

Running head: Investigating the Relationship of Self-reported Emotions and Expression of emotions

Investigating the Relationship of Self-reported Emotions and Expression of Emotions in both  
Free and Suppressed Conditions

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*This thesis is submitted in partial fulfilment of the Honours degree of Bachelor of Psychological  
Science (Honours)*

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October 2019

Word Count: 9000

# INVESTIGATING THE RELATIONSHIP OF SELF-REPORTED EMOTIONS AND EXPRESSION OF EMOTION

## Table of Contents

List of Figures .....	5
List of Tables .....	6
Abstract .....	7
Declaration .....	8
Acknowledgments .....	9
Chapter One: Introduction .....	10
1.1 Overview .....	10
1.2 Psychological theories of emotion .....	11
1.3 Evidence for interfering emotional states from facial expressions .....	12
1.4 Gaps in literature and implications .....	14
1.5 Suppression of expression of emotion .....	15
1.6 Facial Feedback Hypothesis: Influencing internal emotions .....	16
1.7 Personality traits that influence expression pf emotion .....	17
1.8 Measures of expression.....	18
1.9 Current study.....	21
1.9.1 Project aims.....	21
Chapter two: Method .....	23
2.1 Participants .....	23
2.2 Apparatus and materials .....	23
2.2.1 Equipment.....	23

INVESTIGATING THE RELATIONSHIP OF SELF-REPORTED EMOTIONS AND  
EXPRESSION OF EMOTION

2.2.2 FACS Machine algorithm.....23

2.3 Questionnaires .....24

2.3.1 PANAS-X ( Watson & Clark, 1999).....24

2.3.2 IPIP Big-five factor markers ( Goldberg, 1992).....24

2.4 Stimuli .....25

2.5 Procedures .....26

Chapter three: Results .....28

3.1 Preliminary analysis .....28

3.1.1 Data Screening .....28

3.2 Overall aim: Investigate the relationship between self-reported emotion and  
expression of emotion in free and suppressed conditions .....31

3.3 Aim1 : Are some emotions harder to suppress than others? .....32

3.4 Aim 2: Explore whether suppression influences the experience of emotion as an  
indirect test of the FFH.....34

3.5 Aim 3: Consider whether personality traits influence expression of emotion .....35

Chapter four: Discussion.....39

4.1 Overview .....39

4.2.1 Overall aim: Investigate the relationship of self-reported emotions and  
expression of emotion in both free and suppressed conditions .....39

4.2.2 Aim 1: Whether some emotions are harder to suppress than others .....40

INVESTIGATING THE RELATIONSHIP OF SELF-REPORTED EMOTIONS AND  
EXPRESSION OF EMOTION

4.2.3 Aim 2: Explore whether suppress influences the experience of emotion as an indirect measure of the FFH .....42

4.2.4 Aim 3: Consider whether personality traits influence expression of emotion. In particular, does extraversion correlate positively with expression? .....43

4.3 Clinical implications .....44

4.4 Strengths and limitations .....46

4.5 Conclusions .....49

References .....50

Appendices .....57

Appendix A .....57

Appendix B .....58

Appendix C .....60

Appendix D .....61

Appendix E.....62

Appendix F .....64

Appendix G .....65

Appendix H .....70

INVESTIGATING THE RELATIONSHIP OF SELF-REPORTED EMOTIONS AND  
EXPRESSION OF EMOTION

**List of Figures**

Figure 1: Facial Expressions of Emotion using FACS (FACS; Ekman & Friesen, 1978)

# INVESTIGATING THE RELATIONSHIP OF SELF-REPORTED EMOTIONS AND EXPRESSION OF EMOTION

## List of Tables

Table 1: *Descriptive Statistics of the Current Sample (N=37)*

Table 2: *Descriptive Statistics of Self-Report, Expression and Personality measures*

Table 3: *Spearman correlation between the self-reported scores and the expression scores in both free and suppressed condition.*

Table 4: *Wilcoxon rank sum test results on the Action Units*

Table 5: *Bootstrap linear regression coefficients of the outcome and predictors.*

Table 6: *Spearman correlation between the expression scores and the personality traits Extraversion and Emotional stability*

# INVESTIGATING THE RELATIONSHIP OF SELF-REPORTED EMOTIONS AND EXPRESSION OF EMOTION

## **Abstract**

The relationship between self-reported emotion and expression of emotion has long been debated. Theories of emotion accept that there is coherence between the two. However, evidence has been found that the relationship does not truly exist. Furthermore, research into the relationship in suppressed conditions is minimal. The aim of the study is to further gain insight on the relationship between self-reported emotion and expression of emotion under both free and suppressed conditions. Using a within-subjects design, a sample of 37 participants took part in the lab study. Participants were asked about demographics, personality and mood measures. Subsequently they were shown several short videos to elicit neutral mood, happiness and disgust while their facial expressions were filmed. They also filled out a mood self-report after each video. The coherence of self-reports and expression in both conditions were compared. The results of the analyses indicated that there was not a significant relationship between the free condition and the suppressed condition. Similar to many studies into emotion, the artificial setting was a limitation when trying to capture and elicit natural emotional responses. Nevertheless, the study provides insight into existing knowledge and fills gaps by looking at suppression to understand the overall concept of human emotion.

# INVESTIGATING THE RELATIONSHIP OF SELF-REPORTED EMOTIONS AND EXPRESSION OF EMOTION

## **Declaration**

This thesis contains no material which has been accepted for the award of any other degree of diploma in any University, and, to the best of my knowledge, this thesis contains no material previously published except where due reference is made. I give permission for the digital version of this thesis to be made available on the web, via the University of Adelaide's digital thesis repository, the Library Search and through web search engines, unless permission has been granted by the School to restrict access for a period of time.

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October, 2019



# INVESTIGATING THE RELATIONSHIP OF SELF-REPORTED EMOTIONS AND EXPRESSION OF EMOTION

## **Acknowledgements**

First and foremost, I would like to deeply thank my primary supervisor Assoc. Professor Carolyn Semmler. Your encouragement and support throughout the year in particular stressful periods was greatly appreciated. Thank-you for your guidance and expertise throughout the year and trusting in my work.

I would also like to thank the team at DST Group who helped contribute to the current study. I appreciate all the time taken out to help set up equipment, make sure the technological side of things were taken care of and the quick responses to any issues.

A very special thank-you to my family who have provided love and support endlessly and sacrificed greatly for me to be able to pursue my endeavours. Thank-you to my amazing friends and those closest to me for sharing my excitement and always being there for me.

# INVESTIGATING THE RELATIONSHIP OF SELF-REPORTED EMOTIONS AND EXPRESSION OF EMOTION

## Chapter one: Introduction

### 1.1 Overview:

Studying the role of facial expressions has always been an interest to science and researchers around the world due to its importance in understanding human emotions and behavior (Mandal & Awasthi, 2014). Facial expressions are experienced in everyday life as they affect how we communicate with others in conversations face to face, as well as via technology such as smart phones and computers (Barrett et al, 2019). Exchanging photos on Snap Chat or sending emoji's on other social media platforms is one example of how society has endorsed the value of expressions of emotions. Facial expressions are also suggested to help when deciding how to navigate relationships. A decision about who to trust or who to help or love can all be determined, in part, on facial expressions (Todorov, 2017). However, to what extent is the experience of emotion related to facial expressions? Can we really infer the internal emotions of a person based upon their facial expressions? The answer to this question has implications for real-world settings including border-security, the courtroom, the classroom, and computer software design and may be informed by the existing research on facial expressions and experiences of emotion (Fernandez-Dols & Russel, 2017). For many years research has accepted that facial expressions are regarded as the most significant source of information when trying to distinguish ones emotions due to a belief that there is a coherent emotional response that maps to facial expressions (Fernandez-Dols et al. 1997). However many studies have not found the coherent relationship reported to exist by other authors.

The current project aims to address this by investigating the relationship between self-reported emotions and expressions of emotion, in an attempt to clarify the relationship. The

## INVESTIGATING THE RELATIONSHIP OF SELF-REPORTED EMOTIONS AND EXPRESSION OF EMOTION

following chapter reviews the theories of expression of emotion as well as the existing literature providing evidence for factors that could be influencing this relationship.

