THE TRANSLATION AND ADAPTATION OF THE MALAY VERSION OF THE ABSORPTION IN MUSICAL RESPONSIVENESS SCALE (AIMS) AND OLLEN MUSICAL SOPHISTICATION INDEX (OMSI): A PRELIMINARY STUDY

by

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LIST OF ABBREVIATIONS

AIMS	Absorption In Musical Responsiveness Scale
ASD	Autistic Spectrum Disorder
ASHA	American Speech-Language-Hearing Association
BRECVEMA Framework	Framework of Brainstem reflexes, Rhythmic entrainment, Evaluative Conditioning, Contagion, Visual imagery, Episodic memory, Musical expectancy and Aesthetic judgement
CVI	Content Validity Index
GHQ-12	General Health Questionnaire-12
HREC	Human Research Ethics Committee
I-CVI	Content Validity Index for Items
IPA	Interpretative Phenomenological Analysis
MATLAS	Music therapy Assessment Tool for Low Awareness States
MBCT	Melodic Based Communication Therapy
MOTAS	Modified Tellegen Absorption Scales
OMSI	Ollen Musical Sophistication Index
S-CVI/Ave	Content Validity Index for Scales (Average)
ACP	Average Congruency Percentage
S-CVI/UA	Content Validity Index for Scales per Universal Agreement
SIS-3	Stroke Impact Scales-3
SMUFT	Skilled Musical Function Test
SPSS	Statistical Packages for Social Science
VAMS	Visual Analogue Mood Scale
WHO	World Health Organization

DEFINITION OF KEY TERMS

Adaptation	Process of making something suitable for a new use or purpose (Oxford Dictionaries, 2014).
AIMS	Absorption In Musical Responsiveness Scale. A 34-item measure of individuals' ability and willingness to allow music to draw them into an emotional experience (Sandstrom & Russo, 2011).
ASD	Autistic Spectrum Disorder. A developmental disability who have social, communication and language problems, with restricted and repetitive patterns of behaviour (American Speech-Language-Hearing Association, 2014).
BRECVEMA Framework	A framework that comprises eight mechanisms (brainstem reflexes, rhythmic entrainment, evaluative conditioning, contagion, visual imagery, episodic memory, musical expectancy and aesthetic judgement) which explains how does musical responsiveness forms (Juslin, 2013).
Musical responsiveness	An individual characteristic which includes an openness to experience emotional and cognitive alterations at different situations (Roche & McConkey, 1990) which applied to musical context.
Musical sophistication	A psychometric construct that refers multi-faceted musical skills, expertise, achievements, and related behaviours by measuring different subscales (Daniel, Bruno, Jason, & Lauren, 2014).
OMSI	Ollen Musical Sophistication Index. A novel instrument that comprehensively measures musical sophistication by explicitly considering multi-faceted musical expertise (Ollen, 2006).
Translation	A process whereby a written or spoken rendering of the meaning of a word or text in another language (Oxford Dictionaries, 2014).

ABSTRAK

Penterjemahan dan Adaptasi Borang Penyerapan Terhadap Tindak Balas Muzikal (AIMS) Dan Tahap Muzikal (OMSI) Versi Bahasa Melayu: Kajian Awal

Kesesuaian terapi pertuturan dan bahasa yang berdasarkan muzikal berbeza disebabkan oleh perbezaan individu dalam penyerapan terhadap tindak balas muzikal. Walaupun ahli muzik mempunyai penyerapan terhadap tindak balas muzikal yang berbeza dengan bukan ahli muzik, syarat penentuan untuk membezakan kedua-dua golongan ini adalah berbeza. Kajian penyelidikan ini mengatasi kekurangan ini dengan menterjemahkan dua borang penilaian dari bahasa Inggeris kepada bahasa Melayu dan mengadaptasikan mereka. Borang Penyerapan Terhadap Tindak Balas Muzikal/*Absorption In Musical Responsiveness Scale* (AIMS) mengukur penyerapan individu terhadap tindak balas muzikal, dan Borang Tahap Muzikal/*Ollen Musical Sophistication Index* (OMSI) mengukur tahap muzikal individu. Kedua-duanya penting untuk meneroka peranan muzik dalam kalangan orang yang bermasalah komunikasi, dan menambahbaikkan diagnostik semasa, terutamanya bagi populasi Melayu yang merupakan golongan dominasi di Malaysia. Proses penterjemahan merangkumi penterjemahan standard kepada bahasa Melayu, perterjemahan standard kepada bahasa Inggeris dan perbincangan antara panel. Kesahan kandungan/*content validity* diukur menggunakan indeks kesahan kandungan/*Content Validity Index* (CVI) untuk menilai kesahan soalan dalam borang. Kesahan secara permukaan/*face validity* adalah dinilai dalam kalangan 10 peserta yang fasih dalam bahasa Melayu dan diukur oleh maklum balas mereka terhadap kesesuaian dan kebolehgunaan borang-borang dengan menggunakan borang debrief. Kebolehpercayaan borang AIMS diukur daripada keputusan 39 peserta lain melalui *Cronbach's alpha* dengan menggunakan *IBM Statistical Packages for Social Science (SPSS)*

