berceuse in D flat major, Op.57	Romantic	Chopin	CD – Chopin – Famous Piano Works	Major	Slow	0:00-1:02
7	Rondo from Piano Sonata No.58	Classical	Haydn	A-M Classical.com	Major	Fast	0:00-1:03
8	"Grande Valse Brilliante" in E flat major, Op.18	Romantic	Chopin	CD – Chopin – Famous Piano Works	Major	Fast	0:02-1:08

Table 3.3 (continued) : Data of the 20 Piano Music Excerpts

No	Title	Genre	Composer	Source	Mode	Tempo (fast / slow)	Time Duration Selected
9	Renaissance No.1	Early 20th Century	Leopold Godowsky	IMSLP – Petrucci Online Music Library	Major	Slow	0:00-1:06
10	Tango	Folk	Smit Maarten	Freescores.com	Minor	Fast	0:49-1:35
11	Gymnopedie No.3	20th Century – Ambient	Satie	A-M Classical .com	Minor	Slow	0:02-1:06
12	March from "The Magic Flute"	Classical	Mozart	A-M Classical .com	Major	Fast	0:02-1:05
13	Claire de Lune	20th Century – Impressionistic	Debussy	Freescores.com	Major	Slow	0:00-1:04
14	Sonata in G minor, Movt 1	Nu Baroque	Anna Bon	A-M Classical .com	Minor	Fast	0:00-1:03
15	"Sonata Pathetique" Op.13, 1st Movt	Romantic	Beethoven	IMSLP – Petrucci Online Music Library	Minor	Fast	1:48-2:44
16	Little White Boat	Traditional (Chinese)	Anonymous	Mp3 Sheriff.com (The Piano by Aidan Gibbons)	Major	Fast	1:25-2:26

Table 3.3 (continued) : Data of the 20 Piano Music Excerpts

No	Title	Genre	Composer	Source	Mode	Tempo (fast / slow)	Time Duration Selected
17	Allemande : Partita in B flat major BWV 825	Baroque	J.S. Bach	IMSLP – Petrucci Online Music Library	Major	Fast	0:00-1:02
18	Les Baricades Misteriuses	Baroque	Couperin	A-M Classical .com	Major	Slow	0:02-1:00
19	Sunset	New Age	Frederik Magle	www.magle.dk/music-forums	Minor	Slow	0:00-1:02
20	Piano Sonata No.14 in C minor, 1st Movt	Classical	Mozart	CD – Mozart – Favourite Piano Works	Minor	Fast	1:31-2:34

Meanwhile, Appendix A shows the emotional perception rating paper. Subjects were instructed to tick the appropriate column to indicate whether emotion perceived was ‘happy’, or ‘sad’, after listening to each piano music excerpt in the activity.

3.8 Research Phases and Data Collection

3.8.1 Survey-questionnaire. Proceeding to the fieldwork stage in the research, the phase started with survey-questionnaire. Each subject was approached individually, at a different day and time for each, due to the different free gaps before or after their piano classes' time, as obtained with permission, set-up and agreed with the researcher. On the appointment time, the subject was led to a music studio in the Cadenza Music Academy, Bangi. The survey-questionnaire paper was presented to the subject, and firstly, the objective of the phase was explained to the subject, where it aimed to collect subject's demographics' information and musical background, music preference and listening habits, as well as understanding of emotional perception in music.

After that, instruction on answering the questionnaire was informed to the subject, where each question was to be answered by either filling in the blanks with subject's own answer, choosing one answer that best represented subject's opinion (forced-choice), as well as choosing one or more answers that best represented subject's opinion(s) (multiple-choice). Subject was also informed that the survey-questionnaire will take 10-minutes' time in duration. Once the instructions were understood, subject was signaled to begin answering on his or her copy of questionnaire. The researcher waited for the phase to conclude.

3.8.2 Listening activity. After the survey-questionnaire phase concluded, the subject was informed that the next phase was the listening experiment, also carried out individually in the same music studio room. Objective of the phase was first explained to the subject, that it aimed to collect data on the emotion perceived by the subject, whether 'happy' or 'sad', to each major and minor mode piano music excerpt that was going to be listened to. Subject was presented with the emotional perception rating paper, and instructions were explained that 20 untitled piano music excerpts of either major or minor mode, averaged about 1-minute in time duration, were going to be played continuously in the listening experiment, with 5-seconds' silence gap between each excerpt. Subject was required to tick on either 'happy' or 'sad' column in the rating paper after each excerpt was heard, indicating subject's emotional perception to each excerpt. It was informed to the subject too that the listening experiment will take approximately 22 minutes and 44 seconds in time duration.

Once subject had understood the procedure, the iPhone device containing the music excerpts' listening playlist was presented to the subject, and informed that the listening would be done from this source. The Sony headphone was also plugged into the iPhone, and the volume adjusted. Subject put the headphone on, and before began, suitability of volume was tested first so as to ensure music was not too loud or too soft. The listening experiment was carried out with the headphone as not to disturb the individual piano classes going on in other music studios in the academy, as well as importantly for the subject to have a focused listening and not be distracted by other sounds during the procedure.

When the subject had fully understood the flow of procedure and was ready to begin, with the headphone put on and the rating paper on the table, the music excerpts' playlist track was switched on and subject was signaled to start. The researcher supervised the session at a comfortable distance from the subject in the studio. When the listening experiment was done and the answers for emotional perception were obtained for all excerpts, the rating paper, iPhone device, and the headphone were collected back by the researcher. The session concluded and subject exited the music studio room. All data were collected and analyzed for results, as explained in detail in the next chapter.

CHAPTER 4: DATA ANALYSIS AND RESULTS

4.1 Overview

This data analyses and results' section reports all main findings of the research. Data analyses were done in accordance to the objectives and hypotheses of research. To begin, descriptive analysis was done to obtain frequency and percentage of highest number of subjects for each main survey-questionnaire category investigated, firstly demographic factors of age, gender, grade/level in piano, and years in piano learning; secondly music preference, music listening habits, and favourite music modes; and lastly emotional understanding of music listened to, and understanding of major as well as minor key music.

Next, the Pearson's Chi-square analysis was applied to find out whether there were associations between two or more variables. This statistical test was chosen as data variables involved were categorical, independent groups and non-parametric. The test was carried out between modes of piano music excerpts (major and minor) with total of 'happy' and 'sad' emotional perceptions received, and tempo of the excerpts with the total of 'happy' and 'sad' as well. Results obtained were reported on whether or not associations occurred; quoting the degrees of freedom, number of excerpts, Pearson's Chi-square value and *p* value obtained, at the significance level of $p \leq 0.05$. The results were later explained in terms of the hypotheses and objectives intended, on whether achieved or not. Both the descriptive and the Chi-square

analyses were done by using the Statistical Package for the Social Sciences (SPSS), version 22.

4.2 Descriptive Analysis

4.2.1 Survey-questionnaire data.

4.2.1.1 ***Demographic characteristics*****.** In the first sub-domain in the survey-questionnaire phase, presented in Table 4.1 are the frequency and percentage for the demographic characteristics of subjects.

Table 4.1 : Demographic Characteristics of Subjects

Characteristic	*n*	%
Age		
9	5	16.1
10	1	3.2
11	8	25.8
12	1	3.2
13	4	12.9
14	1	3.2
15	7	22.6
16	0	0
17	4	12.9
Gender		
Male	6	19.4
Female	25	80.6
Grade/level in piano learning		
Grade 1	14	45.2
Grade 2	8	25.8
Grade 3	5	16.1
Grade 4	2	6.5
Grade 5	2	6.5

Table 4.1 (continued) : Demographic Characteristics of Subjects

Characteristic	*n*	%
Years of piano learning		
2	4	12.9
3	8	25.8
4	6	19.4
5	4	12.9
6	4	12.9
7	3	9.7
8	1	3.2
9	0	0
10	1	3.2

Note. Total of subjects, N = 31.