### **1.2 Psychological theories of expression of emotion**

To understand theories of expression of emotion, it is important to begin with a brief history on the development of the research field. The psychological theory of expression of emotion began and has been influenced by the work of Charles Darwin; *The Expressions of Emotions in Man and Animals* (1872) which was based upon his theory of evolution (Darwin, 1872). Darwin proposed that expression of emotion is evolutionary, adaptive and used for communicative functions (Hess & Thibault, 2009). He had no doubt, that internal emotions would cause specific facial muscle movements and in turn, expressions. These expressions sufficed communicative value as outward manifestations of an internal state (Hess & Thibault, 2009; Fernandez-Dols & Russel, 2017). Commencing from Darwin's work, research into facial expressions has developed many theoretical perspectives including the two dominating theories, the evolutionary-biological approach and the sociocultural approach (Mandal & Awasthi, 2014). As proposed by Darwin, the evolutionary-biological approach suggests that emotions are biologically activated and that expressions of emotions help individuals regulate in the social world and in turn increase survival (Darwin & Prodger, 1998; Mandal & Awasthi, 2014). Research supporting the approach found that when individuals across different cultures experience the same emotion, the same facial expressions would be displayed (Izard, 1994; Ekman 1984). Alternatively, the sociocultural approach suggested that the development of facial expressions of emotions are the result of a socialisation process and constructed by culture in terms of how emotions are expressed and shaped (Mandal & Awasthi, 2014). Through socialisation, individuals learn to

## INVESTIGATING THE RELATIONSHIP OF SELF-REPORTED EMOTIONS AND EXPRESSION OF EMOTION

express their internal emotions and sequentially learn through social and emotional interactions (Mesquita & Albert, 2007). Both of the dominating approaches as well as other psychological theories have been the basis of the stream of research studies conducted investigating the relationship of experienced emotion and expression of emotion including the highly influential research by Paul Ekman.

### **1.3 Evidence for inferring emotional states from facial expressions**

In the past 50 years, Ekman's research on developing the popular framework known as the Basic-Emotion Approach was the foundation of numerous studies investigating the relationship. The popular framework hypothesizes that occurrences of an emotional category (for example the emotion, anger) are expressed with facial movements that can vary slightly around a typical set of movements known as a prototype (Ekman, 1992; Barrett et al, 2019). This prototype is perceived as able to diagnose a person's emotional state in a similar way that fingerprints can be used to identify an individual (Barrett et al, 2019). The theory explains that any variation in expression is often a result of independent processes not the emotion itself, such as adhering to display rules or cultural beliefs (Ekman & Cordaro, 2011; Matsumoto, 1990). Ekman also proposed the discrete emotional model which suggests there are six universal emotions: surprise, happiness, disgust, anger, fear and sadness (Barrett et al, 2019). Consequently, the common view for the relationship of experience of emotion and expression of emotion has remained positive in research for a long time.

Evidence for the common view includes a study conducted by Ekman, Friesen and Ancoli (1980). It found that spontaneous facial expression provided accurate information about

## INVESTIGATING THE RELATIONSHIP OF SELF-REPORTED EMOTIONS AND EXPRESSION OF EMOTION

emotional experience. The study consisted of 35 Caucasian females who were video recorded while viewing emotion eliciting motion pictures and then reported their emotions. In the happy condition, only seven subjects never showed Action Unit 12 (associated with happiness) and reported to be less happy than those who did show Action unit 12 ( $M = 3.74$ ),  $t(32) = 2.44$ ,  $p < .02$ . The authors found that a relationship existed, and how much facial expression was shown related to the intensity of self-reported emotion (Ekman, Friesen & Ancoli, 1980). A limitation to this study however was that the elicitor used was not very effective for creating an expected emotional response (Nordstokke 2005). This is often a main limitation in many similar studies (Fernandez-Dols et al. 1997; Nordstokke 2005; Barrett et al, 2019)

Another study providing evidence for the common view was found using a within subjects design. The researchers wanted to test the coherence between emotion and facial expression. Similar to the study above, participants viewed films to elicit negative emotions and afterwards, provided reports on how they felt (Rosenberg & Ekman 1994). Coherence was found, however only when a new variable measuring the intensity of the reported emotion was added. Nonetheless, the authors mentioned that the findings could still be an artefact (Rosenberg & Ekman, 1994).

To sum up, a meta-analysis conducted in 2018 reported findings showing that there was a statistically significant association between internal emotions and facial expressions (Durán & Fernández-Dols, 2018). Apart from fear, in all other emotion categories participants moved the specific facial muscles identified by the expression more reliability than what is expected by chance. However, reliability levels were weak and effect sizes ranged from .25 to .38, demonstrating that the association is quite low for the purpose of reasonably predicting how

## INVESTIGATING THE RELATIONSHIP OF SELF-REPORTED EMOTIONS AND EXPRESSION OF EMOTION

individuals display emotions (Durán & Fernández-Dols, 2018). The conclusion of the meta-analysis are not the only findings reported that go against the common view.

Fernandez-Dols et al., (1997) conducted a similar laboratory experiment and had university students watch film eliciting an emotion category and provided subjective reports while their face was recorded by a concealed camera. The study did not find the same coherence claimed by the authors above. Only one case of coherence out of 14 reports of disgust were measured, zero for surprise and 2 reports of fear alone. The researchers also found that some participants who would report one type of emotion sometimes showed a completely different prototype of emotion (Fernandez-Dols et al. 1997). Similar limitations were reported, such as a limited sample size and that the stimuli used to elicit those emotions may not have been effective. Regardless, using emotionally loaded films is perceived as the least problematic emotion induction technique (Phillipot, 1993). Even so, comparable findings were reported by Tourangeau and Ellsworth, (1979) who found zero correlations between facial expressions and reported emotions.

### **1.4 Gaps in the Literature and Implications**

It is clear that the debate on whether internal emotions and expression of emotions are linked is still occurring. Unfortunately, as researchers have not yet come to agree upon a general consensus of the relationship, consumers of this research are not provided a clear guidance of understanding what facial expressions might reveal about emotions (Barrett et al., 2019). Consumption of this research has been translated to the everyday setting and the consequences can often be vital. An example of how consumption of this research may be dangerous lies in the court room. Judges and jurors often use facial expressions to help them determine whether a

## INVESTIGATING THE RELATIONSHIP OF SELF-REPORTED EMOTIONS AND EXPRESSION OF EMOTION

defendant is guilty or remorseful (Bandes, 2014). Such a conclusion if incorrect can cost a defendant their freedom. It is clear that there is a need to clarify the research, and correct public perceptions regarding emotion detection from facial expressions.

Another major gap found in the literature is the lack of studies investigating the relationship under suppressed conditions. Only very few studies have directly investigated aspects of emotional expression when subjects are consciously inhibiting their expressions when emotionally aroused (Gross & Levenson, 1993). Understanding what the relationship is like under suppressed conditions could be a significant finding to further understanding emotion and behaviour in social situations. One study that has provided insight was conducted by Gross and Levenson (1993) who recruited 85 participants who watched films eliciting emotion in either suppressed or non-suppressed conditions and filling out self-reports. The findings showed that suppression had no impact on the subjective experience of emotion (Gross & Levenson, 1993). This is a matter that should be explored further.

Another understudied aspect of this research area is the extent of variation within individuals and the factors that may influence this relationship. Such factors include testing to see whether some emotions are harder to suppress than others, understanding if suppression may result in an indirect measure of the facial feedback hypothesis and lastly determining if personality factors play a role in how expressive individuals are. The research into these factors will be discussed in further detail.

