# HONG KONG BAPTIST UNIVERSITY

A Study on the Relationship between Alexithymia, Perceived Stress, Emotional Schema and Multimodal Emotion Recognition Ability in Hong Kong.

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# DECLARATION

I declare that the work in this honours project is original except where indicated by special reference in the text.

Any views expressed in the honours project are those of the author and in no way represent those of the bachelor degree programme in Psychology, Hong Kong Baptist University.

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## Abstract

This study examined the relationship between alexithymia, perceived stress, emotional schema, and multimodal emotion recognition. Specifically, I looked at the relationship between alexithymia and multimodal emotion recognition, perceived stress and multimodal emotion recognition, emotional schema and multimodal emotion recognition, and perceived stress and emotional schema. 96 Hong Kong participants (35 men and 61 women, mean age = 22.4) were invited to complete three self-report scales (TAS-20, PSS-14 and LESS II) and a multimodal emotion recognition test (GERT-S). Results showed that neither alexithymia nor emotional schemas predicted multimodal emotion recognition, while perceived stress was positively correlated with multimodal emotion recognition. Furthermore, there was a significant and positive relationship between alexithymia and perceived stress, perceived stress and emotional schemas, and alexithymia and emotional schemas. These results are consistent with the hypothesis that perceived stress can positively predict maladaptive emotional schemas. The current findings suggest that alexithymic individuals may have intact multimodal emotion recognition ability, perceived stress has a positive impact on multimodal emotion recognition, and emotional schemas have no effect on multimodal emotion recognition. The lack of an effect of emotional schemas on emotional recognition may reflect that emotional schemas may only affect people's perception of emotions but not the sensitivity to recognize them. On the other hand, greater perceived stress may induce more maladaptive emotion schemas. The present findings provide insights to future research about emotion recognition and factors that are related to it.

# 撮要

是次研究想探討述情障礙、感知壓力、情緒圖式及多模態情緒辨識之間的關係，並着手探討四方面: (1) 述情障礙和多模態情緒辨識的關係、(2) 感知壓力和多模態情緒辨識的關係、(3) 情緒圖式和多模態情緒辨識的關係 以及 (4) 感知壓力和情緒圖式的關係。是次研究共有 96 位參與者 (61 女 35 男) 應邀參與研究，參與者平均年齡為 22.4 歲。參與者被邀請於網上填寫 3 份量表及進行一個測試，當中包括多倫多述情量表、壓力知覺量表、雷希情緒圖式量表 II 及日內瓦情緒辨識能力測試。結果表明，述情障礙及感知壓力不能預測多模態情緒辨識，而感知壓力就能夠正面預測多模態情緒辨識。除此之外，更發現述情障礙和感知壓力之間、感知壓力和情緒圖式之間，以及述情障礙和情緒圖式之間有着明顯的正面關係。是次研究的結果與我們第四個假設一致，並與其他假設不一致。主要結論包括: (1) 具述情障礙的個體可能有健全的多模態情緒辨識能力、(2) 感知壓力對多模態情緒辨識有正面影響、(3) 情緒圖式可能只會影響個體的情緒感知而不會影響個體對別人情緒的敏感度，以及 (4) 越大感知壓力越能誘導更多不健康的情緒圖式。是次發現能夠為未來與情緒辨識及其影響因素相關的研究提供新方向，是次研究將會就着結果進行討論及建議未來研究方向。

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## List of Tables

Table of Contents

# CHAPTER ONE

## Introduction

### Background and Objective

In daily life, during conversation, we may “feel” someone’s emotion. For example, we simply “feel” someone’s sadness and know they are sad. In common sense, we all have emotions and we can have different emotions under different circumstances. However, how do we perceive emotion? Nowadays, evidence from psychological research suggests that we have inborn emotion recognition abilities which can be strengthened with experience. “Emotion” has aroused psychologists’ interest long ago in the research field, however, it is hard to be studied. Nevertheless, emotion-related topics are worth studying because of their importance in people’s social life.

Nowadays, people are using messaging apps or social media to communicate more often than before, which puts them into a situation where face-to-face emotional communication has become less important. When we are texting someone, we may just send an emoji to that person to express our emotion with a single tap. However, humans are social animals in nature,  and we need social relations and communication even under the Era of technology and years of pandemic. Because of the change in the way people communicate and understand emotions, new research is needed to understand the implications of such a change such as factors that impact emotion recognition ability.

Alexithymia is highly related to emotion recognition. Alexithymia is suggested to be a personality trait that refers to the inability to describe and identify emotions. People with alexithymia have difficulty in identifying and describing emotions experienced by themselves. It is found that alexithymia is positively associated with impaired facial and auditory emtoion recognition (Jongen et al., 2014; Ola & Gullon-Scott, 2020; Wang et al., 2021). Although it was found that alexithymia is negatively correlated with the total emotion recognition score

over dynamic emotional stimuli which was measured by the Emotion Recognition Assessment in Multiple modalities (ERAM) (the total score contained the scores from video only, audio only and video-audio items) (Laukka et al., 2021), it is still unclear about the relationship between alexithymia and multimodal emotion recognition as the score from video-audio items was not used solely in the study. It provides us a room to study the relationship between alexithymia and multimodal emotion recognition.

One of the social factors that can impact emotion recognition ability is stress. Research in the western countries shows mixed findings on what impact stress has on emotion recognition ability. There are studies that show that stress negatively impacts emotion recognition (Hänggi, 2004), stress enhances the recognition accuracy of certain emotions such as happiness but show no effects over the recognition of disgust (Barel & Cohen, 2018). Interestingly, a study conducted in Hong Kong found that perceived stress impairs disgust facial emotion recognition (Chen et al., 2017). It seems that there is no consensus about how stress may affect facial emotion recognition. However, it is clear that stress does affect emotion recognition. On the other hand, it was found that stress impair auditory emotional recognition such as impaired emotional recognition of prosody of anger and happiness (Paulmann et al., 2016). Since most previous research studied the effect of stress on unimodal emotion recognition only, it is unclear how stress may affect multimodal emotion recognition. Therefore, it is crucial to investigate the stress effect over people's multimodal emotion recognition.

Other than stress, another factor that may influence emotional recognition is emotional schema. Schema is a cognitive concept stored in our brain to help us interpret information, which affects how we view different things cognitively in terms of memory (Brewer & Nakamura, 1984). When we are young, we may be told that something with two wings that fly in the sky is a bird. Afterward, when we see a plane flying in the sky, we may

recall this memory and may think that it is a bird as it has two wings and is flying in the sky as well. This kind of impression-like memory is schema. Schema can affect our emotion recognition such as caregiving schema enhances facial emotion recognition regardless of the facial appearance-based inferences and early maladaptive schema (e.g. abandonment) predicts impaired reocgnition of facial happiness (Colonnello et al., 2019; Csukly et al., 2011). However, little is known about the effect of emotional schema over emotion recognition. Research has demonstrated that emotional schema may be related to emotion recognition. According to Leahy (2002), “simplistic view of emotion” is one of the emotional schemas that one can’t understand the presence of complicated feelings and have a low level of emotional awareness. This is reflected by items like “When I have conflicting feelings about someone, I get upset or confused”. It was found that higher emotional awareness positively predicts better emotion recognition (Wright et al., 2018). In the study of Castro et al. (2015), it was found that parent’s belief about emotions influences their children’s emotion recognition in a problem-solving discussion setting is related to children’s emotion recognition. In their study, children and their parents were invited to watch several video clips, and report the emotions they felt and judge what the others felt during watching different video clips. The results showed that parent’s belief that “emotions are dangerous” significantly and positively predicted children’s recognition of parent’s emotions. It was discussed that children learn their parent’s emotional beliefs, which then affects the development of their emotion recognition skills. In the study of Hagan et al. (2020), it was found that teachers’ belief that “children’s anger was valuable in the school setting” was significantly and positively correlated with teachers’ recognition accuracy over children’s anger expressions, while their belief that “children’s anger was harmful” didn’t predict their recognition accuracy over children’s anger expressions. According to Leahy (2002), “guilt” is an emotional schema that one should not have certain feelings. It relates to the teacher’s

belief in the study of Hagan et al. (2020) semantically as both share a similar value that "should or shouldn't have certain emotion". However, none of these research have directly used emotional schema as the predictor variable to predict emotion recognition. Therefore, it is important to study the relationship between emotional schema and multimodal emotion recognition.

Apart from studying emotion recognition, it is crucial to study the relationship between stress and emotional schema. Stress is related to emotional schema. It is suggested that interpersonal schemas can predict stress generation, thus predicting depressive symptoms (Eberhart et al., 2011). This study partially supported the diathesis-stress model and promoted the model to the understanding of depression's etiology. Is it also possible that emotional schema can predict stress level as well? It is found that emotion schema has an indirect impact on post-traumatic stress symptoms through emotion regulation (Mazloom et al., 2016). Moreover, it is found that coping styles are related to emotional schemas such as the emotional schema "higher values" negatively predicted emotion-focused coping (Bayazi et al., 2014). Also, it was found that emotional schema is related to certain mental disorders as well such as the emotional schema "numbness" negatively predicted depression (Bayazi et al., 2014; Leahy, 2002). By the diathesis-stress model, it is suggested stress may be a predictor of mental disorder (Zuckerman, 1999). However, it is still unclear about the relationship between stress and emotional schema and it is worth studying.

In light of the research gaps and study motivations mentioned, this research would study the relationship between emotional schema, perceived stress, alexithymia and multimodal emotion recognition ability.

**Research Questions**

1. What is the relationship between perceived stress and multimodal emotion recognition?

2. What is the relationship between emotional schemas and multimodal emotion recognition?
3. What is the relationship between alexithymia and multimodal emotion recognition?
4. What is the relationship between perceived stress and emotional schema?

# CHAPTER TWO

# Literature Review

## Emotion

### *Physiological Response*

Emotion involves physical response. Singer and Schachter (1962) define emotion as "a state of physiological arousal and of cognition appropriate to this state of arousal". Through autochthonous neural structures, our brains actively generate and maintain arousal (Jones, 2003). Physiological arousal is the biological activation of our brain and body that indicates our body wakefulness such as increased electroencephalogram (EEG) activity and heart beat rate. High arousal emotion includes joy and anger, and low arousal emotion includes calmness and sadness (Lim, 2016). For example, if we are burnt by hot water, we will pull back our hand immediately and may scream. In the process, we felt pain firstly, and felt angry after that. Hence, our body aroused and we pulled off our hands.

### *Theories of Emotion*

**Two-factors Theory of Emotion.** According to Schachter's two-factors theory of emotion (Manstead & Wagner, 1981), an individual firstly has a physiological arousal. Afterward, they label it with a particular emotion and feel the emotion as a consequence. The labelling requires the individual's interpretation and past experience about different levels of arousal and different emotions, and it presumes that a physiological arousal precedes the production of emotion. It reflects that the same physiological arousal can be labelled with different emotions by different people due to subjective interpretation of different levels of arousal.

**Appraisal Theory.** A lot of appraisal theorists propose that there is a cognitive appraisal that precedes the production of a single emotion or multiple emotions. It is believed that people's emotions arise from their perception and understanding of the circumstances

around them or their imagined circumstances (Ellsworth & Scherer, 2003). It means that an individual's appraisal of circumstances changes their emotions elicited (Scherer, 1984). Appraisal of the environment varies with the past experience and cognitive inference of an individual, which explain why people may have different emotions or the same emotion with different intensity in the same situation. For example, people who are close to the dead person in a relationship tend to cry harder at a funeral. People who are less intimate to the dead person may still feel sadness, but not that intense like them.

## Expression of Emotion

In this study, emotion recognition will be studied and thus understanding how emotion is expressed is important. In our daily lives, there are mutiple ways to express emotion.

### *Facial Expression*

We express emotion through facial expression in daily life. Emotion is agreed to be largely universal with only little cultural differences between places (Elfenbein & Ambady, 2003), even though there is no fixed relationship between facial expression of emotion and its meaning because of cultural differences (Ekman, 1992; Lim, 2016). In the study of Ekman et al. (1987), photographs of different facial expressions were shown to participants in random order and participants were asked to judge the emotion of the facial expression from one of seven emotions provided, by rating the intensity of any emotion they perceived. It was reported that people of different cultural backgrounds tend to label the same expression with the same emotion without any discussion or interaction with each other. At the same time, it was also found that secondary strongest rated emotions were made by the participants for disgust, anger and fear expressions, but not for happy expressions and also very few for either surprise or sadness expressions.