In terms of subjects' age, it is observed that the highest frequency is represented by the 11-year-olds, with 25.8 %. In gender, female subjects (80.6 %) outnumbered male subjects. Subjects of Grade 1 level in piano playing comprises of the highest percentage (45.2 %) compared to other grades. Leading to years taken by the subjects in learning piano, most subjects have learned for 3 years, representing the highest frequency with 25.8 %.

In other contributing demographic factors, it is firstly observed that most subjects took piano lessons for leisure purpose (61.3 %), (Appendix B), the Associated Board of the Royal Schools of Music (ABRSM) is the syllabus done the most (51.6 %), (Appendix C), and classical is the stream of piano learning done the most (87.1 %), (Appendix D).

4.2.1.2 ***Music preference and listening*****.** In terms of the second sub-domain in the survey-questionnaire phase, presented in Table 4.2 are the frequency and percentage for the music preference and listening factors.

Table 4.2 : Music Preferences, Listening Habits, and Favourite Music Modes of Subjects

Characteristic	*n*	%
Music preferences		
Classical	14	45.2
Pop	3	9.7
Jazz	4	12.9
Combination	7	22.6
Others	3	9.7
Music listening habits		
Always	18	58.1
Sometimes	13	41.9
Favourite music modes		
Major	7	22.6
Minor	3	9.7
Major and minor	21	67.7

Note. Total of subjects, N = 31.

In music preferences, it is found that subjects who prefer 'classical' music comprises of the highest percentage (45.2 %). Most subjects 'always' listen to music, comprising of 58.1 % of the total. Majority of subjects too (67.7 %) favor both major and minor music, compared to major-only, and minor-only.

In other contributing music listening and preference factors, it is also observed that most subjects 'sometimes' listen to piano music (54.8 %), (Appendix E), listen mostly to classical and pop music (32.3 % each), (Appendix F), and love classical music the most (35.5 %), (Appendix G).

4.2.1.3 ***Understanding of emotion in music.*** In terms of the third sub-domain in the survey-questionnaire phase, presented in Table 4.3 are the frequency and percentage for the understanding of emotion in music factors.

Table 4.3 : Understanding of Emotion in Music, Major Mode, and Minor Mode among Subjects

Characteristic	*n*	%
Understanding of emotion in music		
Easy	27	87.1
Difficult	4	12.9
Understanding of major mode emotion		
Easy	21	67.7
Difficult	10	32.3
Understanding of minor mode emotion		
Easy	23	74.2
Difficult	8	25.8

Note. Total of subjects, N = 31.

In terms of understanding of emotion in music, it is observed that majority of subjects (87.1 %) found it 'easy' to understand the music they listened to. More subjects (67.7 %) found it easy to understand major key music emotion, while 74.2 % of them too, found it easy to understand minor key music emotion. It is interesting to note that the percentage is higher in minor key music understanding (74.2 %) as compared to major key music (67.7 %).

Apart from the factors mentioned, it is also observed from contributing factors of understanding of emotional perception in music, that 90.3 % of subjects answered 'yes' to emotional induction from music listening (Appendix H), 80.6 % answered 'yes' to awareness of emotion of piano piece from listening (Appendix I), 67.7 % answered 'easy' to perception and understanding of emotion of piano music practiced (Appendix J), and 74.2 % answered 'easy' to feeling and projection of emotion of piano music practiced (Appendix K).

4.2.2 Listening activity data.

4.2.2.1 ***Major and minor mode piano music excerpts.*** Presented in Table 4.4 is the frequency (total) of 'happy' and 'sad' emotional perceptions obtained for the 10 major and 10 minor mode piano music excerpts.

Table 4.4 : Total of 'Happy' and 'Sad' Emotional Perceptions for Major and Minor Mode Piano Music Excerpts

Excerpt No. (Title)	Mode	*n* ('happy')	*n* ('sad')
1 (Intermezzo)	Minor	1	30
2 (La Cucaracha)	Major	31	0
3 (Rhapsody)	Minor	0	31
4(Moonlight Sonata)	Minor	2	29
5 (Sakura)	Minor	5	26
6 (Berceuse)	Major	14	17
7 (Rondo)	Major	30	1
8 (Grande Valse Brilliante)	Major	31	0
9 (Renaissance)	Major	4	27
10 (Tango)	Minor	24	7
11 (Gymnopedie No.3)	Minor	1	30
12 (March from Magic Flute)	Major	17	14
13 (Claire de lune)	Major	5	26
14 (Sonata in G minor)	Minor	27	4
15 (Sonata Pathetique)	Minor	25	6
16 (Little White Boat)	Major	11	20
17 (Allemande)	Major	27	4
18(Les Baricades Misteriuses)	Major	26	5
19 (Sunset)	Minor	1	30
20 (Piano Sonata K457)	Minor	19	12

From this, four blocks of music excerpts were derived, namely 'major-happy', 'major-sad', 'minor-sad', and 'minor-happy' excerpts, where these represent the major or minor mode music excerpts with the highest number of either 'happy' or 'sad' emotional perceptions. Detailed descriptive analysis for each block is presented in the following.

Table 4.5: 'Major-Happy' Piano Music Excerpts

Excerpt No. (Title)	Mode	*n* ('happy')
2 (La Cucaracha)	Major	31
8 (Grande Valse Brilliante)	Major	31
7 (Rondo)	Major	30
17 (Allemande)	Major	27
18 (Les Baricades Misteriuses)	Major	26
12 (March from Magic Flute)	Major	17

It is observed from Table 4.5 that excerpts no.2 (La Cucaracha - anonymous), and no.8 (Grande Valse Brilliante) by Chopin, have the highest number of 'happy' emotional perceptions, with 31 each.

Table 4.6 : 'Major-Sad' Piano Music Excerpts

Excerpt No. (Title)	Mode	*n* ('sad')
9 (Renaissance)	Major	27
13 (Claire de lune)	Major	26
16 (Little White Boat)	Major	20
6 (Berceuse)	Major	17

It is observed from Table 4.6 that excerpt no.9 (Renaissance) by Godowsky, has the highest number of 'sad' perceptions (27).

Table 4.7 : 'Minor-Sad' Piano Music Excerpts

Excerpt No. (Title)	Mode	*n* ('sad')
3 (Rhapsody)	Minor	31
1 (Intermezzo)	Minor	30
11 (Gymnopedie)	Minor	30
19 (Sunset)	Minor	30
4 (Moonlight Sonata)	Minor	29
5 (Sakura)	Minor	26

It is observed from Table 4.7 that excerpt no.3 (Rhapsody in G minor) by Brahms, has the highest number of 'sad' perceptions (31).

Table 4.8 : 'Minor-Happy' Piano Music Excerpts

Excerpt No. (Title)	Mode	*n* ('happy')
14 (Sonata in G minor)	Minor	27
15 (Sonata Pathetique)	Minor	25
10 (Tango)	Minor	24
20 (Piano Sonata K457)	Minor	19

It is observed from Table 4.8 that excerpt no.14 (Sonata in G minor) by Anna Bon, has the highest number of 'happy' perceptions (27).

4.2.2.2 ***Tempo.*** In terms of contributing musical parameter, presented here in Table 4.9 is the tempo (fast or slow) for the major and minor mode piano music excerpts. Based on the beats per minute (bpm) measurement for tempo, fast tempo excerpts have 100 bpm and above, while slow tempo excerpts have 99 bpm and below.