### **1.5 Suppression of the Expression of Emotions**

It is possible that some emotions may be harder to suppress than others and that could influence the relationship between felt and expressed emotion. In this case, we focus on whether

## INVESTIGATING THE RELATIONSHIP OF SELF-REPORTED EMOTIONS AND EXPRESSION OF EMOTION

a positive emotion such as happiness may be harder to suppress than a negative emotion such as disgust. Some evidence has been found for difficulties in suppress using a study where participants viewed an image eliciting disgust, fear, sadness, happiness and neutral emotion and responded to each image with either a genuine or deceptive expression (Porter & Brinke, 2008). The study found that in comparison to genuine emotions, masked emotions were associated with more elevated blink rate and unpredictable expressions. They also demonstrated that negative emotions were harder to falsify than happiness (Porter & Brinke, 2008). A second study conducted a few years later showed evidence in support for Darwin's inhibition hypothesis: When a concealed emotion has a strong intensity, some expressions of emotions cannot be consciously inhibited (Porter, Brinke & Wallace, 2012; Darwin, 1872). The study investigated emotional leakage in deceptive facial expressions and the results strongly suggested that the high intensity emotion resulted in more leakage and was harder to conceal. Further results showed that the least amount of emotional leakage happened during happiness and fearful expressions (Porter, Brinke & Wallace, 2012). Unfortunately, few studies have examined the differences among genuine and masked or neutralized expressions in any basic emotions other than happiness (Ekman, Davidson & Frieson, 1990).

### **1.6 Facial Feedback Hypothesis: Influencing Internal Emotions**

The facial feedback hypothesis (FFH) is a psychological theory that suggests that expressive behaviour such as muscular movements of the face can regulate or activate emotions (McIntosh, 1996). There have been multiple studies designed to investigate the facial feedback hypothesis and the evidence has generally favoured the hypothesis (Alam et al, 2008; Duclos et al, 1989,



## INVESTIGATING THE RELATIONSHIP OF SELF-REPORTED EMOTIONS AND EXPRESSION OF EMOTION

Strack, Martin & Stepper, 1988; Soussignan, 2002). Strack, Martin and Stepper (1988)

investigated the FFH by asking subjects to hold a pen in their mouth intended to either inhibit or facilitate muscles characteristically associated with smiling. Their subjects reported more intense emotional responses while watching a humorous stimuli in the facilitated condition than the inhibited condition, showing evidence supporting the FFH (Strack, Martin & Stepper, 1988). A more recent study was successful in replicating the Strack, Martin and Stepper (1988) study however, wanted to examine the effects of attention on FFH as well as the effects in non-western cultural settings (Dzokoto et al, 2014). The results reported were in support of the FFH and also found that attention to emotion can interfere with FFH process (Dzokoto et al, 2014). A recent meta-analysis published in June of 2019 evaluated the combined evidence for the FFH from 138 different studies. The evidence supported the FFH claim however the effect sizes tend to be small and heterogeneous  $d = 0.20$ , 95% CI [0.14, 0.26],  $t(137) = 6.42$ ,  $p < .05$  (Coles, Larsen & Lench, 2019). The FFH can be interpreted as a potential factor that can influence the relationship between felt emotions and expressed emotions in suppressed conditions. If the hypothesis is correct, it can be expected that the self-reported emotion will be lower in the suppressed condition compared to the expressed emotion condition.

### **1.7 Personality traits that influence expression of emotion**

Personality is an additional factor that research has found to play significant role in individual emotional experience. In particular the personality traits such as extraversion have been found by researchers to be able to predict and be connected to emotional expression (Friedman, 1979; Gross & John, 1995). The positive relationship has also been found regardless

## INVESTIGATING THE RELATIONSHIP OF SELF-REPORTED EMOTIONS AND EXPRESSION OF EMOTION

of the type of expressive measure (Riggio & Riggio, 2002). As a conceptual framework, personality traits such as extraversion and neuroticism are expected to influence how individuals evaluate signals, the kinds of situations they find themselves in and in turn the intensity of their emotional responses (Gross, Johns & Richards, 2000). This is fathomable as extraverts are generally known to have exaggerated displays of emotional expressions and gestures when they are talking (Freyd, 1924). A study completed by Wu et al. (2018) reported findings that support the relationship, by recruiting 2644 Chinese college students. Results showed that there was a significant positive correlation between emotional expression and extraversion (Wu et al, 2018). Opposing evidence however comes from a study where extraversion predicted positive emotion expression ( $\beta = .34, p < .05$ ) though not the interaction between emotional expression and emotional experience ( $\beta = .13, p > .05$ ) (Gross, Johns & Richards, 2000). In summary, the literature suggests that extraversion may play a role in whom is expressive, however the effect it has on the relationship between self-reported emotion and expression of emotion is undetermined.







### **1.8 Measures of Facial Expression**

In the healthy human face there are 34 muscle groups that are evenly distributed on either side of the face and work together to make facial patterns (Barrett et al, 2019). In research, there are three main procedures used when measuring facial muscle movements. The first being electromyography which measures electrical activity from the muscle movements however, this method is flawed due to its impracticality (Barrett et al, 2019), with participants having to have electrodes placed on their face. Secondly, human coders can be used to specify the presence of



















## INVESTIGATING THE RELATIONSHIP OF SELF-REPORTED EMOTIONS AND EXPRESSION OF EMOTION

muscle movements yet, this method takes extensive and intensive training time. This problem can be addressed using computer-vision algorithms utilizing the systematic approach called the Facial Activation Coding System (FACS) (Martinez & Du, 2012). FACS was designed by Ekman, Friesen and Hagger, (2002) as a systematic approach to measuring and describing facial muscle movements that occur (Ekman, Friesen & Hagger, 2002). Using FACS, a machine algorithm is able to describe not only the presence but the intensity of facial movements and presents them as specific Action Units (AU). Each AU corresponds with a particular facial muscle that is visible, such displays can be seen in Figure 1. In comparison, FACS shows higher accuracy than human coders (>90%) (Barrett et al, 2019). Considering this, the most efficient method of measuring facial expressions for the current study will be using the FACS approach with a machine learning algorithm developed from the team at DST Group.

Figure 1: *Facial Expressions of Emotion using FACS (FACS; Ekman & Friesen, 1978)*

AU	Description	Facial Muscles Activated		AU	Description	Facial Muscles Activated	
1	Inner Brow Raiser	<i>Frontalis (pars medialis)</i>		15	Lip-Corner depressor	<i>Depressor angulioris</i>	
2	Outer Brow Raiser	<i>Frontalis (pars lateralis)</i>		16	Lower-Lip depressor	<i>Depressor labii inferioris</i>	
4	Brow Lowerer	<i>Corrugator supercilii, depressor supercilii</i>		17	Chin Raiser	<i>Mentalis</i>	

INVESTIGATING THE RELATIONSHIP OF SELF-REPORTED EMOTIONS AND EXPRESSION OF EMOTION

5	Upper-Lid Raiser	<i>Levator palpebrae superioris</i>		18	Lip Pucker	<i>Incisiviilabii superioris and incisiviilabii inferioris</i>	
6	Cheek Raiser	<i>Orbicularis oculi (pars orbitalis)</i>		20	Lip Stretcher	<i>Risorius with platysma</i>	
7	Lid Tightener	<i>Orbicularis oculi (pars palpebralis)</i>		22	Lip Funneler	<i>Orbicularis oris</i>	
9	Nose Wrinkle	<i>Levatorlabii superioris alaquae nasi</i>		23	Lip Tightener	<i>Orbicularis oris</i>	
10	Upper-Lip Raiser	<i>Levatorlabii superioris</i>		24	Lip Pressor	<i>Orbicularis oris</i>	
11	Nasolabial Deepener	<i>Zygomaticus minor</i>		25	Lip Part	<i>Depressor labii inferioris or relaxation of mentalis, or orbicularis oris</i>	
12	Lip-Corner Puller	<i>Zygomaticus major</i>		26	Jaw Drop	<i>Masseter, relaxed temporalis and internal pterygoid</i>	
13	Cheeks Puffer	<i>Levatoranguli oris</i>		27	Mouth Stretch	<i>Pterygoids, digastric</i>	
14	Dimpler	<i>Buccinator</i>		28	Lip Suck	<i>Orbicularis oris</i>	

Note. AU = action unit.