Versi 22. Kesahan kandungan adalah tinggi bagi AIMS (0.95) dan OMSI (0.98). Kesahan secara permukaan adalah tinggi kerana semua peserta menyatakan kedua-dua borang adalah jelas, sesuai dan mudah difahami. *Cronbach's alpha* AIMS (0.928) dan OMSI (0.675) adalah memuaskan. Jadi, AIMS dan OMSI versi Bahasa Melayu menunjukkan kesahan kandungan dan kesahan secara permukaan yang setara dengan versi original dan boleh dipercayai. Kajian ini memberi peluang untuk kajian masa depan untuk mengesahkan secara terperinci dan menggunakan kedua-dua borang penilaian ini untuk populasi normal dan populasi bermasalah komunikasi, bertujuan menjadikan terapi pertuturan dan bahasa yang berdasarkan muzik dengan lebih efektif.

ABSTRACT

The Translation and Adaptation of the Malay Version of the Absorption In Musical Responsiveness Scale (AIMS) and Ollen Musical Sophistication Index (OMSI): A Preliminary Study

The suitability of musically-based speech and language therapy can differ based on individual differences in musical responsiveness. Although musicians notably differ from non-musicians in musical responsiveness, classification of these two categories are also inconsistent. This study addresses the gap in assessing musical responsiveness and musical aptitude/ability by adopting and translating their original English assessment questionnaires to the Malay language. The Absorption In Musical Responsiveness Scale (AIMS) measures one's emotional susceptibility to music (musical responsiveness) and the Ollen Musical Sophistication Index (OMSI) measures one's musical aptitude and ability (musical sophistication). Malay translations of both questionnaires are necessary for its utility in determining the role of music in communication disorders and improving diagnosis, particularly among the predominantly Malay population in Malaysia. Translations consisted of standard forward and backward translations with an assembled expert panel. Content validity was measured by Content Validity Index (CVI) values, which assessed item relevancy in questionnaires. Face validity was determined by administering the questionnaires on 10 fluent Malay-speaking participants and their responses on the suitability and usability of both questionnaires in the debriefing forms. Internal consistency reliability was measured from another 39 participants with Cronbach's alpha value using IBM Statistical Packages for Social Science (SPSS) Version 22. Content validity was high for both AIMS (0.95) and OMSI (0.98) questionnaires. Face validity was good as all participants

found both questionnaires clear, suitable and understandable. Cronbach's alpha value AIMS (0.928) and OMSI (0.675) were also satisfactory. Thus, the Malay AIMS and OMSI questionnaires demonstrated good content and face validity comparable with their original versions and satisfactory internal consistency reliability. This study provides the preliminary basis for subsequent validation studies and its utilization in control and communication disordered populations, facilitating the efficacy of musically-based therapy in speech and language interventions.

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CHAPTER 1: INTRODUCTION

1.1 RESEARCH BACKGROUND

Music and emotion are often affected mutually. Emotion is often the motive for listening to music (Juslin & Laukka, 2004) while listening to music with different loudness or pitch (Coutinho & Cangelosi, 2011) or music types (e.g. violin which is voice-like) results in different emotions (Juslin, Harmat, & Eerola, 2013). Listening to music in different loudness, pitch level, pitch contour, tempo, texture and sharpness results in different emotions. This effect can be explained by the discrete approach, revealed through physiological cues (e.g. skin conductance and heart rate), and explained by the dimensional approach, revealed via subjective feelings (e.g. arousal and valence) of the listener (Jonna, 2012). Interestingly, a listener's personality also influences the emotion experienced. Those who enjoy listening to music are often more responsive to experiences, empathy, and show enhanced sensitivity to art and beauty. The increased musical responsiveness helps them experience more intense emotions to music (Jonna, William, Doris, & Tuomas, 2011). The positive relationship between emotion and music (Thompson, Schellenberg, & Husain, 2004) reveals the advantage of musical training in decoding speech prosody. This explains how the non-language (music) and language domains might overlap in processing the same emotion.

This positive relationship between emotion and music motivates researchers to further explore how specifically the emotional content within music is humanly refrained and expressed. According to Sun and Moore (2012), some researchers conceptualize musical expression into different word categories (e.g. neutral, disgust, panic) (Izard, 1977; Scherer, 1984; Zentner, Grandjean, & Scherer, 2008) or different dimension scales (e.g. degree of

pleasantness and unpleasantness, represented by valence; intensity of the emotion, which represented by arousal) approaches (Duffy, 1941; Russell, 1980; Schimmack & Grob, 2000). The emotional information is claimed to be carried in the music in the form of an icon, symbol or index (Juslin, 2013). In other words, the emotional content in musical expression are coded in a specific way. For example, emotional content is coded in the form of icons, which is similar with vocal expression and human movement; in the form of internal syntactic relationships or internal play within the music itself, such as timbre; or being coded associatively, which is related to certain specific experience or event.