### *Vocal Expression*

The voice or tone of the word itself can express emotion. Emotional prosody is a set of speech acoustic parameters directly influenced by emotions such as segment, pause duration and mean amplitude (Belin et al., 2004). Non-speech interjections such as laugh and cry are also the auditory equivalent of facial emotional expressions. In the study of Bryant and Barrett (2008), it was found that Amazonian Ecuador-born Shuar hunter horticulturalists were able to reliably identify angry, happy, sad and fearful vocalizations produced by American-born English speakers by matching spoken utterances of emotions to pictured facial expressions of emotions. It suggests that vocal expressions of basic emotion categories present themselves in a similar way across quite different cultures which demonstrates the universality of vocal emotion recognition in adolescents.

***Gesture Expression***

Gesture is regarded as a way to express emotions. Emotional body gesture is an element of body language which is an important type of human social behavior (Noroozi et al., 2018). In the study of Kipp and Martin (2009), it was found that handedness is strongly correlated with emotion categories where hostile correlates with right hand and relaxed correlates with left hand. The result demonstrated positive correlations between left hand and high pleasure, and right hand and low pleasure. It was found that ready-to-attack gesture with forward directed movement discriminates irritation and hot anger from panic, fear and anxiety (Dael et al., 2012; Frijda, 1986). In the study of Balomenos et al., (2004), different gestures with different amplitudes were found to be related to some emotions such as high frequency hand clapping related to joy and lifting hand at low speed related to disgust.

***Posture Expression***

Posture is another body language that is used to express emotions. It has been considered as an expressive medium for the personality of oneself and as a channel of conveying certain types of information such as emotion to others (Kudoh & Matsumoto,

1985). Ekman (1965) suggested that postures could be used to communicate gross types of emotions such as like and dislike. In the study of Kapoor et al. (2007), a relationship between a “pre-frustration” state and postural movement was found in a computer-based tutoring environment. Atkinson et al. (2004) demonstrated that basic emotions are readily recognizable from body movements even when static body postural information is minimised by using point-light displays. It was found that either full-light or point-light displays can convey recognizable emotional information. Also, static displays of body posture were less efficient than dynamic displays in conveying emotional information.

## Emotion Recognition

In this study, emotion recognition will be studied and thus understanding how emotion is recognized is important. In our daily lives, there are mutiple ways to recognize emotion.

### *Facial Emotion Recognition*

We recognize emotions from facial expressions. Our brain has areas for recognizing emotions and research shows that different brain areas are required to recognize different emotions. It is found that the right anterior cingulate cortex and left anterior insula are both specifically involved in producing disgusted emotion and experiencing disgusted emotions from observing others’ disgust (Wicker et al., 2003). Damage to brain areas that are required for emotion recognition can impair an individual’s performance of facial emotion recognition. It was found that participants with difficulty in facial emotion recognition might be confused with different emotions when they were asked to judge an emotion with options provided such as confusing disgust with anger (Calder & Young, 2005). Moreover, neural structures for facial expression recognition are distinctive from other brain mechanisms. It was found that brain injury in humans can produce selective impairments in the recognition of facial identity or facial expression (Calder & Young, 2005).

### *Vocal Emotion Recognition*

Apart from facial expression, voice has been proven to be containing affective information for people to communicate with and understand each other (Scherer, 1995). Our brain has certain areas for processing vocal sound including the auditory cortex which is selective to human voice (Belin et al., 2000; Belin et al., 2004). Studies demonstrated the greater activation of the right inferior prefrontal cortex and right temporal lobe when attention is paid to emotional prosody (Buchanan et al., 2000; George et al., 1996; Mitchell et al., 2003; Wildgruber et al., 2002). It was found that amygdala and anterior insula were found to be involved in non-verbal and verbal vocal emotion recognition (Morris et al., 1999; Phillips et al., 1998). On the other hand, higher accuracy is shown in vocal emotional recognition when recognizing vocal emotion in native language, and the phenomenon is universal. In the study of Chronaki et al. (2018), a large improvement in vocal emotion recognition occurs when doing the native language version of vocal emotion recognition task during adolescence, while vocal recognition of anger didn't improve with age for the non-native languages version of task. Adolescents recognized sad and angry voices more accurately compared to fear and happiness. The results support the in-group advantage for more accurate vocal recognition of emotion when listening to native language.

### *Gesture Emotion Recognition*

Gesture emotion recognition is barely being studied, but there is evidence that it is inborn within us. In the study of Prochnow et al. (2013), it was found that there was bilateral activation of the thalamus, inferior frontal gyrus (IFG) and inferior temporal gyrus (ITG) during the advanced stages of gesture observation. Moreover, the right premotor cortex, the left dorsal medial frontal cortex (DMFC), the right precuneus as well as the left postcentral gyrus were activated during affective gesture observation. In the study of Gallagher and Frith (2004), it was found that the right superior temporal sulcus is activated by the recognition of

expressive gestures (which convey emotional information) during watching videos of people miming expressive gestures compared to watching a null video of people posing in a neutral position.

### *Posture Emotion Recognition*

Posture emotion recognition is another important component in identifying others' emotions. In the study of Jastorff et al. (2015), it was found that posture emotion recognition involves a network that consists predominantly of neural regions located within the salience network and the default mode network. Also, there is significant classification of emotional posture shown within the action observation network (AON). Posture was found to be less effective in conveying fear emotion than facial expressions during the recognition task due to the ambiguity of body expression in the study of Stekelenburg and Gelder (2004). It was suggested that the absence of facial expression makes the body expression providing weak cues about related emotion. Also, an inversion effect was shown for body expressions as well, which suggests that posture and facial emotion recognition may rely on a similar neural mechanism.

## Alexithymia

Alexithymia refers to an individual having a difficulty to identify and describe one's own emotion, demonstrating a certain style of interpersonal relationships and lacking fantasy life (Lesser, 1981). Alexithymia is found to be related to emotion recognition. In the study of Jongen et al. (2014), it was found that healthy subjects with high degree of alexithymia demonstrated significantly lower emotion recognition scores and relatively less activity in some brain areas associated with alexithymia (anterior cingulate cortex) and the facial perception's extended system concerned with the aspects of emotion (insula, striatum, amygdala). Wang et al (2021) demonstrated that alexithymic individuals have impaired auditory emotion recognition but intact emotional multisensory integration (integrate

emotional information from multiple channels). However, Cortes (2013) demonstrated that high and average alexithymia groups recognize emotions less accurately than the low level group visually, but there are no group differences in the bimodal (visual and voice) and voice-only tasks between all groups. In the study of Laukka et al. (2021), Emotion Recognition Assessment in Multiple Modalities (ERAM) was used to test the emotion recognition accuracy (ERA) of participants. It contained 12 emotions and trials with different conditions including video only, video with audio and audio only. The total score of ERAM contains the scores from video only, audio only and video-audio items. It was found that the total score of ERAM is negatively correlated with alexithymia, either when the test was done in the laboratory or online. However, it is unclear about the relationship between alexithymia and multimodal emotion recognition. In the study of Ola and Gullon-Scott (2020), 125 female participants were asked to conduct a questionnaire (measured alexithymia and autism spectrum condition (ASC)) and a short version of Geneva Emotion Recognition Test (GERT-S) online. It was found that people with higher alexithymia and either higher or lower ASC severity were positively correlated with poorer facial emotion recognition accuracy but not recognition speed (Ola & Gullon-Scott, 2020). It was reasoned that in the alexithymic and autistic population, having greater difficulty in externally oriented thinking (EOT) and identifying one's own feelings is strongly related to lower facial emotion recognition accuracy. Although the article stated the GERT-S as a facial emotion recognition (FER) test, it is actually a multimodal emotion recognition test and this article provides insight for the relationship between alexithymia and multimodal emotion recognition. However, it is still unclear about the relationship between alexithymia and multimodal emotion recognition as the sample population included female participants only.

**Perceived Stress**

Stress is a kind of non-specific response of our body to any demand when we lose our equilibrium (Fink, 2010; Selye, 1956). Stress can affect emotion recognition. Paulmann et al. (2016) demonstrated that stressed participants performed worse in an emotional prosody recognition task (less accurately detected the emotional tone of the speakers) than non-stressed participants. Stressed participants had impaired auditory emotion recognition of anger, disgust, fear and happiness while they had better performance in recognizing neutralness and surprise. In the same study, it was also found that negative emotions expressed by stressed speakers are generally less accurately recognized than the same emotions expressed by non-stressed speakers. In the study of Hänggi (2004), control group, support group and stress group were asked to do an Internet-based visual facial emotion recognition task. Negative feedback was given to the participants in the stress group during the experiment. It was found that stressful people performed poorly in the emotion recognition task. A similar result was found in the study of Herridge et al. (2004) where low-hostile men were stressed by ice-cold water, and recognized facial expressions poorer than non-stressed participants. A study conducted in Hong Kong was examining the relationship between Internet addiction and deficits in facial expression recognition, and the mediating role of perceived stress (the stress scale included stressful experiences college students commonly have) within this relationship (Chen et al., 2017). Morphing facial expressions were used to test the facial expression recognition threshold (FERT) of participants when recognizing different facial expressions. Threshold refers to the emotional strength expressed by a facial expression and higher threshold is needed to recognize a facial expression refers to an individual having more difficulty in recognizing a facial expression. The study demonstrated a positive correlation between perceived stress and FERT when recognizing disgust, sadness and surprise facial expressions. However, not all studies showed that stress impair emotion recognition. Barel and Cohen (2018) found that stressful people performed

well in recognizing happiness, surprise, neutralness and anger facial expressions. On the other hand, they had decreased performance in recognizing fear facial expression and performed normally in recognizing sadness and disgust facial expression. In the study of Bland et al. (2022), the impact of social isolation due to Covid-19 upon social and emotional cognition was examined. It was found that reduced contact with friends during Covid-19 social isolation (CSI) predicted better recognition of sad expressions. Although the research was about CSI, it was suggested that social isolation predicted stress level in the same paper which provided us insight about the impact of stress upon emotion recognition.

Interestingly, there is barely any study about the relationship between perceived stress and multimodal emotion recognition. Therefore, it will be beneficial to study it.

**Emotional Schemas**

We have different concepts and interpretations about emotions. According to Leahy (2002), emotional schema is our interpretation of our emotions and our strategies against unpleasant emotions. According to Leahy's (2002) cognitive model of emotional processing, the concept of cognitive priming is involved in the generating of emotional schemas. Our emotional schemas are influenced and shaped by our past experiences. When certain emotions are bonded with negative experiences, negative beliefs will then be produced against the emotions. For example, men were not allowed to cry in the Chinese tradition as Chinese think that crying indicates fragileness and crying men might lose their faces due to this reason. Therefore, when a Chinese man feels sad, they tend to feel shameful and not to accept such feelings. Or, in the study of Sirota et al. (2018), medical students with maladaptive rules about one's emotional experiences tend to suppress their emotions including negative emotions. They believe that expressing emotions is wrong and shameful due to the ethical standards in the medical community. According to Leahy's study (2002), the emotional schema in these two cases is also called "guilt". However, this schema may

affect an individual's interpersonal relationship where they may hide their true feelings from others. This kind of emotional schema is badly affecting the functioning of an individual and will be stated as maladaptive emotional schema for the research purpose in this study. One of the emotional schemas is rumination (Leahy, 2002). Rumination is related to greater depression and anxiety (Nolen-Hoeksema, 2000; Papageorgiou & Wells, 2001). It is found to be highly associated with the beliefs that are related to uncontrollability and harm such as "ruminating is uncontrollable" and "ruminating makes me feel physically ill" (Papageorgiou & Wells, 2001). People with depression, anxiety, somatization or obsessive-compulsive signs are even reported to hold maladaptive emotional schemas automatically and more intensively in their minds where they pathologize their emotions (Sirota et al., 2018). For the research purpose of this study, when an emotional schema is adaptive, it faciliates an individual's functioning. For example, in the study of Leahy (2002), it was suggested that emotional schema "validation by others" is related to less "guilt". Holding greater "validation by others" in mind allows an individual to express their feelings as they think that there are receptive audiences for their emotions. It can greatly reduce anxiety or depression. Also, it can help an individual to accept their feelings and bring them interpersonal benefits (Rime et al., 1991).