# INVESTIGATING THE RELATIONSHIP OF SELF-REPORTED EMOTIONS AND EXPRESSION OF EMOTION

## **1.9 Current Study**

Studying the role of facial expressions is important in understanding human emotions and behaviour. Despite the abundance of literature debating whether there is a link between experience of emotion and expression of emotion, there are no clear guidelines for consumers of research to confidently work on. This can have implications for the practical application of emotion detection in applied setting such as the courtroom – but also for the development of emotion detection software – which is based on the premise that a strong relationship exists. The lack of research on the relationship under suppressed conditions is also a confounding factor that should be investigated further. Finally, variations in individual differences may influence this relationship. Such variations include whether negative or positive emotions are harder to suppress, whether expression or suppression influences the internal experience as an indirect measure of the FFH and lastly whether personality traits such as extraversion influence expression of emotion. The current study attempts to address these gaps in the literature by investigating the relationships – as well as a key hypothesis underpinning the common view of Ekman and others.

### **1.9.1 Project Aims**

The main aim of the study was to investigate the relationship between self-reported and expressed emotion in a free condition as well as a suppressed condition.

The following aims will investigate factors that may influence the relationship:

## INVESTIGATING THE RELATIONSHIP OF SELF-REPORTED EMOTIONS AND EXPRESSION OF EMOTION

- 1) Investigate whether some emotions are harder to suppress than others. Specifically, the difference in suppression between positive (happiness) and negative (disgust) emotions
  
- 2) Explore whether suppression influences the experience of emotions as an indirect measure of the FFH. Based on previous literature it is hypothesized that there will be a decrease in felt emotion in the suppressed condition compared to the free condition
  
- 3) Consider whether personality traits influence expression of emotion. Particularly, hypothesizing that extraversion will be positively correlated with expression of emotion.

## **Chapter Two**

### **Method**

#### **2.1 Participants**

Participants in this study included 20 males and 17 females between the ages of 18 and 64 who all voluntarily participated. The participants were recruited from the University of Adelaide first year Psychology students, as well from the general population. The first year psychology students received course credit for participation. Their ethnic identification was represented as 72.9% Australian, 8.1% Asian, 5.4% Indian and 13.5 % European. The exclusion criteria included anyone who was under the age of 18 and did not have sufficient English reading and writing skills. Participants who did not have normal vision or corrected with contact lenses were likewise excluded from the experiment due to interference that could occur with measurement of muscle movements when wearing glasses. All participants went through the same conditions of the within-subjects design.

#### **2.2 Apparatus and Materials**

##### ***2.2.1 Equipment***

To view the stimuli, a standardized computer screen set at 1536 x 864 resolution was prepared in a control setting, with studio filming lights set to face the participants to control any shadowing or flickers of light. A high resolution camera (Sony Alpha 9), shooting at a frame rate of 200fps was placed on a tripod set above the monitor height to record the facial expressions of the participants. Participants sat in a chair roughly 80cm away from the computer screen.

## INVESTIGATING THE RELATIONSHIP OF SELF-REPORTED EMOTIONS AND EXPRESSION OF EMOTION

### **2.2.2 FACS Machine Algorithm**

To measure the facial movements, the FACS approach was used with a machine algorithm developed from the team at DST. The specific AU suggested to be used in the expression of happiness include AU6 (*Orbicularis oculi muscle*) and AU12 (*Zygomaticus major*) and for the expression of disgust are AU9 (*Levatorlabii Superioris alaquenas*), AU15 (*Depressor angulioris*) and AU16 (*Depressor labiiinferioris*) (Ekman, Levenson & Friesen, 1983). The machine algorithm used in the current study did not include AU16.

### **2.3 Questionnaires**

#### **2.3.1 PANAS-X (Watson & Clark, 1999)**

To assess the specific emotional states, Watson and Clark, 1994 created a 60-item expanded version of the PANAS, PANAS-X (Watson & Clark, 1999). The 5-point Likert type intensity scale was used to measure both positive affect (PA) and Negative affect (NA) as well as 11 other primary affects (Boyle et al, 2015). The PANAS-X was chosen due to evidence showing it is a reliable and valid standardised scale. The scale has been reported to possess high internal reliability with coefficients ranging from 0.83 to 0.90 for PA and 0.84 to 0.91 for NA (Watson & Clark, 1999). Similarly, high convergent validity coefficients ranging from 0.90 to 0.95 for PA and 0.92 to 0.95 for NA were reported by the authors (Watson & Clark, 1999). Acceptable discriminant validity was also validated through coefficients ranging from -0.02 to -0.28 for PA and 0.00 to -0.16 for NA (Watson & Clark, 1999).

#### **2.3.2 IPIP Big-Five Factor Markers (Goldberg, 1992)**



## INVESTIGATING THE RELATIONSHIP OF SELF-REPORTED EMOTIONS AND EXPRESSION OF EMOTION

The second measure used was the IPIP Big- Five Factor markers. Developed by Goldberg (1992), the purpose was to create a moderately small set of variables that will consistently produce the Big-Five factor structure (Goldberg, 1992). The 5-point Likert scale type consists of a 50 item version comprising of 10 items representing each of the Big-Five personality Factors, Extraversion (E), Agreeableness (A), Conscientiousness (C), Emotional Stability (ES) and Intellect/Imagination (I) otherwise known as Openness (Goldberg, 1992). The scale has demonstrated high internal consistencies of 0.84 as well as correlated with the adjective markers and averages 0.67 (Saucier & Goldberg, 2002). The scale was also chosen as previous research has demonstrated that the IPIP Big Five Factor Markers are strongly related to major dimensions of personality such as the NEO-FFI with the lowest value being 0.79 (Gow et al, 2005).

### ***2.4 Stimuli***

The stimuli consisted of five video clips, two to elicit happiness, two to elicit disgust and one neutral film. All of the films were roughly 1-2.5 minutes long and were developed by Jenkins & Andrewes (2012) as an updated set of film clips that could be used for the elicitation of emotion (Jenkins & Andrewes, 2012). However, previous work by Gross and Levenson (1995) also studied effective stimuli video clips to elicit emotions which were used in the present study. The two disgust-inducing films consisted of firstly an ‘Amputation’ Video which showed a close up of an upper limb amputation. The second disgust-inducing film involved a clip which showed a person eating dog faeces from the movie ‘Pink Flamingos’. The first video used to elicit happiness was from the movie 'Marie Antoinette'. The clip shows Marie Antoinette spending time at her picturesque country house with her daughter and some animals and friends. The second happiness-inducing clip was taken from the movie ‘Deep Blue’ which showed a pod

## INVESTIGATING THE RELATIONSHIP OF SELF-REPORTED EMOTIONS AND EXPRESSION OF EMOTION

of dolphins swimming through the ocean. The neutral film was also taken from the Jenkins and Andrewes (2012) film library. The clip is from the movie 'Stigmata' showing a woman sleeping in bed while the camera pans around her room with close ups of her face. More information regarding the stimuli used can be seen in Appendix A.

### **2.5 Procedure**

As the subjects arrived individually to the lab, they were seated in a chair placed in front of the computer screen with a Sony 9 Alpha camera attached on top of the monitor facing the participants. The participants were then given a brief introduction to the experiment by the student researcher, including what the study involves and the aims involved in learning about the relationship of self-reported emotions and expression of emotions. The participants were informed that their facial expressions would be videotaped. Before commencement of the experiment, the participants completed several self-report instruments. These instruments including a general demographics questionnaires, a personality questionnaire (IPIP Big-Five Factor Markers) and a present mood questionnaire (PANAS-X). Once the questionnaires were completed the participants were told that they would be shown several short videos on the computer screen. They were instructed to try watch the videos carefully and keep their face directed towards the screen. However, if the content was discomforting for the participant, they were instructed to just say 'stop'.