The specific coding and conveyance of emotional content indirectly influences basic emotions and perceived emotions among humans. This unique characteristic of music leads to the music involvement for therapeutic purposes, especially in term of improving patients' emotional states and communication skills. Speech pathologists, who aim to improve communication skills among patients, are aware of the benefits of music in improving language and social interaction skills. Research has shown how musically-based speech and language therapy can improve a patient's speech and language performance compared to the traditional approach, which prioritizes verbal use in therapy. For instance, Sandiford, Mainess, & Daher (2013) compared the efficacy of Melodic Based Communication Therapy (MBCT) approach (involving music) with the traditional speech and language therapy approach in eliciting speech among autistic children aged 5 to 7. While both approaches resulted in improvement, more significant improvement was noted in the MBCT group.

The rapid peak improvement in that group might be due to the common affinity of the children for tasks pertaining to music and rhythm, as well as the beneficial of music on improving speech and language due to the similar neural processing mechanisms between

music and language. Moreover, the close ties between music and emotion may indirectly facilitate emotion regulation as well (Saarikallio & Erkkilä, 2007), leading to music exploration in therapy (Moore, 2013). This factor is particularly important for individuals who have marked difficulties with language, such as individuals with Autistic Spectrum Disorder (ASD), thus music may provide them an alternative communicative route. According to the American Speech-Language-Hearing Association (ASHA) 2014, ASD is a developmental disability with social, communication and language problems, along with restricted and repetitive patterns of behaviour. Therefore, the musical emotional aspect is particularly relevant for speech pathologists contemplating client suitability for musical therapy. This holds especially for the population with difficulties in verbally expressing themselves, as music may bypass this difficulty by providing an alternate, non-verbal emotional outlet for them (Choy, 2013).

Other than relating this musical feature among specific individuals such as ASD, the involvement of musical activities in speech therapy has also been conducted among post-stroke individuals with aphasia in order to improve social communication. Tamplin, Baker, Jones, Way, & Lee (2013) investigated the influence of music on the confidence, mood, participation motivation and communicative changes in 20 choir members, all of whom were stroke survivors with aphasia. Results showed subsequent score reductions in scales measuring mood/anxiety disturbances (General Health Questionnaire-12 (GHQ-12)), stroke impact on communication ability (Stroke Impact Scale-3 (SIS-3)), common thinking and memory and mood/fatigue (Visual Analogue Mood Scale (VAMS)). Other than that, thematic analysis from participants and their respective caregivers had higher ratings for themes showing musical benefits of increasing confidence (N=29), peer support (N=26) and

positive effect on mood (N=25), followed by motivation to participate (N=15) and changes to communicate (N=14).

These qualitative and quantitative results demonstrate how musical activity has a positive impact on the mood and social connectedness of these choir members, although the extent of the benefits may differ by individual. Therefore, measuring an individual's musical responsiveness would determine their suitability for and ability to maximize musical benefits, particularly among populations with communication problems. It will also facilitate speech pathologists in delivering individualized services. In this context, the Absorption in Musical Responsiveness (AIMS) is an assessment that play a role in assessing musical responsiveness. Its result sensitivity will be supported by the Ollen Musical Sophistication Index (OMSI) scale, which aims to differentiate the non-musician from musician due to different levels musical responsiveness in both groups. Thus, this leads to the formation of this study in translating the both questionnaires of measuring musical sophistication and responsiveness to a culturally-adapted language in Malaysia.

1.2 PROBLEM STATEMENT

As mentioned, individuals may differ vastly or subtly in musical responsiveness due to nature or nurture (Zatorre, 2003), age (Lima & Castro, 2011), perception (Kawakami, Furukawa, & Okanoya, 2014) and the communication disorder itself (Spackman, Fujiki, Brinton, Nelson, & Allen, 2005) which may in turn influence their receptivity to musical therapy. The intensity of involvement and type of music are also factors (Nagy & Szabó, 2004). High musical involvers tend to experience positive feelings, increased imagination, focused attention and more physical experiences compared to low musical involvers. Thus, comprehensively

measuring musical responsiveness would be helpful before considering musical component involvement in therapy settings.

However, there are limited assessment tools in determining musical responsiveness. Recognizing this dearth, Sandstrom & Russo (2011) created the Absorption in Musical Responsiveness Scale (AIMS) to objectively quantify and measure an individual's musical responsiveness. This 32-item self-reported questionnaire may thus be helpful in identifying individuals who would benefit maximally from music, an important aspect for speech pathologists to individualize clients' responses to musical speech therapy. Therefore, the use of AIMS in determining the role and influence of music will be very informative in planning treatment and therapy for this population in speech pathology.

Notably, musicians and non-musicians tend to experience and respond differently to music. For example, musicians experience enhanced spatial-temporal reasoning after listening to 10 minutes of Mozart's piano sonata (Mozart effect) while non-musicians experience the enhancement only after listening to silence (Cooper, 1997). As a result, their emotion are influenced differently, a finding of much interest to the communicative rehabilitation field. For example, Braithwaite & Sigafoos (1998) found only three out of five children with developmental disabilities have a higher percentage of appropriate communication responses in the condition with social and music antecedents compared to the condition with only social antecedents. Even though there is no reports on the musical training of these children, the result differences among them might suggest individual differences especially in terms of musical responsiveness. The three children who responds well to music might that have higher musical responsiveness. This indicates that not every child will finally benefit maximally in a musical environment, which might due to different musical experience and

responsiveness, and thus leads to different musically-based therapy effectiveness in improving child's social communication skills.