Emotional Schema is related to emotion recognition. According to Leahy (2002), "simplistic view of emotion" is one of the emotional schemas that an individual can't understand the meaning of complicated feelings and isn't aware of their emotions. In contrast, a less "simplistic view of emotion" refers to higher awareness of one's emotions. It was found that higher emotional awareness is positively correlated with emotion recognition performance (Wright et al., 2018). In the study of Castro et al. (2015), it was demonstrated that a parent's belief (emotions influences their children's emotion recognition) in a problem-solving discussion setting is related to their children's emotion recognition. In this study, parents and their children were invited to watch several videos. After that, they were asked to

report the emotions they felt and judge what the others felt during watching different videos. The results showed that a parent's belief "emotions are dangerous" significantly and positively predicted children's recognition of parent's emotions. It was discussed that children learn their parent's emotional beliefs, which then affects the development of their emotion recognition skills. However, in the same study, the parent's emotional belief "emotions are valuable" couldn't predict their children's recognition of parent's emotions. In the study of Hagan et al. (2020), teachers were asked to complete an online survey that included the measure of teachers' beliefs about anger and an emotion recognition task. It was found that teachers' belief that "children's anger was valuable in the school setting" was significantly and positively correlated with teachers' recognition accuracy over children's anger expressions, while their belief that "children's anger was harmful" didn't predict their recognition accuracy over children's anger expressions. However, it is unclear about the relationship between an individual's emotional schemas and their multimodal emotion recognition.

Emotional schema is related to perceived stress as well. In the study of Rogers et al. (2006), the relationship between paranormal belief, coping strategies and emotional intelligence was examined. It was found that mood regulation, emotional (re)appraisal and emotion utilization were significantly and positively correlated with active-cognitive coping and active-behavioural coping. In short, higher emotional intelligence (ability to manage emotion), higher tendency of using effective coping strategies to cope with stress. The influence of emotional schema on stress management is further supported by other studies. Bayazi et al. (2014) found that intellectual emotional schemas are positively correlated with task-focused coping style, the emotional schema "blame" is negatively correlated with task-focused coping style and the emotional schema "higher values" is negatively correlated with emotion-focused coping. Also, it was found that emotional schema is related to certain

mental disorders as well such as the emotional schema “numbness” negatively predicted depression and “”blame” positively predicted anxiety (Bayazi et al., 2014; Leahy, 2002). By the diathesis-stress model, it is suggested stress may be a predictor of mental disorders including depression and anxiety (Zuckerman, 1999). The study of Mazloom et al. (2016) has further assessed the relationship between emotional schemas and stress. It examined the impacts of the emotional schema, emotion regulation and metacognition in the prediction of post-traumatic stress (PTS) symptoms. It was found that emotional schema has an indirect impact on PTS symptoms through emotion regulation, but emotional schema itself has no relationship with PTS symptoms ($r$ = -.16, $p$ = ns). Moreover, it is still unclear about the relationship between stress and emotional schema.

**Experimental Settings and Demographic Information**

The research questions of this study are (1) what is the relationship between alexithymia and multimodal emotion recognition, (2) what is the relationship between perceived stress and multimodal emotion recognition, (3) what is the relationship between emotional schemas and multimodal emotion recognition, and (4) what is the relationship between perceived stress and emotional schema. After reviewing a series of literatures, it would be rational to have the following hypotheses:

1. Alexithymia predicts lower multimodal emotion recognition.
2. Higher perceived stress predicts lower multimodal emotion recognition.
3. More maladaptive emotional schemas predict lower lower multimodal emotion recognition.
4. Higher perceived stress predicts more maladaptive emotional schemas.

To study the research questions and test out the hypotheses, three scales (measuring alexithymia, perceived stress and emotional schemas respectively) and a multimodal emotion recognition test will be used, and a correlational study will be done over the relationship

between these four variables in this research. However, different emotion recognition tests may have different outcomes due to different experimental settings such as the race and cultural backgrounds of emotion portrayers in a test. On the other hand, emotion recognition is a cognitive ability where there may be clear ability differences between genders and ages. To have better control over the experimental design of this study and understanding over the effect of biological factors upon emotion recognition, literature review was done over experimental settings and demographic information.

***Race and Cultural Background***

It is inferred that people with different cultural backgrounds may have different learned display rules of negative emotions. According to the study of Matsumoto and Ekman (1989), it was found that the Japanese had lower average intensity ratings than the Americans for all emotions except disgusted emotion, regardless of the gender or culture of the poser. It was interpreted that Japanese have a strict display rule of negative emotions that displaying or understanding negative emotions may be disruptive to social harmony where they tend to obey the collectivism of society. It's a kind of emotional schema due to cultural background (Leahy, 2002). It suggests a value for studying emotion recognition-related topics in Hong Kong as cultural background may play a role in cultivating emotional schema. But overall speaking, there were no cultural differences due to uncertainty or politeness in judging people of different genders and foreigners in the study. It was considered as a cross-cultural consistency in recognizing emotions. It suggests that using facial expressions of different cultural backgrounds and gender may not impede the performance of an individual in recognizing facial emotions.

It is still not clear about the race effect over facial emotion recognition performance as some studies have found that people of the same race group may have different or similar accuracy in recognizing facial emotions either for their own race and other races (Segal et al.,

2019). It could be due to either the race or cultural effect. Overally speaking, it is commonly agreed that expression of emotion is largely universal with subtle differences across cultures (Elfenbein & Ambady, 2003). Based on this, we would not assume the race of facial expression posers and the race of the observers have an explicit impact over observers' performance of facial emotion recognition.

In-group advantage has been discussed in different studies for a long time. Studies showed that in-group advantage does exist in vocal emotion recognition where individuals of a culture can recognize the vocal emotion of their own language more accurately than other language (Chronaki et al., 2018; Elfenbein & Ambady, 2002; Pell et al., 2009). It prompts us to avoid any linguistic cue when doing the emotion recognition task in this study to reduce language or cultural bias.

It is argued that some other languages like English are superior to others in their emotional vocabulary. It is found that people recognized anger, fear, and sadness more accurately in English than in Hindi (Matsumoto & Assar, 1992). To reduce the bias, we would make the questionnaires or tests in this study to be bilingual, which are English and Traditional Chinese. Also, it suggests that meaningless language or prosody should be used instead of any kind of official language or meaningless prosody in the emotion recognition task of this study.

***Emotion Portrayals***

Different types of emotion portrayal were adopted by a lot of emotion recognition studies. In the study of Scherer and Scherer (2011), black and white static facial expressions of emotions and vocal recordings were used to examine participants' emotion recognition ability. However, the photographs were produced over thirty years ago. The displays may not be up-to-date for assessing emotion recognition ability nowadays. The static photograph didn't reflect the authenticity of emotion recognition in real life, as coloured and dynamic

facial expressions are encountered instead. The facial stimuli and vocal recordings were presented distinctively to collect participants' facial and vocal emotion recognition ability respectively, in which the unimodal stimuli may not reflect the most realistic situation in real life as people are encountering multimodal emotion portrayals simultaneously most of the time such as encountering facial expression and voice at the same time. In the study of Nowicki and Duke (1994), Diagnostic Analysis of Nonverbal Accuracy (DANVA) was designed to assess individual differences in the accurate receiving and sending of nonverbal social information. Distinctive subtests of receptive gestures, facial expressions, postures and paralanguage, and, expressive gestures, facial expressions and paralanguage were used in the study. Although different modalities of emotion recognition were measured, they were not measured together but instead they were measured distinctively. Again, the unimodal emotion portrayals and static photographs may not reflect the most realistic situation in real life. For both of the studies, only few emotions were adopted which limited the extent of assessment and could not test individuals' detailed emotion discrimination ability.

To assess emotion recognition ability more ecologically and validly, the multimodal emotion recognition test was developed. In the study of Bänziger et al. (2009), multimodal emotion portrayals were used to test the multimodal emotion recognition ability of individuals. "Audio only", "audio/video", "still picture" and "video only" subtests of 30 emotion portrayals which in total 120 stimuli, were presented to participants in random order. The results showed that participants were more sensitive to and recognized emotions more accurately for the audio/video mode, while they performed worse for the other modes. It demonstrated the significance of including a massive amount of emotion categories and several communication modalities in tests of emotional sensitivity for assessing detailed and true recognition of emotional expressions, and gaining better comprehension of the underlying skills. Schlegel et al. (2014) have proposed another multimodal emotion

recognition ability test called Geneva Emotion Recognition Test (GERT), which adopted short audio-video clips as the multimodal, dynamic and coloured stimuli of emotion recognition tasks. The stimuli were produced by Bänziger et al. (2012) which ensured the novelty of stimuli in GERT. It has high reliability and construct-related evidence for validity which are the gender and age differences shown among the results. Schlegel and Scherer (2016) have later proposed a short version of GERT (GERT-S), where it was shown that it is a unidimensional test with good internal consistency. Also, it has high construct validity where it is significantly positively correlated with other emotion recognition ability tests with emotional management and emotion understanding tests, and with cognitive ability. Therefore, GERT-S will be adopted to test out participants' multimodal emotion recognition abilities in this study.

***Gender***

Women have been said to have better emotion identification and recognition abilit than men. In the study of Hall (1978), female advantage was shown in decoding nonverbal communication, especially among visual-plus-auditory studies, which could not be explained by luck. In the study of Schlegel et al. (2014), women tended to have significantly better scores in recognizing pride, fear and despair, and a small but significant advantage in the total test score. In the study of Demenescu et al. (2014), females performed more accurately than males in vocal emotion recognition and this gender difference occured in older and middle-aged participants. In the study of Wingenbach et al. (2018), females performed more accurately and faster in facial emotion recognition than males and faster in recognising facial emotions correctly. The female advantage in detecting facial expressions of others was unaffected by emotion categories and expression intensity levels used in the study. It seems that there is a biological advantage for women in identifying and recognizing emotions. Since

the phenomenon is well known across studies, gender differences are presumed in this study as well.

***Age***

Studies show that emotion recognition ability varies with age. In the study of Montagne et al. (2007), people at average 31.3 age had better facial emotion recognition performance than those at average 58.3 age. In the study of Demenescu et al. (2014), older participants performed less accurately in recognizing emotions across both irrespective and modalities of emotion than middle-aged or younger participants. In the study of Mill et al. (2009), older participants performed less accurately in emotion recognition in general. Both vocal and facial expressions revealed an age-related decline in the recognition of anger and sadness starting at about age 30. Interestingly, particpants in the age group of 51 to 60 recognized contempt and neutral facial expressions better than younger and older age groups. In the study of Passarotti et al. (2009), it was found that the facial emotion recognition ability at around age 14 is immaturer that that at around age 30, which was indicated by the reduced recruitment of both the pregenual and dorsal right anterior cingulate cortex (ACC). It suggests that there is a developmental difference of facial emotion recognition between people from high schools and colleges. Studies reflect that college students can perform better in emotion recognition tasks, thus providing more accurate data for this study. At the same time, emotion recognition ability starts to drop after reaching a certain age in general and the performance of different emotion recognition may vary with age due to other factors. After reviewing related literature, it is assumed that people of different ages have different emotion recognition ability levels.

# CHAPTER THREE

# Methodology

## Participants

260 Participants were recruited from Hong Kong by convenient and snowball sampling methods through social media and instant messaging apps. The sample consisted of 35 men and 61 women, with a mean age of 22.4 (SD = 4.53). 89 participants have an associate or bachelor's degree and 7 participants have a master degree from local universities as their highest educational levels.

### *Recruitment of Participants*

Recruitment of participants was made through social media and instant messaging apps from the 24th of February to the 9th of March. The test package included a Qualtrics questionnaire and a multimodal emotion recognition test. 260 participants accepted the invitation and provided a response but only 200 of them participated in both the questionnaire and test. During the recruitment period, 17 participants were contacted to retake and complete both the questionnaire and test, and 34 participants were contacted to retake and complete the test through email. 3 data were found to be incompleted data in which the participants skipped several items in the questionnaire, and one participant was found to have the test completed only but not for the questionnaire. These data were excluded from the analysis. Finally, only 96 samples were considered as completed data. The first 72 samples conducted the test without a progress bar and the latter 24 samples conducted it with a progress bar. The reason behind there was such a difference was because data were initially collected without a progress bar. However, more and more participants complained that the test was too long and repetitive, where they might even be confused if it was their device issues. After the researcher conducted further literature review about the effect of progress bar over cognitive

task, a progress bar was then added to the test to let new participants know their progress when conducting the test.