Table 4.9 : Tempo for each Major and Minor Mode Piano Music Excerpt

Excerpt no. and title	Mode	Tempo	*n* ('happy')	*n* ('sad')
1 (Intermezzo)	Minor	Slow	1	30
2 (La Cucaracha)	Major	Fast	31	0
3 (Rhapsody)	Minor	Fast	0	31
4(Moonlight Sonata)	Minor	Slow	2	29
5 (Sakura)	Minor	Slow	5	26
6 (Berceuse)	Major	Slow	14	17
7 (Rondo)	Major	Fast	30	1
8(Grande Valse Brilliante)	Major	Fast	31	0
9 (Renaissance)	Major	Slow	4	27
10 (Tango)	Minor	Fast	24	7
11(Gymnopedie No.3)	Minor	Slow	1	30
12(March from Magic Flute)	Major	Fast	17	14
13 (Claire de lune)	Major	Slow	5	26
14(Sonata in G minor)	Minor	Fast	27	4
15(Sonata Pathetique)	Minor	Fast	25	6
16(Little White Boat)	Major	Fast	11	20
17 (Allemande)	Major	Fast	27	4
18(Les Baricades Misteriuses)	Major	Slow	26	5
19 (Sunset)	Minor	Slow	1	30
20(Piano Sonata K457)	Minor	Fast	19	12

Note. Total of 'fast' excerpts, n = 11. Total of 'slow' excerpts, n = 9.

In terms of tempo and emotional perception in music, firstly in the fast tempo excerpts, two of those, no.2 (La Cucaracha – anonymous), and no.8 (Grande Valse Brilliante) by Chopin, have the highest frequency of 'happy' perceptions, 31 each. It is also observed that 7 other fast tempo excerpts have higher frequency of 'happy' than 'sad' perceptions, namely no.7 (Rondo) by Haydn (30 'happy'), no.10 (Tango) by Smit Maarten (24 'happy'), no.12 (March from Magic Flute) by Mozart (17 'happy'), no.14 (Sonata in G minor) by Anna Bon (27 'happy'), no.15 (Sonata Pathetique) by Beethoven (25 'happy'), no.17 (Allemande) by Bach (27 'happy'), and no.20 (Piano Sonata K457) by Mozart (19 'happy'). Thus, 9 out of 11 fast tempo excerpts have higher frequency of 'happy' perceptions. Contrastingly, excerpt no.3 (Rhapsody) by Brahms has the highest frequency of 'sad' (31) despite being fast in tempo, and no.16 (Little White Boat – anonymous), has more 'sad' perceptions (20) than 'happy'.

In terms of slow tempo excerpts, 3 of the excerpts have the highest frequency of 'sad' perceptions, namely no.1 (Intermezzo) by Brahms, no.11 (Gymnopedie No.3) by Satie, and no.19 (Sunset) by Frederik Magle, where all three have 30 'sad' perceptions each. Apart from that, 5 slow tempo excerpts also have higher frequency of 'sad' perceptions, namely no.4 (Moonlight Sonata) by Beethoven (29 'sad'), no.5 (Sakura) arranged by Rudolf Dittrich (26 'sad'), no.6 (Berceuse) by Chopin (17 'sad'), no.9 (Renaissance) by Godowsky (27 'sad'), and no.13 (Clair de lune) by Debussy (26 'sad'). Contrastingly, excerpt no.18 (Les Baricades Misteriuses) by Couperin has higher frequency of 'happy' perceptions (26), despite being slow in tempo.

4.3 Correlational and associational analysis.

4.3.1 *Major and minor modes with level of 'happy' emotional perception.*

Table 4.10 : Results of Chi-square Test and Descriptive Statistics for Piano Music Mode (Major and Minor) with Level of 'Happy' Emotional Perception

Mode	'Happy' Level	
'Happy'	Low (0 to 15) 'Happy'	High (16 to 31)
Major	4 (40 %)	6 (60 %)
Minor	6 (60 %)	4 (40 %)

Note. $\chi^2 = 0.8$, df = 1
$p = 0.371$,*$p > .05$

The Chi-square (χ^2) test of independence was applied to find out whether there was association between piano music mode (major and minor) and level (low and high) of 'happy' emotional perception. According to the results of analysis, it was found that there was no association between piano music mode and level of 'happy' emotional perception (χ^2 (1, N = 20) = 0.80, p = 0.371), at the significance level of $p \leq 0.05$. Therefore, there was no significant relationship between piano music mode (major and minor) and level (low and high) of 'happy' emotional perception from subjects. It was observed from the percentage of the excerpts too, that 6 (60 %) major mode excerpts had high (16 to 31) total of 'happy' perceptions, while 6 (60 %) minor mode excerpts had low (0 to 15) total of 'happy' perceptions, but statistical results indicated that there was equal chance that either major or minor mode piano music excerpts had low or high total of 'happy' perceptions from subjects. The following graph represents the results.

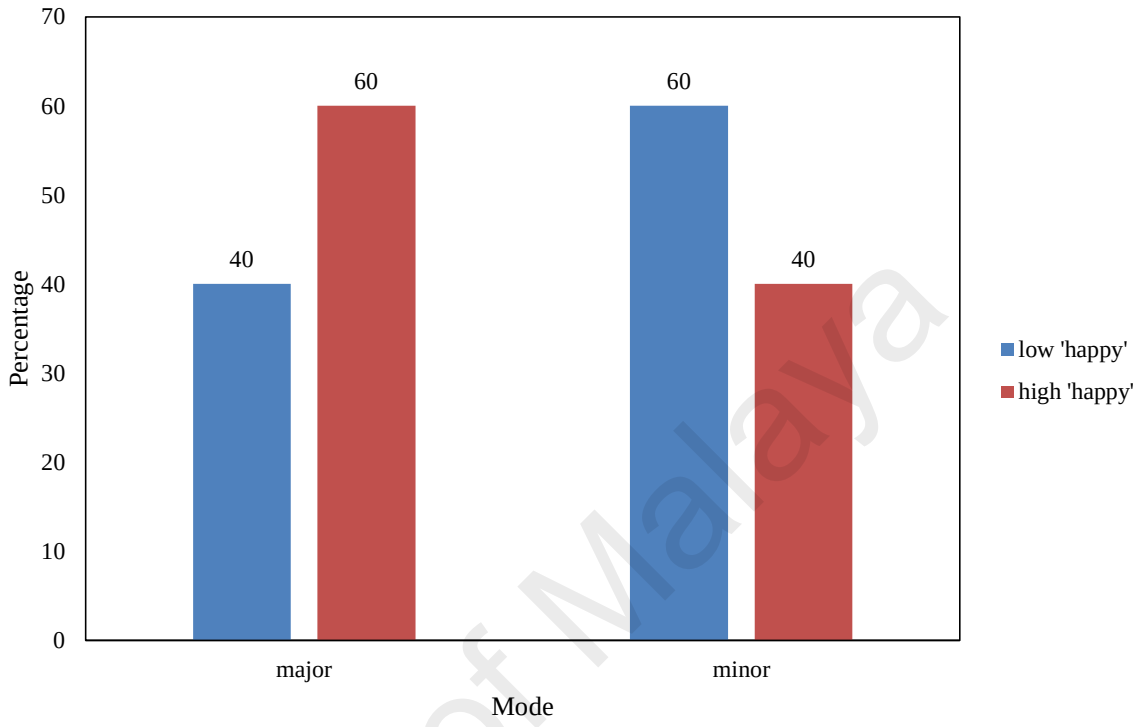

Figure 4.1 : Percentage of Piano Music Mode (Major and Minor) with Level (Low and High) of 'Happy' Emotional Perception.

In further discussion of results, firstly, the majority (60 %) of major mode piano music excerpts were perceived as 'happy' by the subjects. This was consistent with the Western classical music notion that relates major mode music to happiness, and the results further supported previous studies by Hevner (1935), Gerardi and Gerken (1995), Hunter et al. (2010), Schellenberg and Von Scheve (2012), and Temperley and Tan (2013), among others. However, according to statistical test results, it was found in this study that major mode was not associated with the level of 'happy' emotional perceptions received from the subjects. Therefore, there was a contrast between statistical test results obtained from this study, and the Western classical music notion of 'major-happy'. This conveyed that while major mode piano music was mostly perceived as 'happy' by the subjects, the major mode factor itself was not statistically significant in association with 'happy' emotion, therefore not a strong factor in affecting 'happy' emotion to be perceived.