Additionally, the definition of 'musician' and 'non-musician' is debatable as the years of musical training commonly used as a yardstick for classification may not be representative. Güsewell and Ruch (2014) showed how musicians' frequency of recurrent, artistic activities either professionally (e.g. art therapist) or artistic leisure activity (e.g. attending concert) influences their well-balanced responsiveness profile, which is a more regulated overall responsiveness. For example, soloists had higher overall responsiveness than amateur musicians, followed by individuals without musical practice. Thus, the frequency of practice appears to be more crucial for a well-balanced responsiveness profile compared to musical occupation or professional practice. By considering this factor, it is important to classify musicians from non-musicians in a more inclusive and comprehensive way instead of relying only on years of musical training. In this case, Müllensiefen, Gingras, Musil, and Stewart (2014) developed the term 'musical sophistication' to indicate one's musical expertise and aptitude, and the Ollen Musical Sophistication Index (OMSI), a 10-item self-report questionnaire was developed to quantify this (Ollen, 2006). Hence, the OMSI could help speech pathologists identify those with savant musical talents (e.g. with unusual expert musical ability) from those who are not among individuals with communication disorders. Considering an individual's level musical sophistication in combination with musical responsiveness will also be more informative and accurate assessment. This will help speech pathologists in tailoring a treatment plan individualized to a patient's musical responsiveness, increasing therapeutic efficacy.

The current English version of AIMS and OMSI may not be well-suited for use in Malaysia due to cultural and linguistic differences, particularly in the more Malay speaking states like Kelantan as the questionnaires involve fairly descriptive sentences. It is thus important for the AIMS and OMSI to be translated to Malay to be used extensively in Malaysia, especially as there is no current Malay version of both questionnaires.

This study will focus on translating and adaptation (content validation, face validation and internal consistency reliability) of both questionnaires. This provides the initial basis for the next phase of studies to concentrate on the complete validation and normative study of the Malay AIMS and OMSI. While splitting up the study is not ideal, this arrangement was the best compromise given the current circumstances to ensure the quality of each study phase was not compromised. The OMSI is crucial to support the result interpretation of AIMS due to the differential effects observed between musicians and non-musicians. This forms the rationale of this study in translating both questionnaires simultaneously, instead of translating only one questionnaire.

1.3 RESEARCH OBJECTIVES

General objective: To translate and adapt the Malay version of the AIMS and OMSI questionnaires

Specific objectives:

1. To translate the AIMS and OMSI from English to Malay
2. To determine the content and face validity of the Malay version of AIMS and OMSI

3. To determine the internal consistency reliability of the Malay version of AIMS and OMSI

1.4 RESEARCH QUESTIONS

1. Is the translation of the Malay version of the AIMS and OMSI acceptable?
2. Is the content and face validity of the Malay version of the AIMS and OMSI comparable to the original version?
3. Is the internal consistency reliability of the Malay version of the AIMS and OMSI acceptable?

1.5 RESEARCH HYPOTHESES

1. The translation of Malay version of the AIMS and OMSI will be acceptable.
2. The content and face validity of the Malay version for the AIMS and OMSI will be similar to the original version.
3. The internal consistency reliability of the Malay version of AIMS and OMSI is acceptable.

1.6 STUDY SIGNIFICANCE

This study addresses the need for developing questionnaires adapted to the Malaysian context in assessing musical responsiveness and sophistication. Without this study, the Malay population with communication disorders may not fully benefit from musically-based speech and language therapy. Diagnostic accuracy affects treatment efficacy. To assume that music could influence every patient without further examining the extent of its benefits would be to ignore the contribution of individuals such as musical responsiveness on therapy efficacy

(Thaut, 1988). With the Malay version of the AIMS and OMSI, the role of music in the population with communication disorders can be better understood while improving their current diagnosis. This enables the effectiveness of therapy involving musical activities to be maximized, thus improving patients' interpersonal communication (Wigram & Gold, 2005).

CHAPTER 2: LITERATURE REVIEW

2.1 THE ROLE OF MUSIC IN THERAPY

Music and speech are distinct but at certain points, they are largely similar, especially in the acoustic aspects (Weninger, Eyben, Schuller, Mortillaro, & Scherer, 2013). Information conveying emotions from the 3 domains (speech, music, and sound events) were extracted and analyzed. High cross-domain consistency in the valence (e.g. positive, negative) and arousal (e.g. calm, lively) dimensions suggested that music and speech share similar acoustic characteristics for influencing emotion. For example, participants experienced more positive mood after listening to high-pitched music and speech, compared to low-pitched music and speech (Ilie & Thompson, 2006).