## Measures

We will go through the translation procedures and measures used in this study in the following sections. A questionnaire that consisted of three scales (a scale that measures alexithymia, and perceived stress scale, and a scale that measures emotional schema) and a multimodal emotion recognition ability test were conducted on two different platforms. The questionnaire was conducted on Qualtrics while the test was conducted on Limesurvey.

### *Demographic Information*

In the first part of the questionnaire, demographic information was collected from the participants. Demographic information collected including gender, age, university, educational level and email address. Email address was used to match the data between the questionnaire and the test.

### *Alexithymia*

The Toronto Alexithymia Scale-20 (TAS-20) consisted of 20 items and was adopted to measure alexithymia of the participants (Bagby et al., 1994). It has five positive items, and all items are scored on a five-point Likert scale (5= strongly agree, 1 = strongly disagree). Chen and Hang (2003) have developed the Chinese version of TAS-20 which the back-translation was approved by the author of TAS-20 Dr. Taylor. Although they didn't report the reliability, it was validated via confirmatory factor analysis (TAS-20 was broken down into 3 factors including factor 1 "difficulty identifying feelings", factor 2 "difficulty describing feelings" and factor 3 "externally-oriented thinking". The correlation between factor 1 and 2 was .910, correlation between factor 1 and 3 was .546, correlation between factor 2 and 3 was .564; $p < .01$). TAS-20 scores are obtained by reversing the scores on the five positive items (e.g., 1=5, 2=4, 3=3, etc.) and summing across all 20 items. Items 4, 5, 10, 18, and 19

are positive. The test-retest reliability of TAS-20 with a sample of 72 undergraduate students is .77 ($p < 0.01$). Its internal consistency is sufficiently high (Cronbach's alpha = 0.81) with another group of sample (965 undergraduate students), (Cronbach's alpha = .80) with the 72 students sample and (Cronbach's alpha = .83) with a sample group of 218 psychiatric out-patients. According to Carnovale et al. (2021), it is recommended to use a single total score of TAS-20 but not its subscale scores. Therefore, the total score will be assessed instead of the subscale scores of TAS-20 in this study.

***Perceived Stress Level***

The Perceived Stress Scale-14 consisted of 14 items (PSS-14) and was adopted to measure the perceived stress level of the participants during the past month (Cohen et al., 1983). It has seven negative and seven positive items, and all items are scored on a five-point Likert scale (4 = very often, 0 = never). Leung et al. (2010) have developed the Chinese version of PSS-14. PSS-14 scores are obtained by reversing the scores on the seven positive items (e.g., 0 = 4, 1 = 3, 2 = 2, etc.) and summing across all 14 items. Items 13, 10, 9, 7, 6, 5 and 4 are positive. Cronbach's alpha reliability for PSS-14 is .84, .85 and .86 in each of the three samples.

***Emotion Schema***

The Leahy Emotional Schemas Scale II (LESS II) consisted of 28 items and was adopted to measure the emotional schema of the participants during the past month (Leahy, 2012; Suh et al., 2019). It has eight positive and twenty negative items, and all items are scored on a six-point Likert scale (6 = very true of me, 1 = very untrue of me). LESS II scores are obtained by reversing the scores on the eight positive items (e.g. 6 = 1, 5 = 2, 4= 3, 3 = 4, etc.) and summing across all 28 items. Items 4, 6, 14, 15, 19, 24, 25 and 26 are positive. Cronbach's alpha value for LESS II is .893.

***Multimodal Emotion Recognition Ability***

The short version of the Geneva Emotion Recognition Test (GERT-S) was adopted to measure the multimodal emotion recognition ability of the participants (Schlegel & Scherer, 2016). The test has multiple language versions including English and Chinese. It consists of forty-two colour video clips with sound (duration 1 to 3 seconds) where ten professional French-Swiss actors (five female and five male) express fourteen different emotions with pseudolinguistic sentences (meaningless syllables) and nonverbally. In the test, participants are instructed to watch all clips and judge the emotion of the actor or actress in each clip. After the introduction of the test, participants are shown a list of 14 emotions and their definitions. After the instruction section, they are given several example clips to get a sense about how the test is going to be like and they enter the real test section. During the test, after each clip, participants are asked to pick which of the fourteen emotions describes best the emotion the actress or actor intended to express (for a demo version and more details, see https://shorturl.at/cdDHT). Participants' responses are scored as incorrect (0) or correct (1), yielding a total average GERT-S score that can range from 0 to 1. All items' scores are summed up into a total GERT-S score (for GERT-S scoring instruction, see https://shorturl.at/gsGW5). All the clips used were from the database of the Geneva Multimodal Emotion Portrayals (GEMEP) (Bänziger et al., 2012).

***Translation***

The English and Chinese versions of the Toronto Alexithymia Scale-20 (TAS-20) and the Perceived Stress Scale-14 (PSS-14) were designed and validated by different scholars. The English and Chinese versions of the short version of the Geneva Emotion Recognition Test (GERT-S) were designed and validated by its research team.

The English version of the Leahy Emotional Schema Scale II (LESS II) was designed and validated by its research team. It was forward-translated into Chinese by the first bilingual helper whose mother language is Chinese and who is proficient in English (studying

in the Chinese University of Hong Kong and majoring Psychology). The translated questionnaire of emotional schemas was then presented to the second bilingual helper whose mother language is Chinese and who is proficient in English (studying in Britain, majoring in Psychology and currently investigating an emotion-related topic for the final year thesis), and she was invited to back-translate the questionnaire from Chinese to English. The researcher compared and did the final examination upon both the original questionnaire and the back-translated manuscript, compared forward and back-translated items and fine-tuned the less appropriate wordings to minimise the potential incongruity between the meaning of items of themake sure the items in the Chinese and original questionnaire have the same meanings. The items were kept fine-tuning until there was no inconsistency in meaning of items and to finalize the questionnaire.

**Procedures**

Before collecting any data, several pilot studies were conducted and feedback was collected from the pilot testers. After collecting their feedback, minor adjustments were done over the Chinese translation of LESS II. After that, the researcher started collecting data for the study through the Internet. Participants were shown an informed consent form and were requested to agree to the form before participating into the study. Once they agreed to participate in the study, they were requested to complete a Qualtrics questionnaire which included the TAS-20, the PSS-14 and the LESS II. After that, they were requested to take a short break and then complete the GERT-S.

The first 72 samples conducted the test without a progress bar and the latter 24 samples conducted it with a progress bar. The reason behind there was such a difference was because data were initially collected without a progress bar. However, more and more participants complained that the test was too long and repetitive, where they might even be confused if it was their device issues. After the researcher conducted further literature review

about the effect of progress bar over cognitive task, a progress bar was then added to the test to let new participants know their progress when conducting the test.

# CHAPTER FOUR

## Results

### Reliability Analysis

The Cronbach's Alpha of TAS-20, PSS-14, LESS II was .841, .875 and .807 with the 96 Hong Kong sample participants respectively in this study. The Cronbach's Alpha of GERT-S was .543 with the 96 Hong Kong sample participants in this study. As the Cronbach's Alphas of TAS-20, PSS-14, LESS II were higher than .7, they had a high reliability in the whole sample of this study. However, the Cronbach's Alphas of GERT was lower than .7, it had a low reliability in the whole sample of this study.

### Descriptive Statistics

**Table 1**

*Descriptive statistics of participants' ages*

| | Gender | N | Mean | Median | SD | Minimum | Maximum |
|---|---|---|---|---|---|---|---|
| Age | Male | 35 | 22.0 | 22 | 2.52 | 18 | 29 |
| | Female | 61 | 22.6 | 22 | 5.36 | 18 | 57 |

*Note.* Table 1 shows the descriptive statistics of the ages of the participants in this study. Statistics include the sample size, mean, median, standard deviation, minimum and maximum.

The sample population of participants' age is shown in Table 1. The mean age for the whole sample was 22.4.

**Table 2**

*Descriptive statistics of participants in TAS-20*

| | Gender | Category | N | Mean | Median | SD | Minimum | Maximum |
|---|---|---|---|---|---|---|---|---|
| TAS-20 | Male | Normal | 23 | 34.9 | 33 | 8.97 | 19 | 51 |
| | | Possible | 7 | 54.7 | 53 | 3.25 | 52 | 60 |
| | | Alexithymia | 5 | 62.6 | 62 | 1.95 | 61 | 66 |
| | Female | Normal | 52 | 40.5 | 41 | 6.62 | 28 | 51 |
| | | Possible | 6 | 54.3 | 54 | 1.97 | 52 | 57 |
| | | Alexithymia | 3 | 66 | 65 | 2.65 | 64 | 69 |

*Note.* Table 2 shows the descriptive statistics of the total score of the Toronto Alexithymia Scale-20 (TAS-20). Statistics include the sample size, mean, median, standard deviation, minimum and maximum. For the column of category, Normal, Possible and Alexithymia represent no alexithymia, possible alexithymia and alexithymia. Normal is the total score that is between 20 to 51, Possible is the total score that is between 52 to 60 and Alexithymia is the total score that is between 61 to 100.

The sample population of TAS-20 is shown in Table 2. The distribution of the three groups (normal, possible alexithymia and alexithymia group) either in both male and female was not balanced. The total score range of TAS-20 of the whole sample population was within 19 and 69.

**Table 3**

*Descriptive statistics of participants in PSS-14*

| | Gender | Stress Level | N | Mean | Median | SD | Minimum | Maximum |
|---|---|---|---|---|---|---|---|---|
| PSS-14 | Male | Low | 13 | 19.4 | 19 | 5.42 | 9 | 26 |
| | | High | 22 | 36.2 | 35.5 | 5.69 | 29 | 47 |
| | Female | Low | 28 | 22.6 | 24 | 5.17 | 11 | 28 |
| | | High | 33 | 35.7 | 35 | 5.09 | 29 | 48 |

*Note.* Table 3 shows the descriptive statistics of the total score of the Perceived Stress Scale-14 (PSS-14). Statistics include the sample size, mean, median, standard deviation, minimum and maximum. In this study, there are two perceived stress level groups including low and high levels. High level is the total score that is between 0 to 28 and high level is the total score that is between 29 to 56.

The sample population of PSS-14 is shown in Table 3. The low and high stress group sizes either in the male or female sample population are fairly balanced. The total score range of PSS-14 of the whole sample population was within 9 and 48.

**Table 4**

*Descriptive statistics of participants in LESS II*

| | Gender | Adaptiveness | N | Mean | Median | SD | Minimum | Maximum |
|---|---|---|---|---|---|---|---|---|
| LESS II | Male | Adaptive | 25 | 81.4 | 83 | 11.21 | 57 | 96 |
| | | Maladaptive | 10 | 110.2 | 109.5 | 7.97 | 100 | 122 |
| | Female | Adaptive | 40 | 79.2 | 79.5 | 10.81 | 58 | 97 |
| | | Maladaptive | 21 | 104.2 | 104 | 4.94 | 99 | 117 |

*Note.* Table 4 shows the descriptive statistics of the total score of the Leahy Emotional Schema Scale II (LESS II). Statistics include the sample size, mean, median, standard deviation, minimum and maximum. In this study, there are two types of emotional schemas including adaptive and maladaptive emotional schemas. Adaptive emotional schemas are the total score that is between 28 to 98 and maladaptive emotional schemas are the total score that is between 99 to 168.

The sample population of LESS II is shown in Table 4. The adaptive and maladaptive emotional schemas group sizes either in the male or female sample population are moderately balanced. The total score range of LESS II of the whole sample population was within 57 and 117.