4.3.2 *Major and minor modes with level of 'sad' emotional perception.*

Table 4.11 : Results of Chi-square Test and Descriptive Statistics for Piano Music Mode (Major and Minor) with Level of 'Sad' Emotional Perception

Mode	'Sad' Level	
	Low (0 to 15) 'Sad'	High (16 to 31) 'Sad'
Major	6 (60 %)	4 (40 %)
Minor	4 (40 %)	6 (60 %)

Note. $\chi^2 = 0.8$, df = 1.
$p = 0.371$,*$p > .05$

The Chi-square (χ^2) test of independence was applied to find out whether there was association between piano music mode (major and minor) and level (low and high) of 'sad' emotional perception. According to the results of analysis, it was found that there was no association between piano music mode and level of 'sad' emotional perception (χ^2 (1, N = 20) = 0.80, p = 0.371), at the significance level of $p \leq 0.05$. Therefore, there was no significant relationship between piano music mode (major and minor) and level (low and high) of 'sad' emotional perception from subjects. It was observed from the percentage of the excerpts too, that 6 (60 %) major mode excerpts had low (0 to 15) total of 'sad' perceptions, while 6 (60 %) minor mode excerpts had high (16 to 31) total of 'sad' perceptions, but statistical results indicated that there was equal chance that either major or minor mode piano music excerpts had low or high total of 'sad' perceptions from subjects. The following graph represents the results.

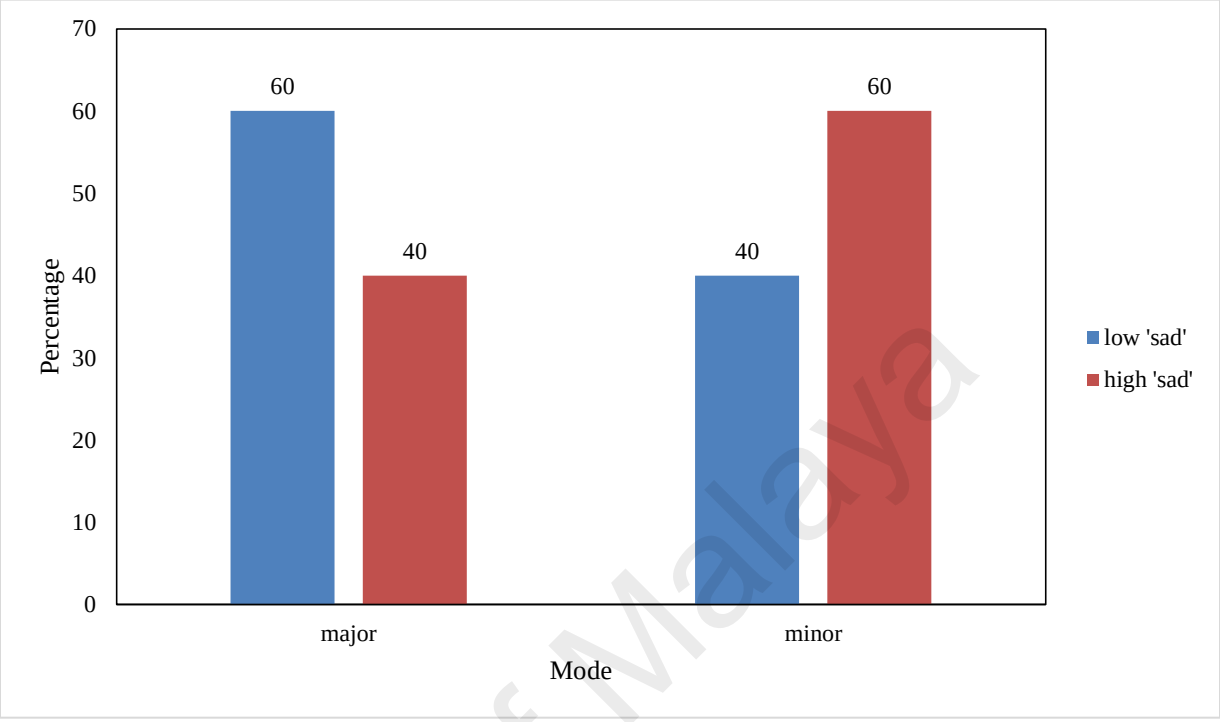

Figure 4.2 : Percentage of Piano Music Mode (Major and Minor) with Level (Low and High) of 'Sad' Emotional Perception.

In further discussion of results, firstly, the majority (60 %) of minor mode piano music excerpts were perceived as ‘sad’ by the subjects. This was consistent with the Western classical music notion that relates minor mode music to sadness, and the results further supported previous studies by Hevner (1935), Lindström and Gabrielsson (2001), Juslin and Laukka (2004), Bowling et al. (2012), and Temperley and Tan (2013), among others. However, according to statistical test results, it was found in this study that minor mode was not associated with the level of ‘sad’ emotional perceptions received from the subjects. Therefore, there was a contrast between statistical test results obtained from this study, and the Western classical music notion of ‘minor-sad’. This conveyed that while minor mode piano music was mostly perceived as ‘sad’ by the subjects, the major mode factor itself was not statistically significant in association with ‘sad’ emotion, therefore not a strong factor in affecting ‘sad’ emotion to be perceived.

4.3.3 *Tempo with level of 'happy' emotional perception.*

Table 4.12 : Results of Chi-square Test and Descriptive Statistics for Piano Music Tempo (Fast and Slow) with Level of 'Happy' Emotional Perception

Tempo	'Happy' Level	
	Low (0 to 15) 'Happy'	High (16 to 31) 'Happy'
Fast	2 (18.2 %)	9 (81.8 %)
Slow	8 (88.9 %)	1 (11.1 %)

Note. $\chi^2 = 9.899$, df = 1.
$p = 0.005$,*$p \leq .05$ (Exact Sig. (2-sided) value chosen due to 2 cells of the table (50 %) have expected count less than 5 during Chi-square cross-tabulation).
Total of fast tempo excerpts, $n = 11$
Total of slow tempo excerpts, $n = 9$

The Chi-square (χ^2) test of independence was applied to find out whether there was association between piano music tempo (fast and slow) and level (low and high) of 'happy' emotional perception. According to the results of analysis, it was found that there was association between piano music tempo and level of 'happy' emotional perception (χ^2 (1, $N = 20$) = 9.899, $p = 0.005$), at the significance level of $p \leq 0.05$. The exact significance (2-sided) value, $p = 0.005$, instead of the usual asymptotic significance value, was chosen from the Chi-square test, due to 2 cells (50 %) of the table had expected count less than 5, during the cross-tabulation process.

Therefore, there was significant relationship between piano music tempo (fast and slow) and level (low and high) of 'happy' emotional perception from subjects. It was observed from the percentage of the excerpts too, that 9 (81.82 %) fast tempo excerpts had high (16 to 31) total of 'happy' perceptions, while 8 (88.89 %) slow tempo excerpts had low (0 to 15) total of 'happy' perceptions. Thus, statistical results

indicated that there was high chance that fast tempo excerpts be associated towards high number of 'happy' perceptions, while slow tempo excerpts be associated towards low number of 'happy' perceptions from subjects. The following graph represents the results.