Based on a review by Yeaw (2001), most researches exploring the effectiveness of music therapy were weakened by their measurements. The trend of focusing on the assessment of external stimuli, without further exploring internal factors (e.g. patient responsiveness to musical stimuli) might obscure the desired outcome in the context of music's clinical utility. Considering internal factors help decide which approach should be used in therapy, for instance, including active or passive music components; as both produce significant qualitative differences. Even though both passive music therapy (e.g. listen to recorded music) and active music therapy (e.g. sing along) improved participants' behavioural, attention and reduced hostility, therapy approach was recommended to be selected based on the individuals' personality and clinical diagnosis (Montello & Coons, 1998). This highlights the importance of an assessment tool which is specific for choosing music therapy suitability in therapeutic settings. Following this, more promising assessment tools specific to music therapy were

developed. The Skille Musical Function Test (SMUFT) (Skille, 1995) identifies an individual's musical potential and psychological function, but still requires further validation.

Yeaw (2001) highlighted the potential benefits of music therapy on individuals with variety of problems, particularly in enhancing learning. This is likely due to the non-verbal nature of music which bypasses language barriers in the communicative disordered populations. Yeaw (2001) also urged future research to use advance therapy approaches, where the gap in literature exists. Adaptation of assessment tools are expected to refine the musically-based speech therapy approach and thus, provides another creative communication pathway. These observations provides the basis for the current study.

2.2 FACTORS THAT AFFECT MUSICAL RESPONSIVENESS

In terms of specific assessment factors influencing music therapy, musical responsiveness was more common. Music responsiveness is individualized as it tends to change with age (Lima & Castro, 2011). From young adulthood to older age, responsiveness to sad and scary music tended to decline, but remained stable for happy and peaceful music. This might be due to the age-related structural brain regions changes involved in emotion recognition or a positivity bias result of increased motivation and emotion regulation ability that comes with age (Lima & Castro, 2011). Individual differences in the context of musical responsiveness indirectly influences diagnosis making and therapy planning of speech pathologists. Since speech pathologists deal with patients from all ages, ranging from infants, children, adults to the elderly, having additional information of musical responsiveness assists in identifying a patients' strength to maximize speech therapy effectiveness. Based on these findings, sad

music would be hypothetically recommended for a child while happy and peaceful music for an elderly patient for emotional regulation.

The felt emotion (musically-evoked emotion), is sometimes different from the perceived emotion (emotion recognized objectively from surroundings or environments). According to Kawakami, Furukawa & Okanoya (2014), some individuals experience pleasant emotions but perceive sad emotion when listening to sad music. The ambivalent emotion (in this case, pleasant sadness) might result from the relieved anticipation of the upcoming music, reduced cognitive burden in music-listening mode instead of real situations, and the qualitative difference between the musical and the real life sadness (Kawakami, Furukawa & Okanoya, 2014). This condition was explored by the BRECVEMA Framework (Juslin, 2013) which will be discussed in the next sub-sections 2.4. In brief, this framework helps to differentiate 'aesthetic emotion', the induced emotion co-occurring with or after the aesthetic judgement of the music, from 'everyday emotion'. It explains the presence of 'pleasurable sadness' where the listener has 'mixed' or 'conflicting' emotion after listening to certain music. Vuoskoski, Thompson, McIlwain, & Eerola (2012) has also suggested that personality traits (such as openness to experiences, empathy or sensitivity to beauty and art) leads to the enjoyment of sad music.

Individual differences on musical responsiveness might be affected by the communication disorder itself. Spackman, Fujiki, Brinton, Nelson & Allen (2005) suggested that children with language impairment were less able to recognize emotions expressed from music accurately. Children with language impairment were less able to identify the expressed emotion from music compared to typically developing children. This might due to their lack of frequent social interaction resulting from language impairments. On the other hand, the

presence of a concurrent disorder such as ASD might affect musical responsiveness as well. Research showed individuals with ASD have intact appreciation to music (Thaut, 1988) despite having impaired emotion recognition from facial expression or intonation. In the study, children with ASD scored higher in playing xylophones in various scales, compared to normal and mentally retarded children. This indicates that children with ASD are more musically adept and might respond better to musical stimuli compared to visual and verbal stimuli. Although less able to detect emotion in other forms, they are surprisingly able to understand and recognize emotions conveyed by music by correctly pointing to pictures of corresponding facial expressions (Heaton, Hermelin, & Pring, 1999), although this may be limited to simple (e.g. happiness) rather than complex emotion (e.g. embarrassment) (Capp, Yirmiya, & Sigman, 1992). For speech pathologists, this information is valuable as it shows how music can be used to teach and regulate emotions in ASD children.

2.3 USE OF AIMS AND OMSI IN THERAPY

Ongoing evaluation and interdisciplinary planning for the special needs population could be efficiently carried out with an accurate diagnosis (Hadley, Hadley, Dickens, & Jordon, 2001; Claus, 1998), and almost everyone responds to music but the extent of responsiveness strongly varies as acknowledged in the education and rehabilitation fields (Thaut & McIntosh, 2014). As mentioned previously, the AIMS scale was developed to measure musical responsiveness, defined as "ability and willingness to allow music to draw them into an emotional responses" (Sandstrom & Russo, 2011). AIMS scores was found to correlate positively with emotional responses such as valence, which reflects its high sensitivity. It had been used in the study done by Reinhard, Marco, & Luisa (2010) in investigating the transfer effect from non-language communication domains (music) to language-based

communication skills in social recognition. In brief, AIMS would help speech pathologist to measure patient's responsiveness to musically-based speech therapy. This additional relevant information would ease the transferring of positive effect from music domains to language area, and thus contributing to the communication rehabilitation field.