**Table 5**

*Descriptive statistics of participants in GERT-S*

| | Gender | Ability Level | N | Mean | Median | SD | Minimum | Maximum |
|---|---|---|---|---|---|---|---|---|
| GERT-S | Male | Low | 29 | 15 | 16 | 3.54 | 8 | 21 |
| | | High | 6 | 23 | 23 | 0.894 | 22 | 24 |
| | Female | Low | 49 | 17.2 | 18 | 2.942 | 10 | 21 |
| | | High | 12 | 23.8 | 24 | 1.267 | 22 | 26 |

*Note.* Table 5 shows the descriptive statistics of the total score of the short version of the Geneva Emotion Recognition Test (GERT-S). Statistics include the sample size, mean, median, standard deviation, minimum and maximum. In this study, there are two ability levels including low and high levels. Low level is the total score that is between 0 to 21 and high level is the total score that is between 22-42.

The sample population of GERT-S is shown in Table 4. The low-high ability level group size proportion was similar in the male and female sample population as it was around 4:1. The total score range of GERT-S of the whole sample was within 8 and 26.

**Table 6**

*Correlation between alexithymia, perceived stress, emotional schemas and multimodal emotion recognition*

| | | TAS-20 | PSS-14 | LESS II | GERT-S |
|---|---|---|---|---|---|
| TAS-20 | *r* | - | | | |
| | *p* | - | | | |
| PSS-14 | *r* | 0.381 | - | | |
| | *p* | < .001 | - | | |
| LESS II | *r* | 0.599 | 0.492 | - | |
| | *p* | < .001 | < .001 | - | |
| GERT-S | *r* | -0.02 | 0.225 | 0.109 | - |
| | *p* | 0.846 | 0.027 | 0.288 | - |

*Note.* Table 6 shows the correlation coefficient between the total scores of TAS-20, PSS-14, LESS II and GERT-S. Higher score of LESS II means more maladaptive emotional schemas. *p* refers to Pearson's value and *r* refers to correlation coefficient.

**Examination of Scales**

To examine the relationship between alexithymia, stress, emotional schema, and emotional recognition ability, a correlation analysis was conducted between the total scores of TAS-20, PSS-14, LESS II and GERT-S. Table 6 showed the correlation coefficients between them. Analysis showed that there is a significant and moderate positive relationship between the total scores of TAS-20 and PSS-14 ($r$ = .381, $p$ = < .001). Second, there is a

significant and strong positive relationship between the total scores of TAS-20 and LESS II ($r$ = .599, $p$ = < .001). Third, there is a significant and strong positive correlation between the total scores of PSS-14 and LESS II ($r$ = .492, $p$ = <.001). It indicates that TAS-20, PSS-14 and LESS II are highly and positively correlated with each other. Fourth, there is no relationship between the total scores of TAS-20 and GERT-S ($r$ = -.02, $p$ = .846). Fifth, there is a significant and weak positive relationship between the total scores of PSS-14 and GERT-S ($r$ = .225, $p$ = .027 < .05). Sixth, there is no relationship between LESS II and GERT-S ($r$ = .109, $p$ = .288). It indicates that PSS-14 is the only effective predictor of GERT-S among the three scales. Although TAS-20 and LESS II are positively correlated with PSS-14, they cannot predict GERT-S.

**Table 7**

*Correlation between alexithymia, perceived stress, emotional schemas and 14 emotions*

| | | Am | Jo | Sur | Dis | Sad | Des | Re | An | Ag | Pl | Fe | Ir | In | Pr |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TA | *r* | .1 | -.013 | -.117 | .105 | .191 | -.019 | .057 | -.084 | .064 | -.112 | -.119 | .09 | -.128 | -.049 |
| | *p* | .334 | .904 | .258 | .309 | .063 | .854 | .581 | .415 | .538 | .277 | .249 | .382 | .212 | .634 |
| PS | *r* | .268 | .088 | .063 | .14 | .224 | -.15 | .071 | .001 | .211 | -.012 | .143 | .096 | -.069 | .05 |
| | *p* | .008 | .395 | .545 | .173 | .028 | .144 | .494 | .995 | .039 | .905 | .166 | .353 | .507 | .63 |
| LE | *r* | .2 | -.027 | .177 | .126 | .211 | -.026 | .017 | .057 | -.048 | -.007 | .147 | .099 | -.188 | -.153 |
| | *p* | .051 | .794 | .084 | .221 | .039 | .801 | .868 | .584 | .646 | .944 | .153 | .335 | .067 | .135 |

*Note.* Table 8 shows the correlation coefficient between the total score of TAS-20, the total score of PSS-14, the total score of LESS II and the average score of the 14 emotions of GERT-S. *p* refers to Pearson's value and *r* refers to correlation coefficient. "TA" is TAS-20, "PS" is PSS-14, "LE" is LESS II, "Am" is amusement, "Jo" is joy, "Sur" is surprise, "Dis" is disgust, "Sad" is sadness, "Des" is despair, "Re" is relief, "An" is anxiety, "Ag" is anger, "Pl" is pleasure, "Fe" is fear, "Ir" is irritation, "In" is interested and "Pr" is pride.

To understand more about the relationship between 14 emotions in GERT-S, alexithymia, emotional schemas and perceived stress, a correlation analysis was conducted between the average score of 14 emotions' blocks, the total score of PSS-14 and LESS II. Overall speaking, there is no relationship between 11 emotions and PSS-14, and, 13 emotions and LESS II. First, table 8 indicates that there is a really significant and weak positive relationship between the average score of "amusement" blocks and the total scores of PSS-14

($r$ = .268, $p$ = .008 < .01). Second, it indicates that there is a significant and weak positive relationship between the average score of “sadness” blocks and the total scores of PSS-14, and, the average score of “anger” blocks and the total scores of PSS-14 ($p$ < .05). Third, it indicates that there is a significant and weak positive relationship between the average score of “sadness” blocks and the total scores of LESS II ($r$ = .211, $p$ = .039 < .05).

**Table 8**

*Correlation between perceived stress and 14 dimensions of emotional schemas*

| | Inv | Inc | Gu | Lo | Du | NA | Ru | Bl | De | LC | LE | Nu | OR | Si |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PS *r* | .276 | .333 | .315 | .522 | .43 | .425 | .474 | .382 | .019 | .127 | .185 | -.075 | -.105 | .001 |
| *p* | .007 | <.001 | 0.002 < | .001 < | .001 < | .001 < | .001 < | .001 | .854 | .218 | .072 | .468 | 0.31 | .995 |

*Note.* Table 7 shows the correlation coefficient between the total score of PSS-14 and the average score of the 14 dimensions of LESS II. “PS” is PSS-14, “Inv” is invalidation, “Inc” is incomprehensibility, “Gu” is guilt, “Lo” is loss of control, “Du” is duration, “NA” is non-acceptance of feeling, “Ru” is rumination, “Bl” is blame, “De” is devalued, “LC” is low consensus, “LE” is low expression, “Nu” is numbness, “OR” is overly rational and “Si” is simplistic view of emotion.

To understand more about the relationship between emotional schemas and perceived stress, a correlation analysis was conducted between the total scores of PSS-14 and the average score of 14 dimensions of emotional schemas. There is a really significant and positive relationship between the total score of PSS-14 and the average score of different dimensions of emotional schemas including incomprehensibility, loss of conotrol, duration,

non-acceptance of feeling, rumination and blame ($p < .001$). There is also a significant and positive relationship between PSS-14 and invalidation ($p = .007 < .01$), and, PSS-14 and guilt ($p = .002 < .005$).

# CHAPTER FIVE

## Discussion

### Discussion and Implications

In this study, we studied how alexithymia, stress, and emotional schema are related to the ability to recognize emotion. Specifically, the research questions of this study are (1) what is the relationship between alexithymia and multimodal emotion recognition, (2) what is the relationship between perceived stress and multimodal emotion recognition, (3) what is the relationship between emotional schemas and multimodal emotion recognition, and (4) what is the relationship between perceived stress and emotional schema. As I mentioned in earlier chapters, my hypotheses were:

1. Alexithymia predicts better multimodal emotion recognition.
2. Higher perceived stress predicts better multimodal emotion recognition.
3. More maladaptive emotional schemas predict better multimodal emotion recognition.
4. Higher perceived stress predicts more maladaptive emotional schemas.

To resolve the research questions, three scales (TAS-20, PSS-14 and LESS II) and a multimodal emotion recognition test (GERT-S) were used to assess participants' alexithymia, perceived stress, emotional schemas and multimodal emotion recognition abilities.

First, the present findings demonstrated that alexithymia was not correlated with multimodal emotion recognition ability (see Table 6). It was inconsistent with our hypothesis. Generally speaking, previous research has demonstrated that alexithymia is negatively correlated with facial and auditory emotion recognition (Jongen et al. 2014; Ola & Gullon-Scott, 2020; Wang et al, 2021). However, this negative relationship between alexithymia and emotion recognition was not found in this study. I believe that this lack of an effect might be related to our use of a multimodal test. When participants recognized emotions multimodally instead of unimodally, they might be able to collect more emotional information to recognize

emotions by combining facial expression, voice, gesture and posture information. Therefore, three groups of participants with different levels of alexithymia could recognize emotions with good performance, minimizing the differences in recognition rate between three groups. Alternatively, it might be just like some research reported that alexithymic individuals may have impaired auditory emotion recognition but intact emotional multisensory integration (eMSI) (Wang et al, 2021), which allowed alexithymic participants in this study to integrate emotional information from multiple channels. Wang et al. (2021) suggested that alexithymic individuals with impaired emotion recognition ability may have stronger eMSI to compensate for the impaired ability (hyper-integration hypothesis). This provides us insights that alexithymic participants might have impaired multimodal emotion recognition ability but intact emotional multisensory integration, and the impacts of these aspects canceled each other out in this study (even having low sensitivity towards others' emotions, still, tried to gather and integrate all the emotional information from all channels together and figure out what emotions were expressed by the portrayers). Thus, resulting in no relationship between alexithymia and multimodal emotion recognition ability. One explanation could be that alexithymic individuals have intact gesture and posture emotion recognition ability. Since previous research only suggested that alexithymic individuals possibly have impaired facial and auditory emotion recognition, it might be possible that the alexithymic participants in this study had intact gesture or posture emotion recognition ability which compensated for their impaired facial or auditory emotion recognition, thus resulting in no relationship between alexithymia and multimodal emotion recognition. Further study may be needed to examine the gesture and posture emotion recognition ability of alexithymic individuals. On the other hand, it was found that alexithymia is negatively correlated with multimodal emotion recognition with female sample population in the study of Ola and Gullon-Scott (2020), even when GERT-S was used in the study as well. One of the reasons why similar results were not

obtained in this study could be that participants were instructed to watch the videos once with headphones in their study, while participants were not limited in the number of watching the videos and were not instructed to wear headphones or not in this study.

Second, the present findings demonstrated that perceived stress is positively correlated with multimodal emotion recognition (see Table 6). It was inconsistent with our hypothesis. In general, previous research has demonstrated inconsistent results where perceived stress can have either positive or negative effects over unimodal emotion recognition, depending on what emotion it was (Barel & Cohen, 2018). Most of them showed that higher perceived stress predicts worse auditory and facial emotion recognition (Chen et al., 2017; Hänggi, 2004; Herridge et al., 2004; Paulmann et al., 2016). However, be mindful that results of stress induction and PSS-14 may be associated with emotion recognition differently because they were measuring stress in different time frames and intensities. Perceived stress was induced instead of being measured by self-report in most of the previous studies (Barel & Cohen, 2018; Hänggi, 2004; Herridge et al., 2004). In this study, perceived stress was measured through PSS-14, which is a self-report scale that measures the perceived stress of an individual in their last month. Fight-or-flight response occurs when an individual is confronted with extreme stress in an immediate situation (Goligorsky, 2001), which was proven to be related to emotion recognition such as better recognition of fear emotion (Del-Ben et al., 2008). However, it could only be induced by immediate extreme stress and PSS-14 might not be able to elicit a similar response as it reflected participants' stress level in the past instead of their immediate stress level. Further study may need to be conducted over the relationship between different timing and intensities of perceived stress and multimodal emotion recognition. Or simply, further study may need to be conducted over the relationship between induced stress and multimodal emotion recognition. Apart from discussing the inconsistency between our results and previous research, it is important to notice the

consistent results as well. In this study, perceived stress was positively correlated with “amusement”, “sadness” and “anger” while there was no relationship between perceived stress and other 11 emotions (see table 7). It still supported the study of Barel and Cohen (2018) and Bland et al. (2022).