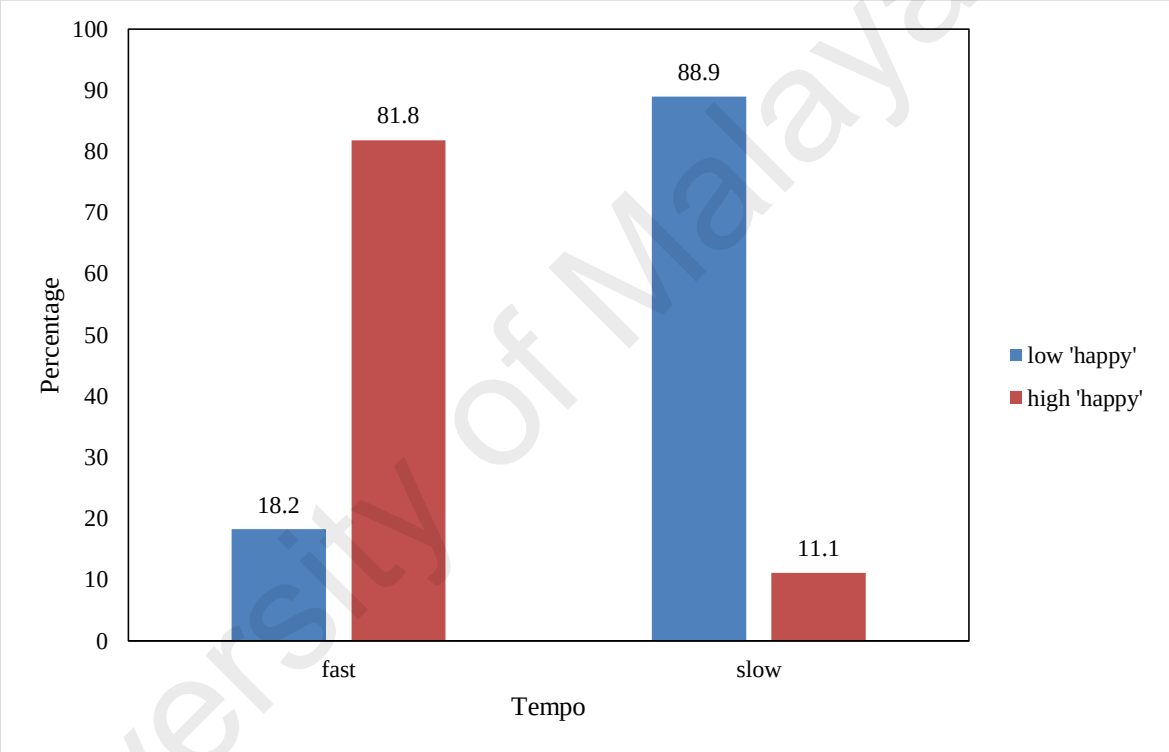

Figure 4.3 : Percentage of Piano Music Tempo (Fast and Slow) with Level (Low and High) of 'Happy' Emotional Perception.

In further discussion of results, firstly, the majority (81.8 %) of fast tempo piano music excerpts were perceived as 'happy' by the subjects. This further supported previous studies that relate fast tempo music to happiness, such as Hevner (1935), Palmer (1997), Peretz et al. (1998), Juslin (2000), Juslin (2003), and Schubert (2004), among others. In addition, the statistical test results showed that there indeed was association between piano music tempo and level of 'happy' emotional perceptions, and fast tempo caused higher number of 'happy' emotional perceptions from subjects. This conveyed that fast tempo was statistically significant in association with 'happy' emotion, and therefore a strong factor in affecting 'happy' emotion to be perceived.

4.3.4 *Tempo with total of 'sad' emotional perception.*

Table 4.13 : Results of Chi-square Test and Descriptive Statistics for Piano Music Tempo (Fast and Slow) with Level of 'Sad' Emotional Perception

Tempo	'Sad' Level	
	Low (0 to 15) 'Sad'	High (16 to 31) 'Sad'
Fast	9 (81.8 %)	2 (18.2 %)
Slow	1 (11.1 %)	8 (88.9 %)

Note. $\chi^2 = 9.899$, df = 1.
$p = 0.005$,*$p \leq .05$ (Exact Sig. (2-sided) value chosen due to 2 cells of the table (50 %) have expected count less than 5 during Chi-square cross-tabulation).
Total of fast tempo excerpts, $n = 11$
Total of slow tempo excerpts, $n = 9$

The Chi-square (χ^2) test of independence was applied to find out whether there was association between piano music tempo (fast and slow) and level (low and high) of 'sad' emotional perception. According to the results of analysis, it was found that there was association between piano music tempo and level of 'sad' emotional perception (χ^2 (1, $N = 20$) = 9.899, $p = 0.005$), at the significance level of $p \leq 0.05$. The exact significance (2-sided) value, $p = 0.005$, instead of the usual asymptotic significance value, was chosen from the Chi-square test, due to 2 cells (50 %) of the table had expected count less than 5, during the cross-tabulation process.

Therefore, there was significant relationship between fast and slow tempo excerpts with the low and high total of 'sad' emotional perceptions from subjects. It was observed from the percentage of the excerpts too, that 8 (88.89 %) slow tempo excerpts had high (16 to 31) total of 'sad' perceptions, while 9 (81.82 %) fast tempo excerpts had low (0 to 15) total of 'sad' perceptions. Thus, statistical results indicated

that there was high chance that slow tempo excerpts be associated towards high number of 'sad' perceptions, while fast tempo excerpts be associated towards low number of 'sad' perceptions. The following graph represents the results.

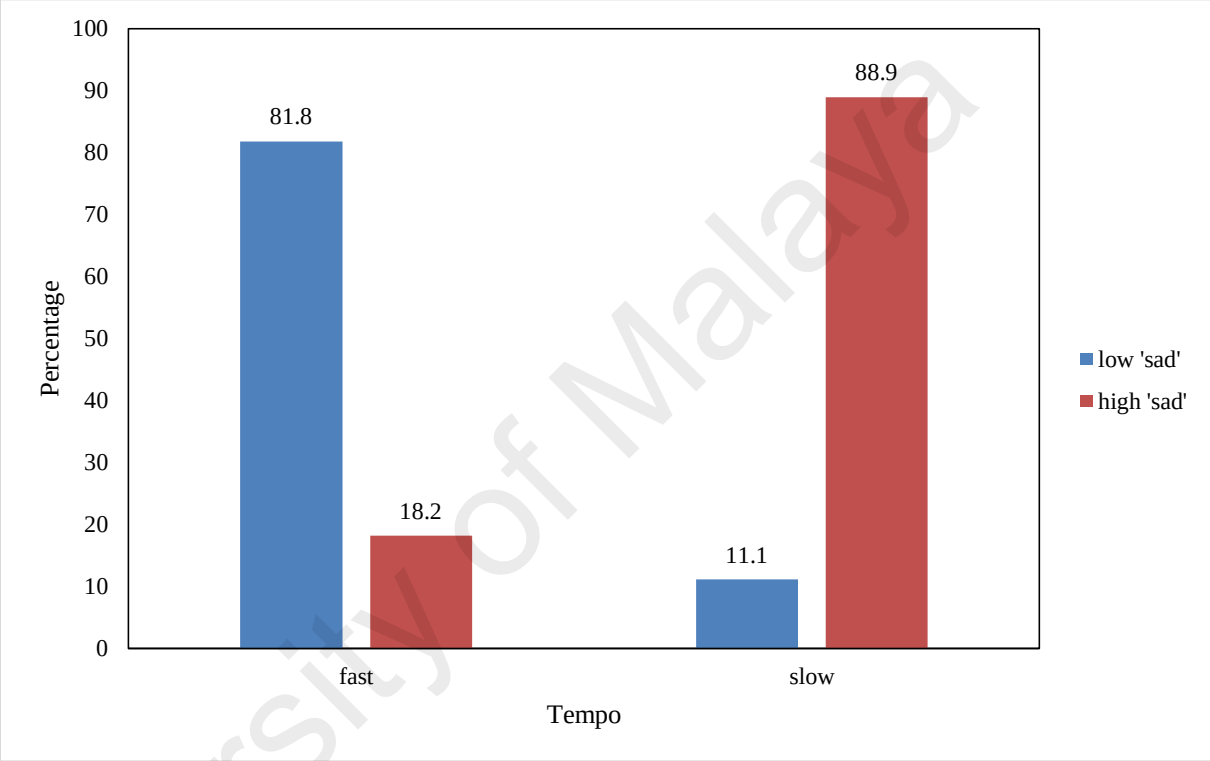

Figure 4.4 : Percentage of Piano Music Tempo (Fast and Slow) with Level (Low and High) of 'Sad' Emotional Perception.