Generally, most research have employed formal music training (e.g. years of private lessons) or year or level in a formal music program (e.g. music or non-music major) to differentiate musicians from non-musicians (Ollen, 2006). This finding might explain the weak differences between musicians and non-musicians in certain studies (Bigand, Vieillard, Madurell, Marozeau, & Dacquet, 2005). Therefore, Ollen (2006) suggested using and measuring musical sophistication to classify musician and non-musician more comprehensively instead of only depending on musical expertise. This measurement resolves the insufficient measurement on classifying musicians and non-musicians and constitutes the development of OMSI, a tool that measures the multi-faceted nature of musical expertise. Therefore, in this study, it was used alongside to ensure the musical responsiveness is measured accurately to improve the sensitivity of the AIMS assessment tool.

2.4 THEORY USED IN RESEARCH

The connectivity between music and emotion can be explained using the BRECVEMA Framework (Juslin, 2013). It is a multi-dimensional approach explaining the processing of musical responsiveness. This framework comprises eight mechanisms which are brainstem reflexes, rhythmic entrainment, evaluative conditioning, contagion, visual imagery, episodic memory, musical expectancy and aesthetic judgement, thus providing eight reasons why we experience a particular emotion while listening to music. Basically, this framework explores

the individual formation of musical emotion and explains the individual differences of musical responsiveness, which could be detected by the culturally-adapted AIMS and OMSI.

The BRECVEMA framework helps in the interpretation of individualized musical responsiveness observed in the study, and further understanding the role of music and emotion. First, it might be due to brainstem reflex, where the dynamic changes in music increase arousal or create surprise to listeners. Second, it might be due to rhythmic entrainment, where music changes the internal bodily rhythm of the listener (e.g. heart rate). Third, it might be evaluative conditioning, where the music pairs with certain condition (positive or negative stimuli) that induces musical emotion. Fourth, it might due to emotional contagion in that listeners instinctively feel the emotion expressed by music. Fifth, it might due to the visual imagery, where the listener can imagine a scene when listening to music. The sixth reason proposed episodic memory, where the listener can recall the personal memory of a specific event in his life evoked by the musical emotions. It could also be musical expectancy, where the music modifies delays when listener expect a continuation of music (Juslin, 2013).

The eighth mechanism is interesting. As briefly discussed in the previous sub-section, the first 7 mechanisms proposed in BRECVEMA develop the 'everyday emotion', while the 'aesthetic emotion' (e.g. pleasurable sadness) is explained by the eighth mechanism (aesthetic judgement). As noted by Juslin (2013), a musical piece can generate happiness in a listener via emotional contagion, but simultaneously sadden the listener due to associated episodic memories. Levinson (1997) suggested that this type of music tend to move listeners most, with tendencies of high musical responsiveness towards this type of music.

With this framework in mind, analyzing how musical responsiveness arises in individuals become clearer. Therefore, due to the differences, the step of translating the musical assessment tools, AIMS and OMSI, and adapting them on the Malay population is crucial. In therapy settings, this study facilitates the diagnosis-making of speech pathologists by utilizing both culturally-adapted questionnaires on patients with communication disorders. Going one step further, the questionnaires helps those with intact music appreciation and emotional recognition in music to break the communication barrier and build up their social network using the musical outlet, which is the final aim of the speech pathologist.

CHAPTER 3: MATERIALS AND METHODOLOGY

This was a cross-sectional study that received ethical approval from the Human Research Ethics Committee Universiti Sains Malaysia (HREC) (USM/JEPeM/14100375, see Appendix A), and consent from authors of the original AIMS and OMSI questionnaires (see Appendix B and Appendix C). This study was completed as illustrated in Figure 3.1 (flowchart), which involved standard forward translation, backward translation, panel discussion and adaptation (content validity, face validity and internal consistency reliability) of the translated questionnaires. Content validity was quantified using the Content Validity Index (CVI), while face validity was assessed by administering the questionnaires with 10 participants recruited via convenient sampling in accordance with recommendations from a statistician and the World Health Organization (WHO, 2014). Internal consistency reliability was examined statistically using data from a separate group 39 participants, and quantified with Cronbach's alpha calculation.

3.1 MATERIALS

3.1.1. AIMS

The AIMS measures an individual's ability and willingness to allow music to draw them into an emotional experience (Sandstrom & Russo, 2011). The original English version of AIMS has never been translated into other languages. It consists of 34 questions which requires participant to indicate the agreement on each statement on a 5-point Likert scale (1 as strongly disagree and 5 as strongly agree with the item).