Third, the present findings demonstrated that emotional schemas can’t predict multimodal emotion recognition (see Table 6). It was inconsistent with our hypothesis. One explanation for the result could be that the impact of emotional schemas was small and was undermined by the relatively high emotional recognition skill of participants. In this study, participants at mean age 22.4 were recruited and all of them had at least bachelor’s degree or higher degree. It was rational to assume that they had more mature emotion recognition ability than people at young age physiologically and had enough interpersonal experiences, in which they have developed high level emotion recognition skills that canceled out the negative impact of their maladaptive emotional schemas. On the other hand, another possible perspective was that emotional schemas may only affect an individual’s perception of emotions but exert no effect on their sensitivity towards others’ emotions. According to Leahy (2002), LESS was designed for self-report assessment of emotional schemas and emotional schemas reflect how emotions are experienced by an individual and their strategies to overcome unpleasant emotion by her definition. LESS II was later developed as a brief version of LESS (Leahy, 2012; Suh et al., 2019). By Leahy’s (2002) definition, LESS II might only assess participants’ perceptions of emotions and how they expressed emotions such as suppressing and accepting negative emotions. It suggests that participants might have maladaptive emotional schemas but not impaired multimodal emotion recognition ability. Further study may need to be done over the relationship between emotional schemas and unimodal emotional recognition to clarify this possibility. Also, it might be that participants in this study didn’t have to encounter a real interpersonal experience, thus not executing any

strategy against emotions when they conducted the GERT-S. Although the GERT-S as a multimodal emotion recognition ability test was more realistic than any general unimodal emotion recognition ability test, it was just a test to participants where they didn't feel the stress they might have to encounter daily in interpersonal relationships. Participants might not need to execute any plan to deal with unpleasant emotions because they might not have any unpleasant emotions or unpleasant emotions that were strong enough to activate their emotional schemas in this study. Another simple interpretation for the result could be that the study allowed participants to watch the videos multiple times, which greatly canceled out the impact of emotional schemas upon multimodal emotion recognition. Further study may need to be done to replicate the same study but with a different setting where participants are only allowed to watch the videos once.

Fourth, the present findings demonstrated that perceived stress is significantly and positively correlated with maladaptive emotional schemas (see Table 6). It was consistent with our hypothesis. Indeed, emotional schemas construct the perception of emotions of an individual, which affects how they deal with negative emotions. Adaptive emotional schemas help manage unpleasant emotions better, and vice versa (Leahy, 2002). Stress may be produced if unpleasant emotions are not well-handled. For example, if an individual feels guilty about their negative emotions and inhibits their negative emotions, stronger thoughts and emotions may be induced, thus making them more stressful (Leahy, 2002). My findings demonstrated that perceived stress was significantly and positively correlated with 8 emotional schemas including "invalidation", "incomprehensibility", "guilt", "loss of control", "duration", "non-acceptance of feeling", "rumination" and "blame". Part of them support previous research such as higher stress is related to stronger emotional schema "blame" which support the study of Bayazi et al. (2014) and part of them provide new insights to future research such as stress is not related to "devalued" which provides new insight to the

study of Bayazi et al. (2014). Also, in light of the relationship between perceived stress and maladaptive emotional schemas, and perceived stress and multimodal emotion recognition observed in this study, further study may focus on examining whether perceived stress is the mediator in the relationship between emotional schemas and multimodal emotion recognition or not.

Other than the results answering the research questions and hypotheses, there were other interesting findings as well. The present findings demonstrated that alexithymia is significantly and positively correlated with perceived stress and maladaptive emotional schemas (see Table 6). It is not surprising because alexithymia refers to the difficulty to identify and describe one's own emotion. Certain emotional schemas can induce a similar impact onto an individual. For example, according to Leahy (2002), holding a strong emotional schema of "demand for rationality" may inhibit the self-understanding of an individual that follow from not allowing oneself experiences emotion while holding strong emotional schema "simplistic view of emotions" make it hard for an individual to understand the meaning of complicated emotions and one can have complicated emotions. These are the example maladaptive emotional schemas that can make it harder for an individual to identify and describe one's emotions. For the positive relationship between alexithymia and perceived stress, it might be due to the stress-alexithymia hypothesis (Martin & Pihl, 1985). This hypothesis has been proposed for a long time and it was suggested that alexithymic characteristics impact an individual's response to a stressful circumstance in a way that is favourable to develop stress-related disorders such as posttraumatic stress disorder (PTSD) (Sánchez et al., 2001). It was found that people with PTSD might have alexithymia in the study of Frewen et al. (2008). Regarding the relationships between alexithmia and perceived stress, and alexithymia and emotional schemas, further study may need to be done over the relationships to examine whether they are mediators in the relationships or not. Also, further

research may need to be conducted to see if perceived stress is a moderator in the relationship between alexithymia and multimodal emotion recognition.

## Limitations

A correlational study was conducted to examine the relationship between four variables. Considering all the scales, test used in this study and the research design, there are several confounding and inevitable limitations that need to be concerned in this study.

### *Sample Size*

In this study, 260 participants were recruited and only 96 participants were valid samples. The male-and-female proportion was also not balanced enough (35 men and 61 women) (see Table 1) where more male participants could be recruited. Because of limited sample size, the difficulty of dividing groups (different conditions for different variables) became explicit such as there were only three alexithymic participants among the female sample population (see Table 2). It greatly reduced the reliability and validity of the study.

### *Reliability and Validity of Instrumentation*

In this study, the Chinese version of LESS II was translated and back-translated by two helpers with Psychology-related knowledge background in this study. However, it was not validated through validation study and approved by the original author of the scale (Dr. Leahy). This might reduce the validity of the Chinese version of LESS II in this study. On the other hand, the GERT-S had a low reliability in 96 sample populations of this study. This might be due to cultural differences where Hong Kong people were recruited in this study. In that case, the issue was inevitable.

### *Experimental Control*

Due to the pandemic situation, this study had to be conducted online. Participants were recruited to participate in this study online, and all the scales and test had to be done on their own devices. Although participants were informed to do the GERT-S on a computer,

they might use other devices to do it such as smartphones and iPad. The Limesurvey version of GERT-S has slight differences in interface when it was on computer and other devices. Participants who did the GERT-S on smartphones could watch the video and pick an emotion option on the same page, while those who did GERT-S on the computer could not. On the other hand, although participants were told to take a short break before conducting the GERT-S in the consent form, they might do the test immediately after completing three scales. This could affect the results as fatigue and mental fatigue might exert impact onto their emotion recognition performance. Also, due to the pandemic situation, participants were able to conduct the three scales and test in wherever they wanted. The environment of the experiment was not controlled in this study.

**Future Study**

After discussing the results of this study, there are several aspects that need to be concerned in the future research. First, future researchers may need to examine the moderation effect of gender upon the relationship between alexithymia and multimodal emotion recognition. The study of Ola and Gullon-Scott (2020) recruited 125 female participants only to examine the relationship between alexithymia and multimodal emotion recognition with TAS-20 and GERT-S. The current study complemented Ola and Gullon-Scott's study by recruiting both male and female participants to examine the relationship. However, our result couldn't explain the effect of male participants on the relationship and future researchers may want to assess the relationship with male participants only to clarify it. Also, further study may be needed to examine the gesture and posture emotion recognition ability of alexithymic individuals.

Second, future research may need to examine how the use of induced and perceived stress measurement may have impacts on the relationship between stress and emotion recognition. In previous studies, it was common to use stressors to induce stress onto

participants to create a stress group and control group, then examine the relationship between perceived stress and emotion recognition. In this study, a perceived stress self-report scale (PSS-14) was used instead to assess participants' stress level which was used to examine the relationship between perceived stress and multimodal emotion recognition. After discussing the results in this study, it may be necessary to examine the relationship between different timing and intensities of perceived stress and multimodal emotion recognition. Alternatively, further study on multimodel emotion recognition may simply be conducted by inducing stress.

Third, future research may need to examine the relationship between emotional schemas and unimodal emotional recognition. In previous research, there was barely any research about the relationship between emotional schemas and emotion recognition. Although previous research provides us insights that emotional schema may be related to emotion recognition (Castro et al., 2015; Hagan et al., 2020; Wright et al., 2018), the results in this study demonstrated that there was no direct relationship between emotional schemas and multimodal emotion recognition. On the other hand, further study may need to be done to replicate the same study but with a different setting where participants are only allowed to watch the videos once. It might be due to the fact that participants were allowed to watch the videos in the GERT-S multiple times which might greatly reduce the individual differences in multimodal emotion recognition performance and reduce the impact of emotional schemas upon multimodal emotion recognition. Future researchers may want to replicate the same study but in a lab setting and limit the frequency of watching videos of participants when doing the GERT-S.

Fourth, further study may need to be conducted to see if there is any moderator to the relationship between emotional schemas and perceived stress that can influence the valence of stress effect to the relationship (positive or negative impact). Also, regarding the relationship between perceived stress and maladaptive emotional schemas, and perceived

stress and multimodal emotion recognition, further study may need to be done over the relationships to examine whether perceived stress is the moderator in the relationship between emotional schemas and multimodal emotion recognition or not.

Fifth, future researchers may need to examine the mediation effect of alexithmia, perceived stress and emotional schemas in the relationships between alexithmia and perceived stress, and alexithymia and emotional schemas. In this study, it was found that there is a significant and positive relationship between alexithmia and perceived stress, and alexithymia and emotional schemas. Previous studies evidented the two relationships, however, no clear studies about the mediation effect of each factor in the relationships. The suggestion here will facilitate researchers' understanding of the effect of alexithymia on perceived stress and emotional schemas. Also, further research may need to be conducted to see if perceived stress is a moderator in the relationship between alexithymia and multimodal emotion recognition.

**Conclusion**

In summary, this study examined the relationship between alexithymia, perceived stress, emotional schema and multimodal emotion recognition. In this study, three self-report scales (TAS-20, PSS-14 and LESS II) and a multimodal emotion recognition test (GERT-S) were used to examine the relationship and explore new insights for the research questions. For the results part, it was found that both alexithymia and emotional schemas couldn't predict multimodal emotion recognition, while perceived positively predicted multimodal emotion recognition. At the same time, there was a significant and positive relationship between alexithymia and perceived stress, perceived stress and emotional schemas, and alexithymia and emotional schemas. The results in this study were consistent with the fourth hypothesis, and were inconsistent with the other hypotheses. Major implications are that alexithymic individuals may have intact multimodal emotion recognition ability, perceived

stress has positive impact over multimodal emotion recognition, emotional schemas may influence an individual's perception of emotions only but not sensitivity towards other's emotions and greater perceived stress may induce more maladaptive emotion schemas. Limitations of this study include the limited sample size of this study, lack of reliability and validity of instrumentation, and lack of experimental control such as couldn't control participants' procedures during the GERT-S and the experimental environment. Future studies that need to be conducted including the moderation effect of gender upon the relationship between alexithymia and multimodal emotion recognition, the relationship between different timing and intensities of perceived stress and multimodal emotion recognition (or the relationship between induced stress and multimodal emotion recognition), the relationship between emotional schemas and unimodal emotional recognition, the same study but participants are only allowed to watch the videos of GERT-S once, to examine the moderator in the relationship between emotional schemas and perceived stress, and etc.

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# Appendices

# Appendix A

Consent form for participants

**Hong Kong Baptist University**

## CONSENT TO PARTICIPATE IN RESEARCH

**Correlational Study in Hong Kong:**

**Emotional Schema, Alexithymia, Perceived Stress and Multimodal Emotion Recognition Ability**

You are being invited to participate in a research conducted by Leung Man Chun, a final year Psychology student from the faculty of Social Science of Hong Kong Baptist University, supervised by Dr. Louis Chan. The purpose of this research is to study the relationship between emotional schema, alexithymia, perceived stress and multimodal emotion recognition ability in Hong Kong. You will spend about 25 minutes to complete a questionnaire and an emotion recognition ability test for the study。

This experiment should not cause any psychological or physical hazard to you. In order to minimize fatigue or discomforts, you are advised to take a short break between conducting the questionnaire and doing the emotion recognition ability test.

Your participation is voluntary. If you decide to participate, you are free to withdraw at any time.

Your email will be collected for data matching in this study. Any personal information or data obtained in this study will remain confidential. They will be preserved and accessible for 6 months after completion of the research. Data recorded in the experiment will be used for research purposes only.