In further discussion of results, firstly, the majority (88.9 %) of slow tempo piano music excerpts were perceived as ‘sad’ by the subjects. This further supported previous studies that relate slow tempo music to sadness, such as Hevner (1935), Palmer (1997), Gabrielsson (1999), Schellenberg and Von Scheve (2002), Juslin and Laukka (2004), and Yamasaki (2004), among others. In addition, the statistical test results showed that there indeed was association between piano music tempo and level of ‘sad’ emotional perceptions, and slow tempo caused higher number of ‘sad’ emotional perceptions from subjects. This conveyed that slow tempo was statistically significant in association with ‘sad’ emotion, and therefore a strong factor in affecting ‘sad’ emotion to be perceived.

4.4 Results for Hypotheses

4.4.1 Hypothesis 1. Major mode piano music is associated with total of 'happy' emotional perceptions from subjects.

Based on the Chi-square (χ^2) test of independence results, I found that there is no association between major mode piano music with the total of 'happy' emotional perceptions from subjects, where the Chi-square value is χ^2 (1, N = 20) = 0.80, p = 0.371, at the significance level of $p \leq 0.05$. Thus, it is derived that there is no significant relationship between major mode piano music with the total of 'happy' emotional perceptions, be it low level (0 to 15 'happy') or high level (16 to 31 'happy') as analyzed. Therefore, hypothesis 1 is rejected.

4.4.2 Hypothesis 2. Minor mode piano music is associated with total of 'sad' emotional perceptions from subjects.

Based on the Chi-square (χ^2) test of independence results, I found that there is no association between major mode piano music with the total of 'sad' emotional perceptions from subjects, where the Chi-square value is χ^2 (1, N = 20) = 0.80, p = 0.371, at the significance level of $p \leq 0.05$. Thus, it is derived that there is no significant relationship between minor mode piano music with the total of 'sad' emotional perceptions, be it low level (0 to 15 'sad') or high level (16 to 31 'sad') as analyzed. Therefore, hypothesis 2 is rejected.

4.4.3 Hypothesis 3. Contributing musical parameter factor of tempo will be associated with the total of 'happy' and 'sad' emotional perceptions in major and minor mode piano music excerpts.

Based on the Chi-square (χ^2) test of independence results, I found that there is association between piano music tempo (fast and slow) with the total of 'happy' and 'sad' emotional perceptions from subjects, where the Chi-square value is χ^2 (1, N = 20) = 9.899, p = 0.005, at the significance level of $p \leq 0.05$. Thus, it is derived that there is significant relationship between tempo and the total of ;happy' and 'sad' emotional perceptions, be it low level (0 to 15 'happy/sad') or high level (16 to 31 'happy/sad') as analyzed. Therefore, hypothesis 3 is accepted.

4.5 Results for Objectives

4.5.1 Objective 1. To find out whether major and minor modes from the piano music excerpts are associated with the total of 'happy' and 'sad' emotional perceptions from subjects in this study.

In this study, I found that major and minor modes of the piano music excerpts are not associated with the total of 'happy' and 'sad' emotional perceptions from the subjects, where the Chi-square value from the test of independence statistical analysis is χ^2 (1, N = 20) = 0.80, p = 0.371, at the significance level of $p \leq 0.05$. Therefore, there is no significance relationship between the modes (major and minor) with the total of 'happy' and 'sad' emotional perceptions, indicating equal chance of whether

piano music of either mode will be perceived as ‘happy’ or ‘sad’. It is derived that major and minor modes do not have significant effects to ‘happy’ and ‘sad’ emotional perceptions in piano music based on the results of this study.

4.5.2 Objective 2. To find out whether contributing musical parameter factor of tempo is associated with the number of ‘happy’ and ‘sad’ emotional perceptions in major and minor piano music excerpts.

On the contrary, I found that tempo (fast and slow) of the piano music excerpts are associated with the total of ‘happy’ and ‘sad’ emotional perceptions from the subjects, where the Chi-square value from the test of independence statistical analysis is χ^2 (1, N = 20) = 9.899, p = 0.005, at the significance level of $p \leq 0.05$. Therefore, there is significance relationship between the tempo (fast and slow) with the total of ‘happy’ and ‘sad’ emotional perceptions, indicating high chance that fast tempo will be perceived as ‘happy’, while slow tempo will be perceived as ‘sad’. It is derived that tempo (fast and slow) do have significant effects to ‘happy’ and ‘sad’ emotional perceptions in piano music based on the results of this study.

4.5.3 Objective 3. To obtain frequency and percentage on subjects' demographic and musical background from the survey-questionnaire phase, specifically on age, gender, grade/level in piano, years in piano learning, other demographic factors, as well as factors of music preference and listening habits, and lastly, understanding of emotional perception in music.

Main frequency and percentage as insight on subjects' demographic factors are obtained as the following. Highest percentage of subjects (N = 31) are 11 years old (25.8 %), female (80.6 %), of Grade 1 level in piano playing (45.2 %), and went through 3 years in piano learning (25.8 %). In terms of music preference and listening habits, highest percentage of subjects prefer classical music (45.2 %), always listen to music (58.1 %), and prefer both major and minor modes (67.7 %), rather than major-only, or minor-only. In terms of understanding of emotion in music, highest percentage of subjects found it 'easy' to understand emotion in music (87.1 %), 'easy' to understand major mode emotion (67.7 %), and 'easy' to understand minor mode emotion (74.2 %). These information provide insight on discussion of results on associations between modes, as well as tempo, and emotional perceptions ('happy' and 'sad') obtained.

CHAPTER 5: DISCUSSION, CONCLUSION, AND RECOMMENDATION

5.1 Overview

This chapter discusses the conclusion and recommendation derived from the results of analysis in the previous chapter. Relating to my research questions, I firstly discuss the insight obtained from the descriptive analysis of frequency and percentage for survey-questionnaire phase, which includes demographic, music preference and listening, and understanding of emotion in music factors, as well as limitations encountered. Next, I discuss the total of 'happy' and 'sad' emotional perceptions obtained for major and minor mode piano music from the listening activity phase, relating to the four blocks of mode-emotional perception results, namely 'major-happy', 'major-sad', 'minor-sad', and 'minor-happy'. Leading to the next point, I discuss the association between mode (major and minor) and level of 'happy' emotions, mode (major and minor) and level of 'sad' emotions, tempo (fast and slow) and level of 'happy' emotions, and last but not least tempo (fast and slow) and level of 'sad' emotions. Then, I conclude on the objectives achieved. The chapter concludes with recommendation and suggestions for future research based on matters that need improvement from this particular research.

5.2 Discussion on Results of Survey-Questionnaire Data Analysis.

5.2.1 Demographic characteristics. In terms of the insight obtained from the demographic characteristics, I find that the highest percentage of subjects is represented by 11-year-olds (25.8 %), females (80.6 %), grade 1 level in piano learning (45.2 %), and 3 years' duration of learning (25.8 %). In terms of limitations encountered, firstly, there is higher number of piano music students from primary school, which includes the 11-year-olds, as compared to students from secondary school (age 13 – 17) who enrolled for piano lessons in Bangi. It is observed that majority of secondary school students are involved in important school examinations, for example Sijil Pelajaran Malaysia (SPM), causing not many of them to take, or continue piano lessons consistently, in order to be included as subjects in the sampling too, thus more insight from secondary school subjects are lacking.

Secondly, there are more female students as compared to male students in piano, due to most male students opt for drum and guitar lessons. Thirdly, lack of higher grade students has made the lower grade students, notably grade 1 in piano learning, represents the most percentage of subjects in this study. Therefore, information on music preference, listening, understanding of emotion in music, as well as 'happy' and 'sad' emotional perceptions in music from listening activity of the major and minor mode music, are obtained mainly from this category of subjects in contributing to the knowledge of 11-year-old subjects' emotional perception in music.