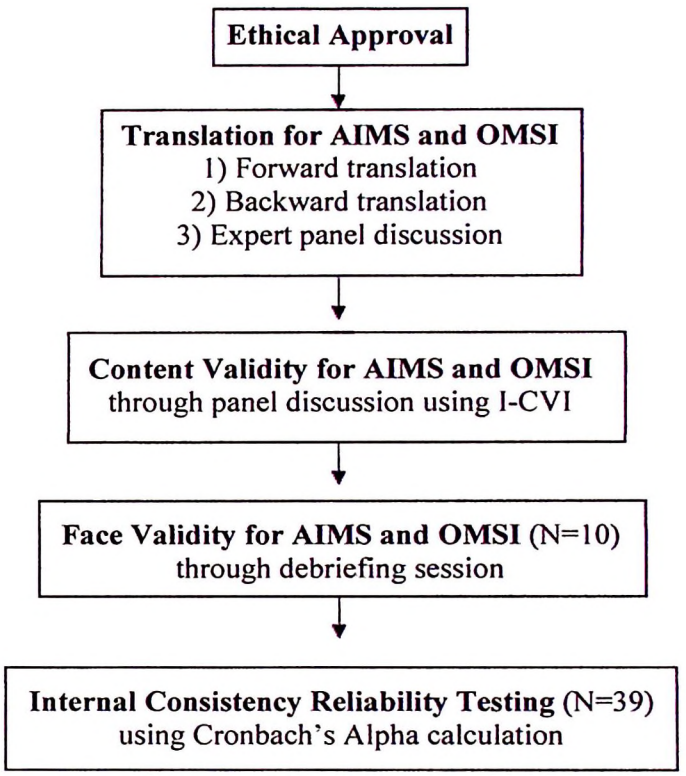

Figure 3.1 Flowchart showing the methodology in conducting this study, starting from translation, content and face validation, followed by internal consistency reliability testing

A maximum and minimum score of 170 and 34 can be obtained respectively, with categorization as low (scores <85) or high musical responsiveness (scores >85) (see Appendix D for a copy of the scale).

3.1.2. OMSI

The OMSI measures musical sophistication comprehensively by considering multiple facets of musical expertise (Ollen, 2006). There are 10 questions, 4 out of which requires numerical answers, with being multiple-choice questions. The maximum score is 1000. The calculation is done with an online algorithm (The Marcs Institute, n.d.). Scores below 500 are categorized as having low musical sophistication and those above 500 as having high musical sophistication (see Appendix E for a copy of the scale).

3.1.3. SCREENING FORM

The screening form was based and adapted from Choy (2013) to suit the requirement of this study. It determines participant eligibility for this study. It was constructed with considerations on handedness, gender, race, education status, number of language used, medical conditions, alertness and mood status. This ensures the recruitment of participants who are aged between 18-40 years old, non-musicians, literate and are native or fluent Malay speakers. Those who are musicians, have had brain injury and serious concussions, has history of neurological, psychiatric, psychological, learning and language problems, history of alcohol or drug abuse and have been completed or withdrawn from this study previously will be excluded (see Appendix F for a copy of the items).

3.1.4. DEBRIEFING FORM

The debriefing form was based and adapted from Choy (2013) to suit the requirement of this study. It was used to assess the face validity of AIMS and OMSI by knowing the participant responses on the suitability and usability of both questionnaires. This evaluates participants' understanding on all items in both questionnaires and addresses any problem encountered during the study. It also could provide insights on how music affects emotion among individuals and its role in emotion. There are 14 items consist of their musical experience, environment, perception, genre and mood condition (see Appendix G for a copy of items).

3.2 METHODOLOGY

3.2.1. FORWARD TRANSLATION

The original English version of AIMS and OMSI questionnaires were translated to Malay by two bilingual speakers fluent in Malay and English (author and supervisor), with one of them being a researcher familiar with the subject area (supervisor). Translations focused on conceptually equivalent rather than literal translations without excessive deviation from the original versions. Simple, clear and concise sentences and layman terms were prioritized, with minimal use of technical jargon.

3.2.2. BACKWARD TRANSLATION

The forward-translated AIMS and OMSI questionnaires were then back-translated from Malay to English by a bilingual linguist from the university's School of Languages, Literacies and Translation. The linguist was blind to the study, fluent in Malay and English and had Malay as a native language. The translation certificate is listed in Appendix H.

3.2.3. CONTENT VALIDITY

Content validity was defined as an instrument measuring (sufficiently) the intended content (Polit & Beck, 2006). It is quantified using CVI with a Likert Scale of 4 (1 being not relevant and 4 being highly relevant). It is measured in two ways, which are at item-level using Content Validity Index for Item (I-CVI), and scale-level using Content Validity Index for Scales (S-CVI). I-CVI considers each expert to rate each individual items in both questionnaires, while S-CVI looks at the overall scale of questionnaires, by calculating how many items are rated as 3 and 4 by all the experts. It is extended and presented in two ways, which are the Content Validity Index for Scales per Universal Agreement (S-CVI/UA), and Content Validity Index for Scales (Average) (S-CVI/Ave) or Average Congruency Percentage (ACP). S-CVI/UA is the proportion of items that all experts rate as 3 or 4. It represents how many items is perceived as quite and highly relevant by all the experts in measuring musical responsiveness. S-CVI/Ave, ACP is the average proportion of items that rated as 3 or 4 among the experts. It is calculated in three ways 1) averages the quite relevant and highly relevant items across the experts, 2) divides the I-CVI by total number of items, 3) divides total number of quite and highly relevant items by total number of items (Polit & Beck, 2006). I-CVI was selected to represent the content validity of AIMS and OMSI in this study as through this measurement, each item in both questionnaire would be taken into consideration.