The first trial started with a blank computer screen, where participants were asked to take however much time (up to a minute) they need to clear their minds of all feelings, thoughts and memories. Following this, the participants viewed the Neutral film with time allowed after the completion of the clip once again to ponder on how they felt. The participants were then asked to

## INVESTIGATING THE RELATIONSHIP OF SELF-REPORTED EMOTIONS AND EXPRESSION OF EMOTION

complete the PANAS-X to assess their present mood state. The second trial consisted of the same procedure where the participants were given the same instructions following with a viewing of the first 'Marie Antoinette' Happiness video. Subsequently, the participants were further asked to complete the PANAS-X. As before, the self-report was followed by a neutral film and a post film period with completion of the PANAS-X to attempt to bring participants back to a neutral mood trying to account for carry over effects. The third trial involved the same procedure however, this time the participants received the following instructions:

“I will now be showing you another short video. It is important that you watch the clip carefully, however once again if you find the content too distressing you can just say "stop".

While watching this video I would like you to try your best to not let those feelings you may have show. So try to behave in a way that if someone was watching you, they wouldn't know what you are feeling.”

Following these instructions, the participants then watched the clip 'Deep Blue', the second Happiness film. After this, participants once again completed the PANAS-X. The same procedure used for the first three trials were then repeated however this time, instead of showing the participant's videos eliciting happiness, the two disgust clips, 'Amputation' and 'Pink Flamingos' were presented. The participants went through the same instructions for both the free condition and suppressed condition with the disgust videos following the post film period needed and filling out the PANAS-X.

## Chapter Three

### Results

#### 3.1 Preliminary analysis

##### 3.1.1 Data Screening

From 38 participants only one participant's data was removed due to withdrawal from the study, therefore the final sample size consisted of 37 participants.

Data was analysed using the statistical package R studio version 3.3.0. Before data analysis, aggregation of data was performed to compute averages of the AU of interest per frame and to accumulate the mean intensity of the AU for each individual video. As videos were recorded at 200 frames per second, and varied from 37 seconds to two minutes long, it was decided to estimate the average activation of the AUs per video to compensate for the masses of raw data retrieved from the machine learning algorithm.

Along with data aggregation, data screening was also performed to assess normality and homogeneity of the variance in the data. To assess the assumption of a normal distribution, the Shapiro-Wilk normality test was used. In this case, significant values were extracted from most variables and therefore were interpreted as non-normal data (Navarro, 2019). However, the Shapiro-Wilk test can be sensitive to slight deviation from normality and hence trigger significant results (Navarro, 2019). To account for this problem, inspection of the skewness and kurtosis values as well as graphical data including histograms and Q-Q plots was executed (Navarro, 2019). From observing the graphical data, it was confirmed that the data had non-normal distributions and hence, it was sensible in this case to continue data analysis using non-parametric tests. Table 1 and 2 are the frequencies and descriptive statistics for the demographic variables of the final sample variables

INVESTIGATING THE RELATIONSHIP OF SELF-REPORTED EMOTIONS AND  
EXPRESSION OF EMOTION

Table 1: *Descriptive Statistics of the Current Sample (N=37)*

Variable	Characteristic	N	%
Age:	18-24	30	81.1%
	25-34	3	8.1%
	35-44	2	5.4%
	45-54	1	2.7%
	55-64	1	2.7%
Ethnicity:	Australian	27	72.9%
	Asian	3	8.1%
	Indian	2	5.4%
	European	5	13.5%
Gender:	Male	20	54.1%
	Female	17	45.9%

*Note. N= Sample Size, %= Percentage of Sample*

Table 2: *Descriptive Statistics of Self-Report, Expression and Personality measures*

Variable	Mean	SD	Min	Max
<b>PANAS-X Self report Scores/5</b>				
Happiness Free Condition	2.35	1.57	0	5
Happiness Suppressed condition	2.54	1.56	0	5
Disgust Free Condition	2.14	1.93	0	5

INVESTIGATING THE RELATIONSHIP OF SELF-REPORTED EMOTIONS AND  
EXPRESSION OF EMOTION

Disgust Suppressed Condition	3.46	1.85	0	5
<b>Expression Scores/5 ( Free Condition)</b>				
Happiness AU6	0.18	0.34	0	1.68
Happiness AU12	0.17	0.28	0	1.14
Disgust AU9	0.11	0.19	0	0.85
Disgust AU15	0.10	0.26	0	1.38
<b>Expression Scores/5 (Suppressed Condition)</b>				
Happiness AU6	0.17	0.28	0	1.71
Happiness AU12	0.18	0.30	0	1.40
Disgust AU9	0.11	0.14	0	1.85
Disgust AU15	0.08	0.14	0	2.97
<b>IPIP Big-Five Factor Markers</b>				
<b>Personality Scores/50</b>				
Openness	36.7	5.92	21	47
Conscientiousness	36.2	6.44	23	49
Extraversion	30.49	7.53	14	42
Agreeableness	40.24	4.41	31	47
Emotional Stability	30.43	6.95	19	45

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*Note. SD=Standard Deviation, Min= Minimum, Max= Maximum*

## INVESTIGATING THE RELATIONSHIP OF SELF-REPORTED EMOTIONS AND EXPRESSION OF EMOTION

### **3.2 Overall Aim: Investigate the relationship between self-reported emotion and expression of emotion in free and suppressed conditions.**

The main aim of the study was to provide some insight on the debate regarding the relationship between self-reported emotion and expression of emotion. The interest of this investigation lies in both the free condition and the suppressed condition. Correlational analysis was used to determine if there was a significant positive or negative correlation between self-report scores and the individual AU associated with either happiness or disgust. In addressing the overall aim, the Spearman correlation method was used as it does not assume normality (Tabachnick & Fidell, 2007). Findings are presented in Table 3.

Results indicated that in the free condition for the emotion Happiness, there was a negligible and non-significant, positive relationship between the AU6 and self-reported emotion,  $r_s = 0.11$ ,  $> .05$ . In comparison, the findings for the same AU in the suppressed condition showed a weak positive correlation, that was significantly different from zero,  $r_s = 0.34$ ,  $p < .05$ . For the second AU associated with happiness, AU12, the findings indicated that the relationship with happiness scores on the self-report indicated once again a negligible, yet negative correlation  $r_s = -.11$ ,  $p > .05$ , that is unlikely to be different from zero.

Looking at the negative emotion disgust, results indicated that in the free condition there was no relationship between self-report scores and AU9,  $r_s = -0.04$ ,  $p > .05$ . Similar to the happiness findings, the results for AU9 but in the suppressed condition showed a weak-moderate, positive and significant relationship with self-reported emotion,  $r_s = 0.38$ ,  $p > .05$ . The other AU associated with disgust, AU15 indicated once again almost no relationship at all was observed with the self-report scores,  $r_s = 0.04$ ,  $p > .05$ . The suppressed condition with the

INVESTIGATING THE RELATIONSHIP OF SELF-REPORTED EMOTIONS AND EXPRESSION OF EMOTION

same AU15 showed similar results with a non-significant relationship with the self-reported scores,  $r_s = -0.15, p > .05$ .

Table 3: Spearman correlation between the self-reported scores and the expression scores in both free and suppressed condition.

Action Units	Happiness self-report				Disgust self-report			
	Free Condition		Suppressed Condition		Free Condition		Suppressed condition	
	$r_s$	$p$	$r_s$	$P$	$r_s$	$p$	$r_s$	$p$
AU6	.11	.52	.34	.04				
U12	-.11	.52	.15	.39				
U 9					-.04	.79	.38	.02
U15					.04	.80	-.15	.37

Note.  $r_s =$  Spearman correlation coefficient,  $p =$  significance

Overall, the findings indicate that there is mostly no significant relationship between the AUs and the self-reported scores in both free and suppressed conditions. Interestingly, the exceptions include AU6 and AU9 but only in the suppressed conditions. Nevertheless the relationships are still weak. Therefore, the findings of the study suggest that there is no real relationship between self-reported scores and experience of emotion in free conditions and there is a limited relationship mostly found under suppressed conditions.