## QUESTIONS AND CONCERNS

If you have any questions or concerns about this research, please feel free to contact the investigator Mr. Leung by email (20631553@life.hkbu.edu.hk), or the supervisor Dr. Louis Chan by email (clouis@hkbu.edu.hk) If you have questions about your rights as a research participant, please contact Research Ethics Committee by email (hkbu_rec@hkbu.edu.hk) or by mail to Graduate School, Hong Kong Baptist University, Kowloon Tong, Hong Kong.

香港浸會大學

# 研究參與同意書

**情緒圖式、述情障礙、感知壓力及多模態情緒辨識能力的香港相關研究**

此乃香港浸會大學心理學系四年級學生之學術研究，此研究旨在探討香港裏的情緒圖式、述情障礙、感知壓力及多模態情緒辨識能力的關係，懇請您抽出大概25-30分鐘填寫一份問卷及完成一個情緒辨識能力測試。

參與是次研究純屬自願性質，是次研究不應對閣下造成任何身心負面後果，如有需要你有權隨時退出，但本研究所搜集到的數據將對情緒圖式、述情障礙、感知壓力及情緒辨識能力的關係提供寶貴資料。為減少因參與研究所致的身心疲倦感，建議閣下完成問卷後先作短暫休息、然後才開始做情緒辨識能力測試。

此研究會收集電子郵件，以便問卷和情緒辨識能力測試結果作資料核對。本研究所收集的資料只作研究用途，閣下的個人資料將絕對保密，並付上此份同意書以保障閣下的私隱，而所收集的資料及本同意書將於研究完成後半年後銷毀。

## 查詢及投訴

如果你對是次研究有任何查詢，歡迎與研究員及其導師聯絡。如果你對你在是次研究的權利有任何疑問，歡迎聯絡相關機構審查委員會作進一步查詢。

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## DECLARATION 聲明

By clicking the AGREE button, I declare that I understand the procedures described above and agree to participate in this study.

我明白理解是次研究程序、條款及細則，並按下「同意」表明我的明白理解及願意且同意參與是次研究。

◯ AGREE/同意

# Appendix B

## Demographic Survey

**Personal Information 個人資料**

Email 電子郵件

Sex 性別

- ◯ Male
- ◯ Female

Age 年齡

University 大學

- ◯ The University of Hong Kong 香港大學
- ◯ The Chinese University of Hong Kong 香港中文大學
- ◯ The Hong Kong University of Science and Technology 香港科技大學
- ◯ City University of Hong Kong 香港城市大學
- ◯ The Hong Kong Polytechnic University 香港理工大學
- ◯ Hong Kong Baptist University 香港浸會大學
- ◯ The Education University of Hong Kong 香港教育大學
- ◯ Lingnan University 嶺南大學
- ◯ Other 其他

Highest Educational Level 最高學歷水平

- ◯ Associate Degree/Bachelor's Degree Year 1 副學士/學士學位一年級
- ◯ Associate Degree/Bachelor's Degree Year 2 副學士/學士學位二年級
- ◯ Bachelor's Degree Year 3 學士學位三年級
- ◯ Bachelor's Degree Year 4 or above 學士學位四年級或以上
- ◯ Master's Degree 碩士學位
- ◯ PHD/Doctoral Degree 博士學位
- ◯ Other 其他

# Appendix C

## Toronto Alexithymia Scale-20

On the following questions, you will find a series of statements which people may use to describe themselves. Read each statement and decide whether or not it describes you. You can think thoughtfully, or make judgments based on your daily behavior or intuition.

在接下來的問題中，你將找到一系列用來描述自己的陳述，閱讀每個陳述並判斷同意描述與否。 你可以深思熟慮，或根據你的直覺做出判斷。

### Part A

Scale 評分標準: 1 (strongly disagree 強烈不同意) - 5 (strongly agree 強烈同意)

| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Q1. I am often confused about what emotion I am feeling. 我常常不清楚自己感受到的是什麼樣的情緒。 | ○ | ○ | ○ | ○ | ○ |
| Q2. It is difficult for me to find the right words for my feelings. 我很難找到恰當的言詞來描述我的感受。 | ○ | ○ | ○ | ○ | ○ |
| Q3. I have physical sensations that even doctors do not understand. 我有一些連醫生也不了解的身體感覺。 | ○ | ○ | ○ | ○ | ○ |
| Q4. I am able to describe my feelings easily. 我能輕易地描述出自己的感受。 | ○ | ○ | ○ | ○ | ○ |
| Q5. I prefer to analyze problems rather than just describe them. 我比較喜歡分析問題而不僅僅是描述它們。 | ○ | ○ | ○ | ○ | ○ |
| Q6. When I am upset, I do not know if I am sad, frightened, or angry. 當我心裡難受時，我分不清究竟是悲傷、害怕還是憤怒。 | ○ | ○ | ○ | ○ | ○ |
| Q7. I am often puzzled by sensations in my body. 我常常被我身體的一些感覺所困惑。 | ○ | ○ | ○ | ○ | ○ |

| | | | | | |
|---|---|---|---|---|---|
| Q7. I am often puzzled by sensations in my body. 我常常被我身體的一些感覺所困惑。 | ○ | ○ | ○ | ○ | ○ |
| Q8. I prefer to just let things happen rather than to understand why they turned out that way. 我寧願任事情發生，而不去瞭解它們為何會發展成那樣。 | ○ | ○ | ○ | ○ | ○ |
| Q9. I have feelings that I cannot quite identify. 我有一些自己難以識別的感受。 | ○ | ○ | ○ | ○ | ○ |
| Q10. Being in touch with emotions is essential. 能夠感受自己內在的情緒是必要的。 | ○ | ○ | ○ | ○ | ○ |
| Q11. I find it hard to describe how I feel about people. 我難以描述我對別人有何感受。 | ○ | ○ | ○ | ○ | ○ |
| Q12. People tell me to describe my feelings more. 別人告訴我要多描述一些我的感受。 | ○ | ○ | ○ | ○ | ○ |
| Q13. 我不知道自己的內心怎麼了。 I do not know what's going on inside me. | ○ | ○ | ○ | ○ | ○ |
| Q14. I often do not know why I am angry. 我常常不知道我為何會覺得生氣。 | ○ | ○ | ○ | ○ | ○ |
| Q15. I prefer talking to people about their daily activities rather than their feelings. 我比較喜歡和別人談論他們的日常活動而不是他們的感受。 | ○ | ○ | ○ | ○ | ○ |
| Q16. I prefer to watch 'light' entertainment shows rather than psychological dramas. 我比較喜歡看〝輕鬆〞的娛樂電影而不是探討心理的劇情片。 | ○ | ○ | ○ | ○ | ○ |

| | | | | | |
|---|---|---|---|---|---|
| Q17. It is difficult for me to reveal my innermost feelings, even to close friends. 即使是對親近的朋友，我也難以表露我內心最深處的感受。 | ○ | ○ | ○ | ○ | ○ |
| Q18. I can feel close to someone, even in moments of silence. 即使在我們沈默的時候，我也能感到與另一個人親密的感覺。 | ○ | ○ | ○ | ○ | ○ |
| Q19. I find examination of my feelings useful in solving personal problems. 我覺得省察自己的感受對於解決個人問題是有用的。 | ○ | ○ | ○ | ○ | ○ |
| Q20. Looking for hidden meanings in movies or plays distracts from their enjoyment. 尋找電影或戲劇中隱藏的意義會使人從享樂中分心。 | ○ | ○ | ○ | ○ | ○ |

# Appendix D

## Perceived Stress Scale-14

The questions in this scale ask you about your feelings and thoughts during the last month. In each case, you will be asked to indicate how often you felt or thought a certain way. Although some of the questions are similar, there are differences between them and you should treat each one as a separate question. The best approach is to answer each question fairly quickly. That is, don't try to count up the number of times you felt a particular way, but rather indicate the alternative that seems like a reasonable estimate.

以下問題是問關於你上個月的感受和想法。 每一條題目都是問你“幾經常”有所描述的感受和想法。 雖然有些題目意思看來十分相近，其實它們是不同的。 你應視它們為獨立的題目作答。 最適合的方法是盡快回答每條問題。 不用準確計算次數的多少，只要作出合理的估計。

### Part B

Scale 評分標準:

0 - never 絕對不會

1 - almost never 大概不會

2 - sometimes 有時會

3 - fairly often 經常會

4 - very often 十分經常會

| | 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| Q1. In the last month, how often have you been upset because of something that happened unexpectedly? 上個月你有幾經常對某些突然發生的事情感到不安？ | ○ | ○ | ○ | ○ | ○ |
| Q2. In the last month, how often have you felt that you were unable to control the important things in your life? 上個月你有幾經常感覺到總是沒法控制生活上重要的事？ | ○ | ○ | ○ | ○ | ○ |
| Q3. In the last month, how often have you felt nervous and "stressed"? 上個月你有幾經常感覺到焦慮和壓力？ | ○ | ○ | ○ | ○ | ○ |

| | | | | | |
|---|---|---|---|---|---|
| Q4. In the last month, how often have you dealt successfully with irritating life hassles? 上個月你有幾經常成功地處理生活上令人煩燥的事？ | ○ | ○ | ○ | ○ | ○ |
| Q5. In the last month, how often have you felt that you were effectively coping with important changes that were occurring in your life? 上個月你有幾經常感覺到有效地處理生活上的重大轉變？ | ○ | ○ | ○ | ○ | ○ |
| Q6. In the last month, how often have you felt confident about your ability to handle your personal problems? 上個月在處理個人問題之能力方面，你有幾經常感到充滿信心？ | ○ | ○ | ○ | ○ | ○ |
| Q7. In the last month, how often have you felt that things were going your way? 上個月你有幾經常感覺到事事順利？ | ○ | ○ | ○ | ○ | ○ |
| Q8. In the last month, how often have you found that you could not cope with all the things that you had to do? 上個月你有幾經常發現你是沒法處理各樣應要做的事？ | ○ | ○ | ○ | ○ | ○ |
| Q9. In the last month, how often have you been able to control irritations in your life? 上個月你有幾經常能控制生活上之煩燥？ | ○ | ○ | ○ | ○ | ○ |

| | | | | | |
|---|---|---|---|---|---|
| Q9. In the last month, how often have you been able to control irritations in your life? 上個月你有幾經常能控制生活上之煩燥？ | ○ | ○ | ○ | ○ | ○ |
| Q10. In the last month, how often have you felt that you were on top of things? 上個月你有幾經常感到事事駕輕就熟？ | ○ | ○ | ○ | ○ | ○ |
| Q11. In the last month, how often have you been angered because of things that happened that were outside of your control? 上個月你有幾經常對某些屬於你控制範圍以外的事而發怒？ | ○ | ○ | ○ | ○ | ○ |
| Q12. In the last month, how often have you found yourself thinking about things that you have to accomplish? 上個月你有幾經常在思想一些務要達到的事？ | ○ | ○ | ○ | ○ | ○ |
| Q13. In the last month, how often have you been able to control the way you spend your time? 上個月你有幾經常能控制你對時間的分配？ | ○ | ○ | ○ | ○ | ○ |
| Q14. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them? 上個月你有幾經常感覺到有很多困難而未能克服？ | ○ | ○ | ○ | ○ | ○ |

# Appendix E

## Leahy Emotional Schema Scale II

We are interested in how you deal with your feelings or emotions—for example, how you deal with feelings of anger, sadness, anxiety, or sexual feelings. We all differ in how we deal with these feelings—so there are no right or wrong answers. Please read each sentence carefully and answer each sentence—using the scale below—as to how you deal with your feelings during the past month. Pick the number of your response next to the sentence.