Content validation was carried out among the 4 member panel assembled, which consisted of the author and supervisor involved in forward-translation, the linguist involved in backward-translation and a speech-language pathologist; thus having panel expertise in the fields of neuroscience, linguistics and speech and language pathology. Discussion took place

in the Speech and Language Clinic over a single two hour session, which was audio recorded for reference purposes. Panel members were briefed about the study purpose so that all were clear on the context on which discrepancies would be based and resolved. The AIMS was discussed before the OMSI due to its length. Questions were rated using CVI among panel members on translations for content validity measurement.

3.2.4. FACE VALIDITY

The face validity was defined as the appearance of the instrument and how well does participants view that it is suitable and acceptable to be used (Thomas, Hathaway, & Arheart, 1992), in terms of the clarity of word and formatting (DeVon, Block, Moyle-Wright, Ernst, Hayden, & Lazzara, 2007; Zamanzadeh, Rassouli, Abbaszadeh, 2014). It was assessed through pre-testing the translated instruments on target population. Face validity was quantified by considering participants' responses if they understand the questions being asked, and whether those questions truly reflect their musical responsiveness (for AIMS) and musical sophistication (for OMSI) in the debriefing session. The specific questions in the debriefing form that covers this aspect are '*adakah anda faham soalan yang dibagi?*' and *'adakah muzik dapat mempengaruhi perasaan anda?'*.

3.2.4.1. Participants

The sample size for face validity (10 participants, 5 males) was obtained in accordance with recommendations from a statistician and the procedure from World Health Organization (WHO, 2014). The age range is 21 to 39 years old (mean= 30 years old). The group consisted of 60% Malay (N=6), 10% Chinese (N=1), and 10% Indians (N=1), with 6 of them having an undergraduate Degree as education background. All participants were right-handedness.

Malay language was their either first language (N=8) or second language (N=2). (see Appendix I for participant information).

The AIMS scores ranged from 83 to 118 (9/10 participants had high AIMS scores) and the OMSI scorings ranged from 12 to 161 (10/10 participants had low OMSI scores).

3.2.4.2. Procedures

Testing was conducted at a place comfortable for each participant, who were individually tested in separate sessions ranging from 30-40 minutes. Prior to the study, the study objective was explained and participants' consent were obtained to ensure voluntary participation (see consent form in Appendix J). Participant eligibility was confirmed by filling out the screening form, followed by the translated OMSI (see Appendix L) and AIMS questionnaires (see Appendix K). A debriefing session using the debriefing form was conducted at the end to address any questions and being particularly crucial in assessing face validity in this study.

3.2.5. INTERNAL CONSISTENCY RELIABILITY TESTING

The internal consistency reliability was defined as the degree where the responses are consistent across the items in the construct (Kline, 2011). It measures if items in both AIMS and OMSI questionnaires are measuring the same concept, which are musical responsiveness and musical sophistication respectively. The sample size for AIMS and OMSI internal consistency reliability testing (39 participants) was calculated statistically using StatsToDo, with expected Cronbach's alpha 0.8 and lower limit of Cronbach's alpha 0.6, as recommended by the statistician. The probability of type I error (α) was set at 0.05 and power ($1 - \beta$) was 0.8. The number of items for AIMS is 34 while for OMSI is 10.

The age range for population is 20 to 24 years old (mean= 22 years old). The group consisted of 55% Chinese (N=22), 32% Malay (N=12), and 13% other races (e.g. *Bumiputera*) (N=5), with all of them having an undergraduate Degree as education background. Analysis of their demographic data is listed in Table 3.1.

The AIMS scores ranged from 69 to 140 (32/39 participants had high AIMS scores) and the OMSI scorings ranged from 13 to 487 (39/39 participants had low OMSI scores). Additionally, the participants' perception in music listening was investigated and linked with BRECVEMA framework to understand the role and influence of music in those participants' emotion (see Appendix M(1) for participant information).

The procedures was similar to the procedures in face validity as discussed previously (in the section 3.2.4.2). Their scorings for each 34 items (AIMS) and 10 items (OMSI) were calculated using Cronbach's alpha value in IBM Statistical Packages for Social Science (SPSS) Version 22. For the OMSI, minor formatting adjustments were made to facilitate the computation within SPSS after consulting the statistician. During data analyzing, the two dependent items (item 6 and 7) were combined into one item and this results in the reduction of number of item from 10 to 9.

Some experts suggested that the Cronbach's alpha value should be at least 0.9 for an instrument used in clinical setting (Nunnally & Bernstein 1994), while some recommended that it should more than 0.7 for a new instrument (DeVellis 1991; DeVon et al. 2007). In this study which focuses more on adapting rather than validating the questionnaires, 0.7 was a more appropriate cut-off point level in this study as the AIMS and OMSI are new instruments. Therefore, a Cronbach's alpha value surpassing 0.7 is considered to have good internal consistency reliability.