**3.3 Aim 1: Are some emotions harder to suppress than others?**



## INVESTIGATING THE RELATIONSHIP OF SELF-REPORTED EMOTIONS AND EXPRESSION OF EMOTION

The purpose of aim one was to investigate whether some emotions were harder to suppress than others. In this study, happiness was the emotion selected to represent positive emotions and disgust represented negative emotions. An independent samples *t*-test was originally intended to be used, however as the variables showed non-linearity, a non-parametric alternative had to be used. The alternative, the Wilcoxon rank sum test is similar to the *t*-test is that it compares the two samples however it does not assume normality (Narvarro, 2019). Therefore, we use the Wilcoxon rank sum test to determine if there is a statistically significant difference between the means of the action units across the free and suppressed conditions. The first dependent variable was the score for AU6; the second included the scores for AU9; the scores for AU12 follow and lastly the scores for AU15 were compared.

Results from the first test in Table 4, indicated that there was a non-significant difference between the dependent variables AU6 and AU9 in suppressed conditions,  $W = 606.5, p > .05$ . A small effect size was also calculated at 0.19 based on Cohen's (1988) guidelines (Lakens, 2013). Comparison of the means of AU15 and AU9 showed similarly, that there was no significant difference between the mean scores,  $W = 565, p > .39, d = 0.05$ . The third comparison was made between AU12 and AU9 and once again showed no significant difference,  $w = 669.5, p > .05, d = 0.25$ . Lastly the third group was compared, which further showed no significant difference between the two AU means  $w = 703.5, p > .05$  once again with a very small effect size,  $d = .04$ .

The results suggest that there is no difference between how well people are able to suppress positive emotions in comparison to negative emotions. However, there were differences in means across the positive and negative emotion AUs as seen in Table 4. Both of the means for the happiness AUs are slightly higher than the means for the disgust AUs suggesting that happiness may be slightly harder to suppress than disgust.

INVESTIGATING THE RELATIONSHIP OF SELF-REPORTED EMOTIONS AND EXPRESSION OF EMOTION

Table 4: *Wilcoxon rank sum test results on the Action Units*

Dependent variables mean scores compared	Mean		<i>w</i>	<i>p</i>	<i>Cohens d</i>
	Dep 1	Dep 2			
1. (AU6 score)-(AU9 score)	17	.11	606.5	.39	.19
2. (AU6 score)-(AU15 score)	17	.08	565	.27	.05
3. (AU12 score)- (AU9 score)	18	.11	669.5	.86	.25
4. (AU12 score)-(AU15 score)	18	.08	703.5	.83	.04

*Note. w=Wilcoxon rank sum coefficient, p= significance, Dep1= first dependent variable in that model, Dep 2= second dependent variable in model*

**3.4 Aim 2: Explore whether suppression influences the experience of emotion as an indirect test of the FFH**

The second aim of the study was to explore whether when an individual suppresses their emotional expression it influences their internal experience of emotion? The hypothesis predicted that there will be a decrease in felt emotion in the suppressed condition. Once again, a Wilcoxon rank sum test was used to determine if there is a statistically significant difference between the dependent variables. The dependent variables in this case being; self-reported happiness scores in the free condition; the happiness self-reported scores in the suppressed condition; disgust self-reported scores in the free condition and lastly the disgust self-reported scores in the suppressed condition.

## INVESTIGATING THE RELATIONSHIP OF SELF-REPORTED EMOTIONS AND EXPRESSION OF EMOTION

The results for the happiness scores indicated that there was slightly higher happiness reported in the suppressed condition ( $M = 2.54$ ,  $SD = 1.56$ ) compared with the happiness scores in the free condition ( $M = 2.35$ ,  $SD = 1.57$ ). In effect, results showed a reverse trend to that predicted. The difference was however, not significant with a small effect size of .12 ( $w = 420.5$ ,  $p > .05$ ). Similar results were found in self-reported disgust scores, with a higher score under suppressed conditions ( $M = 3.46$   $SD = 1.85$ ) compared to self-report under free conditions ( $M = 2.14$ ,  $SD = 1.93$ ). This difference was statistically significant with a medium effect size of .65 ( $w = 420.5$ ,  $p < .05$ ). Interestingly, the results do not support the hypothesis that suppression of facial expression leads to suppression of felt emotion, and for the disgust elicitation, the opposite finding occurred. In summary little evidence was found to support the facial feedback hypothesis.

### **3.5 Aim 3: Consider whether personality traits influence expression of emotion.**

The intention of aim three was to investigate whether personality traits may influence expression of emotion, in particular extraversion. Specifically, the hypothesis suggests that extraversion will be positively correlated with expression of emotion. However, there were studies identified in the literature which predicted that each of the personality factors may explain some unique variance in the expression of emotion. To test this, we ran a linear regression using bootstrapping for regression coefficients to get around issues of non-normality, and provide an estimate of precision on the predictors. We use the bootstrap linear regression conducted with the statistical program SPSS Statistics® Version 25. The regression models are shown in Table 5. Scores on AU6 and personality traits were first entered into the regression model, results indicated that none of the 5 predictors O, C, E, A or ES traits were significant ( $p$

## INVESTIGATING THE RELATIONSHIP OF SELF-REPORTED EMOTIONS AND EXPRESSION OF EMOTION

>.05). Including this, all of the coefficients for the personality traits crossed zero in the 95% confidence interval except for ES suggesting that none of the personality measures except for ES had any influence on the expression of emotion as measured by the muscles activated in AU6. Similar results were found with the second regression model run with the outcome variable AU9. The predictors showed to be non-statistically significant and all crossed zero in the 95% confidence interval, once again revealing that none of the personality traits predicted the expression AU9 in this set of data. The last two regression models we ran were with the predictors AU12 for happiness and AU15 for disgust and the same personality trait predictors. Comparable to the models above, neither model was statistically significant or did not cross zero in the confidence intervals indicating that the personality traits had no influence on any of the expression measures in the bootstrap sample.

Further analysis was completed using Spearman's correlation to see how much the different AUs are correlated with the trait extraversion as well as emotional stability. As seen in Table 6, our data did not support the hypothesis that extraversion will be positively correlated with expression as none of the correlations were significant and mostly negligible. However, the findings showed that ES was statistically significant and moderately correlated with only AU6.

INVESTIGATING THE RELATIONSHIP OF SELF-REPORTED EMOTIONS AND  
EXPRESSION OF EMOTION

Table 5. *Bootstrap linear regression coefficients of the outcome and predictors.*

	Personality Trait	B	Bias	Std.Error	Sig (2- tailed)	BCa 95% Confidence Interval	Lower	Upper
AU6	O	-0	0	.01	.78	-0.2	.01	
	C	-.01	0	.01	.59	-0.3	.02	
	E	-.01	0	.01	.67	-0.1	.02	
	A	.01	0	.02	.67	-0.2	.04	
	ES	.02	0	.01	.08	0	.04	
AU9	O	0	0	0	.32	-0	.02	
	C	0	0	.01	.65	-.01	.01	
	E	0	0	0	.32	-0	.01	
	A	0	0	.01	.91	-.02	.02	
	ES	-.01	0	0	.25	-.02	0	
AU12	O	-0	0	.01	.80	-.02	.02	
	C	-0	0	.01	.79	-.02	.02	
	E	-0	-0	.01	.57	-.02	.01	
	A	0	-0	.01	.79	-.02	.02	
	ES	0	0	.01	.78	-.02	.02	
AU15	O	-0	0	.01	.80	-.03	.02	

INVESTIGATING THE RELATIONSHIP OF SELF-REPORTED EMOTIONS AND EXPRESSION OF EMOTION

C	-0	0	.01	.77	-.01	.02
E	-0	-0	.01	.57	-.02	.01
A	0	-0	.01	.78	-.02	.02
ES	0	0	.01	.80	-.02	.03

*Note. B=beta coefficient, Sig= significance, BCa= bias-corrected and accelerated*

Table 6: Spearman correlation between the expression scores and the personality traits Extraversion and Emotional stability

	Extraversion		Emotional Stability	
	$r_s$	$p$	$r_s$	$p$
AU6	.15	.36	.48	.003
AU 9	.08	.65	-.09	.59
AU 12	.04	.81	.21	.21
AU15	.06	.71	.21	.20

*Note.  $r_s$ = Spearman correlation coefficient,  $p$ =significance*

## **Chapter Four**

### **Discussion**

#### **4.1 Overview**

The current study investigated the relationship between self-reported emotions and expressions of emotion in both free and suppressed conditions. Overall the findings did not show a relationship between experienced emotion and expression except for the AU6 and AU9, but only under suppressed conditions. The study also aimed to investigate how individual factors may have influenced this relationship. Results suggest that in this case, happiness may have been harder to suppress than disgust however the difference was not statistically significant. No evidence was found for the facial feedback hypothesis when examining the self-report in the suppressed and expressed conditions. Lastly, no evidence was found for any personality traits predicting expression however surprisingly, emotional stability did show a moderate, positive and significant relationship when correlated with the AU6. The following chapter will discuss the findings and evaluate them in relation to the current debates in the field as well as the practical implications of the findings.