我們對於你如何應對自己的感受或情緒感到興趣，例如你如何應對憤怒、悲傷、焦慮或性慾感受。我們在如何應對這些感受之上有所差異，所以並沒有錯對之分。請細閱下列每項描述並利用以下評分標準回答每個問題，作答時請回想過去的一個月裏你是如何應對你的感受，並選擇你的答案。

### Part C

Scale 評分標準:

1 - very untrue of me 對自己非常不真實的描述

2 - somewhat untrue of me 對自己部分不真實的描述

3 - slightly untrue of me 對自己少部分不真實的描述

4 - slightly true of me 對自己少部分真實的描述

5 - somewhat true of me 對自己部分真實的描述

6 - very true of me 對自己非常真實的描述

| | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| Q1. I often think that I respond with feelings that others would not have. 我經常認為我作出他人沒有的情緒反應。 | ○ | ○ | ○ | ○ | ○ | ○ |
| Q2. Some feelings are wrong to have. 有些感受是不應該有的。 | ○ | ○ | ○ | ○ | ○ | ○ |
| Q3. There are things about myself that I just don't understand. 我就是不能理解某部分的自己。 | ○ | ○ | ○ | ○ | ○ | ○ |
| Q4. I believe that it is important to let myself cry in order to get my feelings "out". 我認為容許自己哭從而讓自己的感受「得到釋放」是重要的。 | ○ | ○ | ○ | ○ | ○ | ○ |

| | | | | | | |
|---|---|---|---|---|---|---|
| Q5. If I let myself have some of these feelings, I fear I will lose control. 我擔心如果我容許自己有某些感受，我會因而失控。 | ○ | ○ | ○ | ○ | ○ | ○ |
| Q6. Others understand and accept my feelings. 其他人理解並接納我的感受。 | ○ | ○ | ○ | ○ | ○ | ○ |
| Q7. My feelings don't make sense to me. 我的感受對我而言是莫名其妙的。 | ○ | ○ | ○ | ○ | ○ | ○ |
| Q8. If other people changed, I would feel a lot better. 如果其他人有所改變，我會感覺好很多。 | ○ | ○ | ○ | ○ | ○ | ○ |
| Q9. I sometimes fear that if I allowed myself to have a strong feeling, it would not go away. 有時我害怕如果我允許自己出現強烈的感受，這些感受不會消失。 | ○ | ○ | ○ | ○ | ○ | ○ |
| Q10. I feel ashamed of my feelings. 我為我的感受感到羞愧。 | ○ | ○ | ○ | ○ | ○ | ○ |
| Q11. Things that bother other people don't bother me. 困擾其他人的事情並不會困擾我。 | ○ | ○ | ○ | ○ | ○ | ○ |
| Q12. No one really cares about my feelings. 沒有人真正在意我的感受。 | ○ | ○ | ○ | ○ | ○ | ○ |

| | | | | | | |
|---|---|---|---|---|---|---|
| Q13. It is important for me to be reasonable and practical rather than sensitive and open to my feelings. 對我而言，理性並務實地對待我的感受是重要的，而非敏感並持開放態度。 | ○ | ○ | ○ | ○ | ○ | ○ |
| Q14. When I feel down, I try to think of the more important things in life---what I value. 當我情緒低落時，我嘗試去想生命中更重要的事情 – 我重視的事情。 | ○ | ○ | ○ | ○ | ○ | ○ |
| Q15. I feel that I can express my feelings openly. 我覺得我可以公開地表達我的感受。 | ○ | ○ | ○ | ○ | ○ | ○ |
| Q16. I often say to myself, "What's wrong with me?" 我經常問自己：「我到底出了甚麼問題?」 | ○ | ○ | ○ | ○ | ○ | ○ |
| Q17. I worry that I won't be able to control my feelings. 我擔心我不能控制自己的情緒。 | ○ | ○ | ○ | ○ | ○ | ○ |
| Q18. You have to guard against having certain feelings. 你需要提防某些感受的出現。 | ○ | ○ | ○ | ○ | ○ | ○ |
| Q19. Strong feelings only last a short period of time. 強烈的感受只會維持一段短時間。 | ○ | ○ | ○ | ○ | ○ | ○ |
| Q20. I often feel "numb" emotionally---like I have no feelings. 我經常覺得麻木 – 就象我沒有感受。 | ○ | ○ | ○ | ○ | ○ | ○ |
| Q21. Other people cause me to have unpleasant feelings. 其他人令我有不好的感受。 | ○ | ○ | ○ | ○ | ○ | ○ |

| | | | | | | |
|---|---|---|---|---|---|---|
| Q22. When I feel down, I sit by myself and think a lot about how bad I feel. 當我情緒低落時，我會獨坐一處不停思考我的感受有多差。 | ○ | ○ | ○ | ○ | ○ | ○ |
| Q23. I like being absolutely definite about the way I feel about someone else. 我喜歡絕對肯定自己對別人的感受。 | ○ | ○ | ○ | ○ | ○ | ○ |
| Q24. I accept my feelings. 我接納自己的感受。 | ○ | ○ | ○ | ○ | ○ | ○ |
| Q25. I think that I have the same feelings that other people have. 我認為我與其他人有相同的感受。 | ○ | ○ | ○ | ○ | ○ | ○ |
| Q26. There are higher values that I aspire to. 我追求更高的價值。 | ○ | ○ | ○ | ○ | ○ | ○ |
| Q27. I think it is important to be rational and logical in almost everything. 我認為在近乎所有事中保持理性和邏輯是重要的。 | ○ | ○ | ○ | ○ | ○ | ○ |
| Q28. I like being absolutely definite about the way I feel about myself. 我喜歡絕對肯定自己對自己的感受。 | ○ | ○ | ○ | ○ | ○ | ○ |

# Appendix F

Short Version of Geneva Emotion Recognition Test (Examples of Instruction)

(English Version)

## How well can you recognize emotions?

**This test measures your ability to recognize emotions expressed in a speaker's face and voice during a brief utterance.**

**It will take you between 10 and 15 minutes to complete the test.**

**You will see a series of short videos in which different actors express several emotions during a short speech-like utterance. Your task is to select the emotion word which best describes the emotion the actor wanted to express in the respective video. While it is often quite clear which emotion is intended, in some cases it is more difficult to judge which emotion is shown. If this is the case, just trust your intuition and guess which emotion might be expressed. Please put on your earphones to hear the sound.**

**Please complete the test in one go, without any interruption.**

**Attention: Please deactivate any add-ons or software that prevents your browser from accessing external sites, such as ad-block programs, for the duration of the test. The videos in this test might otherwise not be displayed correctly.**

## How well can you recognize emotions?

**We will now present a series of short videos in which different actors express various emotions. After each video, 14 emotion words are presented, arranged in a circle that will help you to rapidly select the appropriate emotion - as shown below:**

## How well can you recognize emotions?

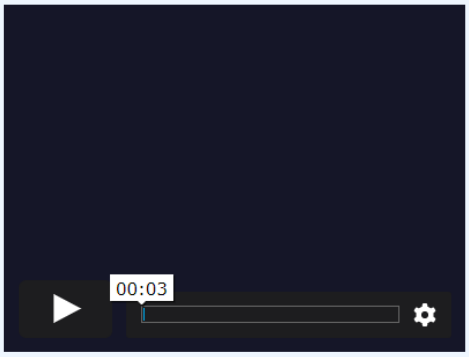
**For the purpose of this study, the emotion terms can be defined as follows:**

| | |
|---|---|
| Pride | Feeling of triumph following a success or a personal achievement |
| Anger | Extreme displeasure caused by someone's unfair or hostile action |
| Joy | Feeling elicited by a fabulous thing that occurred unexpectedly |
| Irritation | Experiencing displeasure at something or someone while still remaining calm |
| Amusement | Laughing at something that is very funny |
| Disgust | Revulsion caused by an unpleasant object or environment |
| Pleasure | Experiencing a feeling of well-being and sensual delight |
| Sadness | Feeling down after the loss of a person, place, or thing |
| Relief | Feeling reassured at the end or resolution of an uncomfortable, unpleasant, or even dangerous situation |
| Despair | Distress at a life problem with no solution, together with an unwillingness to accept the situation |
| Interest | Being fascinated or having one's attention captured by a person or a thing |
| Fear | Being faced with an imminent danger that threatens our physical well-being |
| Surprise | Being faced with an unexpected and unusual event (without positive or negative connotation) |
| Anxiety | Fear of or worry about the consequences of a situation that could be unfavorable for oneself or someone close |

## How well can you recognize emotions?

**After having watched a video, please select the emotion word that best describes the emotion the actor wanted to express.**
**Please note: As the actors' utterances consist of a sequence of meaningless syllables, you will not be able to understand any words.**
**You can watch each video only once.**

**Please play the example video below to make sure you hear the sound. If necessary, adjust the sound volume for comfortable listening.**
**Click "Continue" to watch three more example videos and to practice the judgment procedure.**



# Appendix G

Short Version of Geneva Emotion Recognition Test (Examples of Instruction)

(Chinese Version)

**您辨識他人情緒的能力如何？**

這個測驗評估您從人臉與聲音以辨識此人情緒的能力。

需花您**10-15**分鐘就可以完成測驗。

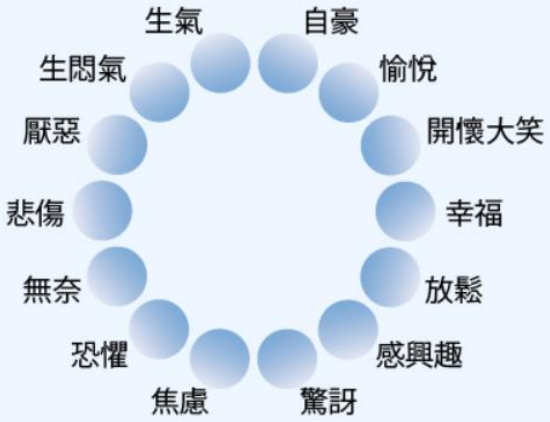
您將會看到一系列的影片，其中的人物會表達不同的情緒。 您的任務是選擇最能說明影片人物所表達情緒的詞彙。在某些情況，這測驗可能相當困難，但請相信自己的直覺，人們的第一直覺通常是最好的。 請您戴上耳機，聆聽聲音。

您需要一次完成所有測驗而不中斷。

**Attention: Please deactivate any add-ons or software that prevents your browser from accessing external sites, such as ad-block programs, for the duration of the test. The videos in this test might otherwise not be displayed correctly.**

**您辨識他人情緒的能力如何？**

我們將呈現一系列不同人表達各種情感的影片，在每個影片之後，會出現**14**個情緒的詞彙排成一圈，這將有助於您快速選擇合適的情緒：




**您辨識他人情緒的能力如何？**

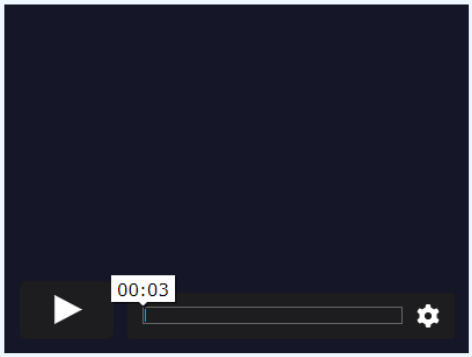
為了此研究的目的，情緒詞彙定義如下：

| | |
|---|---|
| 自豪 | 在成功或是獲得個人成就之後，會有的感覺 |
| 生氣 | 對於他人不公平或有敵意的行動引起極度的不滿 |
| 愉悅 | 不預期下發生驚喜事件，會有的感覺 |
| 生悶氣 | 對於某事或某人感到不滿，但仍要保持冷靜 |
| 開懷大笑 | 對某件很好笑的事情大笑 |
| 厭惡 | 對不愉快的人或環境，感到反感 |
| 幸福 | 體驗健康、快樂與愉悅的感覺 |
| 悲傷 | 在失去人、地或事物之後，情緒低落 |
| 放鬆 | 在解決不舒服、不愉快或是危險的情況之後，感覺放心 |
| 無奈 | 對於沒有解決方法的生活問題，還有不願接受的情況，感到苦惱 |
| 感興趣 | 感覺著迷或被某人、某事物吸引注意力 |
| 恐懼 | 正面臨著威脅身體健康的危險 |
| 驚訝 | 正面臨意想不到和不尋常的事件（沒有正面或負面的內涵） |
| 焦慮 | 害怕或擔心事件所造成的後果，可能對自己或身邊的人不利 |

## 您辨識他人情緒的能力如何？

看完影片之後，請選影片人物所表達的情緒詞彙，按旁邊的圓圈。
請注意：影片中人物會發出一些無意義的聲音，您將無法瞭解那些聲音的含義。
每個影片您只能看一次。

請打開下面的範例影片，以確保您有聽到聲音，並在必要時調整音量。
接下來，您將看到三個練習用的範例影片。



# Appendix H

Short Version of Geneva Emotion Recognition Test (Examples of Videos)