5.2.2 Music preference and listening habits. From the results on music preference and listening habits, I find that firstly, highest percentage comes from classical music preference (45.2 %). As portrayed by the Western music notion, classical music indicates that major mode is strongly perceived as 'happy', while minor mode is strongly perceived as 'sad'. Therefore, the result gives an impression that a majority of subjects with the classical music preference, will follow the notion of 'major-happy' and 'minor-sad' in emotional perception in music.

Next, I also find that higher percentage of subjects (58.1 %) always listen to music, indicating that most subjects always listen to music compared to those who sometimes or seldom listen to music. More music listening makes students aware of various emotions communicated in the music, thus playing a role in subjects' perceiving of 'happy' and 'sad' emotional perceptions in the piano music excerpts of the listening activity. This relates to Scherer and Zentner (2001), which stated that factors of the listening situation in which emotion could be induced, involve musical structure, interpretation by performer, and relevant state and trait characteristics of the listener.

From the music mode preference, most subjects prefer both major and minor modes in music, with the percentage of 67.7 %. This explains the mixed mode and emotional perception in music, where apart from 'major-happy' and 'minor-sad', 'major-sad' and 'minor-happy' are perceived too by the subjects. It is therefore concluded from this, that the high percentage of subjects who prefer classical music, always listen to music, and prefer both major and minor modes, have strong effect on

resulting in ‘major-happy’ and ‘minor-sad’ mode-emotional perceptions in music, as well as in mixture of ‘major-sad’ and ‘minor-happy’ perceptions, in the listening activity.

5.2.3 Understanding of emotion in music. From the results on understanding of emotion in music, I observe that higher percentage of subjects (87.1 %) find it ‘easy’ to understand emotion in music, compared to ‘difficult’. This positive answer from a majority of subjects indicates their good level of awareness to aspects of emotional perception in music. Relating to research question, this result portrays that majority of subjects could grasp the emotional aspect of the music, thus the need to relate more to how this could be applied in projecting emotion in piano music to help them achieve musical performance in their piano playing.

Besides that, I observe that 67.7 % of the subjects find it ‘easy’ to understand major mode emotion in music, while a higher percentage, 74.2 % of the subjects, find it ‘easy’ to understand minor mode emotion in music. This shows subjects’ tendency to minor mode emotion, as compared to major mode. According to Gerardi and Gerken (1995), emotional connotation given to mode must develop with cognitive maturity and/or exposure to the musical culture. Thus, the reasons why most subjects, who are mostly teenagers, show tendency towards minor key emotion, might be attributed to their ability to distinguish more between major or minor key emotion as a result of cognitive maturity, as well as exposure to their homegrown musical culture, where it might involve more minor key music, as compared to major key. As a result, there is significantly higher number of ‘minor-sad’, rather than ‘major-

happy' perceptions, obtained through the listening experiment, thus subjects' tendency towards minor key emotion could be the cause of it.

According to Schellenberg et al. (2008), appeal of sad-sounding music increases when listeners are fatigued, in a negative mood state, or when they are feeling sad. These could also be possible reasons to explain subjects' tendency towards minor key emotion, as subjects who are mostly teenagers tend to be rebellious and negative in this stage of growth. It is therefore concluded from this section that higher percentage of subjects with positive answers in emotional perceptions in music as explained, does have an effect on the outcome of the listening experiment, and significantly, higher percentage of subjects' tendency towards minor key emotion in music, result in 'minor-sad' mode-emotional perceptions being perceived the most, in the listening experiment.

5.3 Discussion on Results of Listening Activity Data Analysis.

5.3.1 Mode-emotional perceptions of 'major-happy', 'minor-sad', 'major-sad' and 'minor-happy' obtained from the listening activity. From the results obtained in the listening activity, firstly, most of the major mode piano music excerpts have 'major-happy' (60 %) rather than 'major-sad' (40 %) perceptions, which strongly portrays the Western classical music notion of 'major-happy'. Thus, it is proven that major mode plays an important role in deriving 'happy' perceptions. Costa (2004) stated that the attribution of happiness and serenity is associated with major mode. Based on familiarity factor, the most common mode in both classical

and modern popular music, Ionian, which is close to major mode, is judged to be the 'happiest' (Temperley and Tan, 2013). This could explain the high percentage of 'major-happy' perceptions received. Thus, in terms of major mode music resulted in higher number of 'happy' emotional perceptions, this study further supports Hevner (1935) of major mode with positive emotional connotation; Gerardi and Gerken (1995) of major mode with positive emotion; Lindström and Gabrielsson (2001) of major mode with happiness and serenity, hence positive valence; and Schellenberg and Von Scheve (2012) of major mode as one of the musical cues to happiness, among several studies.

Secondly, in the minor mode, it is found too that most of the minor mode piano music excerpts have 'minor-sad' (60 %) rather than 'minor-happy' (40 %) perceptions, which also strongly portray the Western classical music notion of 'minor-sad'. Thus, it is proven that minor mode plays an important role in deriving 'sad' perceptions. In the contributing parameters of tempo, pitch and dynamics too, the average values indicate slower tempo and softer dynamics for 'minor-sad' excerpts, compared to 'minor-happy' excerpts. These too, strengthen the 'minor-sad' connotations to the piano music excerpts involved. Thus, in terms of minor mode music resulted in higher number of 'sad' emotional perceptions, this study further supports Heinlein (1928) and Hevner (1935) on early empirical studies that linked minor music to sad affective cues; Zarlino (1983) that linked minor mode to sadness; Gerardi and Gerken (1995) of minor mode with negative emotion; and Lindström and Gabrielsson (2001) of minor mode with sadness, tension, and anger, hence positive valence, among several studies.

In addition to the explanation of how minor mode music resulted in higher number of 'sad' emotional perceptions, I relate my findings and minor mode music excerpts used, firstly, to the previous research by Huron and Margulis (2012) on interval and pitch height theory, where lower pitch expresses sadness, and since minor mode music excerpts that I used had overall lower pitches than the major mode music excerpts, this resulted in higher number of 'sad' perceptions from minor music. I further connect the relation between minor music, low pitch, and sadness, to the sad speech prosody as stated by Juslin and Laukka (2004) to understand why lowering of pitches in speech and music, could result in 'sad' emotional perceptions, and found this in minor mode piano music excerpts used in my study. This, on the other hand, contrasted with the higher pitches and intervals found in major mode piano music excerpts used in my study, which I relate to Temperley and Tan (2013) study that asserted modes 'increase' in happiness as scale-degrees are raised.

Therefore, major-minor distinction parallels the happy-sad emotion, as found by Hevner (1935), Kastner and Crowder (1990), Gerardi and Gerken (1995), Gregory and Varney (1996) and Peretz et al. (1998). This explains high percentage of 'major-happy' and 'minor-sad' mode-emotional perceptions received from subjects, where subjects tend to differentiate more between 'happy' and 'sad' perceptions by associating major mode with 'happy' and minor mode with 'sad'. This further strengthens the Western music notion of 'major-happy' and 'minor-sad'. Interestingly, however, non-Western music culture also shows the similarity in the strength of 'major-happy' and 'minor-sad' distinctions, as exemplified by Bowling et al. (2012) of 'positive/excited' and 'negative/subdued' emotions in classical South

Indian music. Thus, my study also further supports the results obtained by Bowling et al. (2012). In terms of the non-Western subjects, it is also interestingly found that the subjects in my study have also perceived high 'major-happy', and 'minor-sad' perceptions, thus could add further to the data by McKay (2002) of Western subjects in listening experiment and emotional perceptions in music. The similar perceptions received from subjects in this study also supported Gregory and Varney (1996) on comparative study between Indian and British subjects on emotional perceptions in music, where in all these cases, there is a high level of agreement of 'major-happy' and 'minor-sad'.