#### **4.2 Current findings**

##### **4.2.1 Overall aim: Investigating the relationship of self-reported emotion and expression of emotion in both free and suppressed conditions.**

Overall, the sample in our study did not show evidence supporting the literature that there is a relationship between experience of emotion and expression of emotion as defined by the movement of muscles on the face. Yet, there were significant correlations found behind AU6 and

## INVESTIGATING THE RELATIONSHIP OF SELF-REPORTED EMOTIONS AND EXPRESSION OF EMOTION

AU9 and self-reports however, these correlations were only found in suppressed conditions and were only weak to moderate in strength. The results found were not unexpected as previous research conducted with similar designs did not find a coherence or relationship between experience of emotion and expression of emotion (Fernandez-Dols et al. 1997; Tourangeau & Ellsworth, 1979; Reisenzein et al. 2006). It could be argued however that there was an extreme lack of expression in this particular sample as the FACS algorithm measures expression on a 5 point scale and the highest mean score out of all the AUs was 0.18. One explanation could be that participants may have felt uncomfortable in freely expressing themselves with the double set of studio lights and the high tech camera directly facing them less than a meter away.

The small relationship found between AU6 and AU9 in the suppressed condition was unexpected as it was anticipated that participants would show less expressive facial movements and comply with instructions as reported in Gross and Levenson's study (1993). Instead, the AU in the suppressed conditions were almost identical to the free conditions and the maximum expression scores were all higher in the suppressed condition than the free condition once again. A possible explanation may be that as the researcher was in the room at the time of film elicitation, participants may have felt they could not hold back expressions. If the findings of the current study are accepted at face value, then it can be supported that self-report of emotional experiences are not a sufficient cause of particular prototypical facial expressions, as suggested by Ekman & Friesen (1978).

### **4.2.2 Aim 1: Were some emotions are harder to suppress than others**

The study aimed to investigate a possible factor that may affect the relationship in the suppressed condition by looking at which emotion was harder to suppress; happiness or disgust



## INVESTIGATING THE RELATIONSHIP OF SELF-REPORTED EMOTIONS AND EXPRESSION OF EMOTION

representing both positive and negative emotion dimensions. Results did not show any statistically significant differences between the means of any of the AUs associated with either emotion. However, an interesting finding was that the means of the expression scores for Happiness were higher in the happiness suppressed condition than the disgust suppressed condition, suggesting that in the current sample, happiness expression slightly leaked through more than when watching the disgust videos. These findings were unexpected as they differ from previous literature. Even though, there is partial research exploring this idea, studies have demonstrated that negative emotions were harder to falsify than happiness emotions (Porter & Brinke, 2008). Similarly, findings from previous research has shown the least amount of emotional leakage during suppression occurs during happiness expressions (Porter, Brinke & Wallace, 2012).

One possible explanation for this outcome may perhaps lie in the stimulus used to elicit happiness in the suppression condition. It consisted of a cinematic clip of dolphins jumping and doing tricks in the ocean coupled with inspirational music. Given the nature of the clip, participants may have felt more relaxed and in turn forgot about the pressure of the suppression condition. This is in contrast to the stimulus video used in the disgust condition as it would have had more of an arousing and therefore concentrated effect. Inclusively, the results did not provide any valuable information in suggesting whether some emotions are harder to suppress than others. The differences in means that were found are too small to conclude that this would be expected in a real life situation. Future research should use a larger sample of videos for elicitation, so that levels of arousal can be measured and accounted for in the comparison.

#### **4.2.3 Aim 2: Explore whether suppress influences the experience of emotion as an indirect measure of the FFH**

The FFH predicts that expressive behaviour in particular muscle movements of the face can regulate and activate emotions (McIntosh, 1996). However, our findings did not show any results consistent with the hypothesis. This is similar to the findings of Wagenmakers et al. (2016), who conducted a large registered replication report. In this study, when consciously suppressing their facial expressions while watching the happy stimuli, the participants did not show a decrease in self-reported emotion and instead an increase was reported. The difference was not statistically significant with a small effect size. On the other hand, results were similar with the disgust stimuli that there was no decrease in scores found however, it was shown to have a statistically significant difference with a medium effect size. Therefore, there was no evidence found for the FFH that has been reported from previous research including the experiment done by Strack, Martin and Stepper (1988) and followed-up by Alam et al, (2008), Duclos et al., (1989), and Soussignan, (2002).

One explanation of why the FFH may not have been occurring in this study, may be due to being in front of a camera. In many replication studies of the FFH, they all share the commonality that participants were notified that during the experiment they may be observed or monitored (Noah, Schul & Mayo, 2018). A recent study conducted in 2018 suggests that when individuals are recorded or feel monitored, it reduces their reliance on their internal cues in making judgements. Testing this hypothesis, the researchers replicated the FFH experiment however adding a condition where there is no video camera. Results revealed a significant absence of the Facial feedback effect when no camera was present (Noah, Schul & Mayo, 2018).

## INVESTIGATING THE RELATIONSHIP OF SELF-REPORTED EMOTIONS AND EXPRESSION OF EMOTION

Consequently, this effect may have occurred in the current study as no evidence was found to support the hypothesis that suppression influences the experience of emotion. Clearly, a follow-up study would be required to test this possibility, where participants are not aware of the cameras and so rely more on their internal cues for inferring felt emotion.

### **4.2.4 Aim 3: Consider whether personality traits influence expression of emotion. In particular, does extraversion correlate positively with expression?**

The last aim of the study was to investigate whether personality traits play an influential role in individual's levels of expression. In particular, it was hypothesized that extraversion would positively correlate with expression. Results did not support this hypothesis as all personality traits; Openness, Conscientiousness, Agreeableness, Extraversion and Emotional stability statistically predicted any of the AUs however the trait Emotional stability was the only trait not to cross zero on the 95% confidence interval when predicting. Furthermore, the results did not show extraversion to be positively correlated with expression as none of the correlations were significant and mostly negligible. The findings were unexpected as they go against what has been reported previous literature that all found evidence for extraversion influencing emotional expression (Friedman, 1979; Gross & John, 1995; Riggo & Riggo, 2002). One possibility could lie in the particular sample gathered for this study. The mean score for extraversion was one of the lower average scoring traits in the sample and also had the smallest minimum as well as the lowest maximum score out of all the personality traits. Hence this could be an explanation as to why the particular group showed very minor expressive scores.

Interestingly, however there was one positive, moderately strong and statistically significant relationship found. This relationship was between the personality trait emotional

## INVESTIGATING THE RELATIONSHIP OF SELF-REPORTED EMOTIONS AND EXPRESSION OF EMOTION

stability and the AU6 which is the *Orbicularis oculi* muscle used to raise the cheeks when someone smiles. These results are comparable to the findings reported by Gross, Johns and Richards, (2000) and Izard et al. (1993) where they found that neuroticism was able to predict negative expression. Considering that emotional stability lies on the opposite side of the continuum, it is logical to assume that emotional stability then plays a role in positive emotions which has been somewhat seen within the current study. Further evidence lies in the study conducted by Harker and Keltner (2001) who found that positive emotional expression was correlated with personality traits including affiliation and competence, as well as low negative emotionality. In this case, low negative emotionality could once again be interpreted as scoring on the opposite end of the emotional stability- neuroticism continuum.