An interesting point, however, is the significantly higher 'minor-sad' perceptions obtained in the listening experiment, when compared with 'major-happy'. According to Ladinig and Schellenberg (2012), most intense emotional responding occurs when the music is unambiguously happy or sad. This might be the case of the higher perceptions of 'minor-sad' in the piano music excerpts, where they clearly portray the 'sad' perception, leading to this being highly perceived by the subjects. It is also noted that in addition to minor mode itself, there might be strong external contributions from physiological and psychological, cultural, contextual, and musical parameter factors that help to result in high number of 'minor-sad' perceptions obtained. For example in physiological and psychological factor, the study by Nawrot (2003) indicated that infants had the tendency more towards 'happy' perceptions, but children and adults had more developed perceptions and could perceive 'sad' very well, and to relate to this, the subjects in my study were also children and teenagers, who perceived 'sad' very well. In cultural factor, the effect of 'familiarity' towards

types of music in one's culture, could result in the particular recognition or perception of the listener (Temperley and Tan, 2013), and therefore, the subjects in my study, who are more familiar towards minor mode sad-sounding music, perceived 'minor-sad' in higher number compared to 'major-happy'.

In contextual factors, the state of condition, visual imagery and musical expectancy as stated by Juslin and Västfjäll, (2008) could relate to the subjects' condition in my study, where being teenagers and in most cases rebellious, tend to have dark imagery and prone to sad or emotional music, thus influencing their choice of 'minor-sad' perception. Apart from that, the individual, sociocultural identity of listener, and the listening situation (Scherer and Zentner, 2001) could also affect the subjects' choice of 'minor-sad' mode-emotional perceptions in my study. In musical parameter factors, tempo, dynamics, pitch, and others also play important role, in addition of minor mode, to result in the high 'minor-sad' perceptions. For examples, slow tempo, soft dynamics, and low pitch, are all contributors to sad emotional perception of music (Wapnick et al., 2004; Chapin et al., 2010; Esposito and Serio, 2007; Peretz et al., 1998; Palmer, 1997; Juslin and Laukka, 2004; and Gabrielsson, 1999).

Thirdly, in the case of mixed mode and emotional perceptions obtained, namely 'major-sad' and 'minor-happy', Ladinig and Schellenberg (2012) asserted that mixed happy and sad feelings resulted from music with mixed emotional cues from musical parameters, for examples fast tempo with minor mode, while slow tempo with major mode. Contributing parameter of tempo indicates that several 'major-sad' excerpts do

have slower tempo compared to 'major-happy', as well as 'minor-happy' excerpts significantly have fast tempo compared to 'minor-sad', hence the results obtained. Therefore, 'major-sad' and 'minor-happy' mode-emotional perceptions obtained from the minority of piano music excerpts in my study contributed to the study by Schellenberg and Von Scheve (2012) of American pop music that resulted in mixed emotional cues from the subjects. Another possibility is also derived from the study by Tiemann and Huron (2011), where in several non-Western cultures, minor scale did not have sad connotations. This could be related to several choices of 'major-sad' and 'minor-happy' made by the subjects in my study, where they could have perceived several major mode piano music excerpts as being 'sad', while minor mode as 'happy'.

5.3.2 Results from the Chi-square test on associations between mode (major and minor) to 'happy' and 'sad' emotional perceptions. In the case of association and statistical significance however, it is interestingly observed that based on Chi-square test of independence, firstly, there is no association between mode (major and minor) and level of 'happy' emotional perception (χ^2 (1, N = 20) = 0.80, p = 0.371), at the significance level of $p \leq 0.05$. To relate to 'major-happy', I derive from this that, even though 'major-happy' mode-emotional perception indicates higher percentage from the piano music excerpts as perceived by the subjects, there is no statistically significant relationship between major mode piano music and 'happy' perceptions.

Secondly, I also find that there is no association between mode (major and minor) and level of 'sad' emotional perception (χ^2 (1, N = 20) = 0.80, p = 0.371), at the significance level of $p \leq 0.05$. To relate to 'minor-sad', I derive from this that, even though 'minor-sad' mode-emotional perception indicates higher percentage from the piano music excerpts as perceived by the subjects, there is no statistically significant relationship between minor mode piano music and 'sad' perceptions.

Both of these results indicate that, based on statistical analysis, major and minor modes do not have a significant relationship with 'happy' and 'sad' perceptions obtained from subjects despite the high percentage of 'major-happy' and 'minor-sad'. Therefore, the contributing musical parameter of tempo might have an effect to 'happy' and 'sad' perceptions, as explained in the following results.

5.3.3 Results from the Chi-square test on associations between tempo (fast and slow) to 'happy' and 'sad' emotional perceptions. Firstly, I find it interesting that according to the results of the analysis, there is an association between piano music tempo (fast and slow) and level of 'happy' emotional perception (χ^2 (1, N = 20) = 9.899, p = 0.005), at the significance level of $p \leq 0.05$. Thus, I derive from here that there is a significant relationship between fast tempo and 'happy' perceptions, which have an effect in contributing to the major mode excerpts, in order to result in 'major-happy' perceptions among subjects.

Secondly too, I also find that there is an association between piano music tempo (fast and slow) and level of 'sad' emotional perception (χ^2 (1, N = 20) = 9.899, p = 0.005), at the significance level of $p \leq 0.05$. Thus, I derive from here that there is a significant relationship between slow tempo and 'sad' perceptions, which have an effect in contributing to the major mode excerpts, in order to result in 'minor-sad' perceptions among subjects.

Therefore, the fast tempo to 'happy' emotional perceptions, and slow tempo to 'sad' emotional perceptions of piano music excerpts perceived by subjects in my study, have also support the previous studies of Juslin (2000), Juslin and Laukka (2004), Yamasaki (2004), and Schellenberg and Von Scheve (2012), among others.

Interestingly, the results from my study also indicate 88.9 % 'slow tempo-sad' perceptions, higher as compared to 81.9 % 'fast tempo-happy' perceptions, in showing the effect of tempo (fast or slow), to 'happy' and 'sad' emotional perceptions in piano music among subjects. This further supports the study by Yamasaki (2004) through connection of emotion to tempo and rhythm, where the responses obtained were 51.3 % sadness as compared to 43.9 % happiness, in the emotional response to slow and fast tempo music. This add to the data that 'minor-sad', and 'slow tempo-sad', music and emotional perceptions are higher compared to 'major-happy', and 'fast tempo-happy' music emotional perceptions, which provide a further interesting point of study to why music tends to be perceived as higher numbers in 'sad', compared to 'happy'.

5.4 Conclusion

In conclusion, ‘major-happy’ and ‘minor-sad’ mode-emotional perceptions are the most perceived in piano music, among subjects aged 9 to 17. This indicates the effect of major mode to ‘happy’ perception, while minor mode to ‘sad’ perception. However, statistical test indicates that there is no significant relationship between major mode and ‘happy’ perceptions, as well as minor mode and ‘sad’ perceptions. Interestingly, there is significant relationship between fast tempo and ‘happy’ perceptions, as well as slow tempo and ‘sad’ perceptions. Therefore, this portrays that contributing musical parameter of tempo plays an important role in effects of major and minor mode to ‘happy’ and ‘sad’ emotional perceptions in piano music among subjects aged 9 to 17 in this study.

5.5 Recommendations and Suggestions for Future Research

This research could further be improved in the future by firstly, obtaining larger sampling population of subjects, as more in-depth and reliable insight on mode-emotional perceptions in music could be derived better from higher number of subjects. Secondly, further survey-questionnaire could also be improved as a separate study, focusing on more specific factors of emotional perception in music. Thirdly, the listening activity could further be improved with better technology, and as a separate, in-depth study to focus on obtaining clearer results in emotional perception in music. Last but not least, special focus on the tendency of students aged between 9-17 years old, towards 'minor-sad' mode-emotional perception in music, could also be considered for further study, to discover more reasons behind this interesting occurrence.

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