### **4.3 Clinical Implications**

The current study provides several important implications that may be important in the real world inference of the relationship of experience of emotion and expression of emotions. Firstly, the current findings do not find a relationship between self-reported emotions and expressions of emotions. This should bring caution to consumers of the research and to people developing technology dependent on this assumption. Such caution would arise in areas such as security. For example, in the United States, TSA and FBI agents are trained with the aim of detecting terrorists by using facial expressions to detect emotions (Barrett et al, 2019). An additional example lies in a more clinical setting. Often facial configurations are used to aid in diagnosis of emotional states as well as diagnosis and treatment in different psychiatric disorders such as autism (Baron-Cohen et al. 2001). Often treatment plans designed for individuals living with autism will often involve learning to recognise facial expressions (Baron-Cohen et al.

## INVESTIGATING THE RELATIONSHIP OF SELF-REPORTED EMOTIONS AND EXPRESSION OF EMOTION

2004). However, this kind of training has not generalised well in everyday life skills (Berggren et al. 2018). Consequently, it can be seen how society has put in place practices and norms that rest on the common view that emotional experience and expression are related. However, as it can be seen in this study, it can be precarious to do so if the relationship does not exist. Furthermore, a major contribution in the study is that the relationship was investigated under suppressed conditions. Given that this area of research maintains a novice status, the current study aids in contributing knowledge to the existing literature gap.

Secondly, the findings related to whether some emotions are harder to suppress than others help to add knowledge to the study of negative versus positive emotions suggesting that there may not be a major difference – both may be equally easy to suppress. However, many features of human facial communication are still unexplored and research into this area could help improve identification of emotional deception in particular in areas such as security and legal settings where assessments of this kind can produce large consequences.

Investigation into the facial feedback hypothesis within this study supports the findings of Noah, Schul and Mayo (2018) in that when a camera is present, the Facial feedback effect disappears. Regardless of this finding, much of the determination in investigating the FHH comes to the view that it is an essential factor in emotional processes and in turn that the face is associated with emotion (McIntosh, 1996). Hence, this study is important for adding research into the collection of null results regarding the relationship between emotional experience and expressions.

Lastly, even though the findings reported in the current study do not support the literature that exists that suggest that personality influences emotional expression, in particular extraversion, it is still useful research to add into the field of emotional expression. The lack of

## INVESTIGATING THE RELATIONSHIP OF SELF-REPORTED EMOTIONS AND EXPRESSION OF EMOTION

significant findings suggests that more research can be done in the area with different sample groups. Similarly, the results found in the current study suggesting that the trait emotional stability and AU6 are moderately positively correlated are important to future implications equally as previous literature on extraversion. Future research should replicate the finding of a relationship between personality traits and expression of emotion but by focusing attention on the trait ES.

### **4.4 Strengths and Limitations**

This paper provides some insight into the relationship between experiences of emotion and expression of emotion. A major strength of this study lies in the contribution of knowledge about the relationship in suppressed conditions. As mentioned before, Gross and Levenson's study (1993) is one of the few studies that have directly investigated emotional expression in consciously suppressed conditions. Hence, the current study provides some valuable research to contribute to filling the gaps in the literature. A further strength lies in the dependent measure of facial expressions – rather than relying on human ratings. By comparing the self-reports to the individual action units obtained via machine learning, we were able to isolate the specific muscle movements that were identified as more or less significant in expression of the emotion happiness or disgust. For instance, this particular sample demonstrated findings that suggest that AU6 and AU9 were significant when expressing either happiness or disgust. However, using action units to measure expression can be problematic as not all muscle movements may be linked to specific emotions across different people and situations. For example, an individual's goals of being angry may be to overcome some kind of obstacle, in some situations it may be more useful to scowl or more useful to smile or laugh depending on the situation (Barrett et al,

## INVESTIGATING THE RELATIONSHIP OF SELF-REPORTED EMOTIONS AND EXPRESSION OF EMOTION

2019; Ekman & Freisen, 1982). A study done by Hess and Bourgeois (2010) reported that their participants who narrated a time they felt angry spent a high proportion displaying a Duchene smile suggesting that a smile can be fashioned with the absence of experience of emotion. Hence it can be seen how it may be problematic to measure the muscle activation of AU6 and AU12 without the acknowledgment of other traces of muscle activations associated with negative emotions

Furthermore, given the within-subjects design, it proved to be an asset to examine individual variations among the relationships such as personality factors and individuals' ability to be deceitful in different types of emotions. On the other hand however, the within-subjects design often have the possibility of carry over effects as could be seen when each participant watches every video one after the other. However, to counter this effect the study design included a neutral video in-between each video so that participants had the opportunity to come back to a neutral baseline before a different emotion was elicited to reduce any carry overs from the previous clip.

Given the foundation of the design was artificial in nature, a limitation lies in the potential that the facial expressions observed did not tap into a reality of what would be expected in a real life social interaction. Even though using films as stimuli to elicit emotion has numerous advantages, there are still some restrictions that film clips have in particular in relation to demand effects (Cabral et al. 2018). Considering that emotions are predominantly elicited by social interactions, it would be suggested to use a more realistic setting in the future to elicit spontaneous expressions to properly investigate emotional experiences and in turn would result in greater ecological validity (Cabral et al. 2018).

## INVESTIGATING THE RELATIONSHIP OF SELF-REPORTED EMOTIONS AND EXPRESSION OF EMOTION

Furthermore, a major flaw specific to this study lies in the stimuli used as they may not have been as effective as expected, due to the quality of the videos. In particular, one apparent video; the amputation video which was found to be an effective video for eliciting disgust in a study by Gross and Levenson, (1995) and then followed by a more updated study by Jenkins and Andrew (2012). Nonetheless, it was apparent in the current study that the amputation video elicited the lowest experience of emotion ( $M = 2.14$ ) compared to all the other videos. It was also noted by many participants verbally that if the quality of the video was in high definition it would have been much more effective in eliciting disgust as most of the participants were in the age range 18-24 (81.1%). This limitation could be avoided by using an updated film set which would prove to be effective in the younger generations.

Lastly, confounding situational variables were expected such as time of day and noise in surrounding rooms which could have all contributed in effecting concentration of participants. Considering attention is a factor found to interfere with emotional process such as the FFH it could have been a limitation in this case (Dzokoto et al, 2014).

To account for some of these limitations, it would be recommended for forthcoming researchers who wish to investigate expression of emotion to use a more updated film set in which is effective as well as reliable for the age category of the participants. This would possibly increase the response from the participants and allow the relationship to be investigated closer. Within mentioning this however, ideally it would be most effect to use a more realistic setting when running this type of research. For example, running a social interview simulation with participants trying to elicit a certain emotion and then measuring the facial expressions with a concealed camera could be deemed to have more ecological validity. Lastly, an idea for future research to consider lies in the area of suppressed emotion. What was found in the current study



## INVESTIGATING THE RELATIONSHIP OF SELF-REPORTED EMOTIONS AND EXPRESSION OF EMOTION

was that most participants were able to suppress their expressions somewhat, however it was noted by visual observation that often the participants' eyes were directed to different corners of the screen, particularly in the disgust condition. Eye-tracking of the participants could be a future implication to account for this response.

### 4.5 Conclusions

Emotion and expression of emotion provide vital information when understanding social interactions. The findings presented in this study have promising practical and theoretical implications for understanding the relationship between experience of emotion and expressions of emotion – albeit finding out where the limits of this relationship are. The results help add to existing knowledge as well as fill in gaps in research by investigating the relationship under suppressed conditions. Our findings demonstrate that there is no relationship between experience and expression of emotion in free conditions and only a small yet significant relationship found with AU6 and AU9 in suppressed condition. Minimal evidence was found to determine whether happiness or disgust were harder to suppress. Similarly, evidence for the FFH was not found in the current study with non-significant results. Lastly, no personality traits were found to influence facial expression except emotional stability which was moderately correlated with the AU6. As consumers continue to apply implications in real world settings from the common view that emotional experience and expression are linked, it is important to direct future research into investigating this relationship in more detail. A more realistic methodological design is encouraged in future research to aid in establishing the most accurate understanding of the relationship.

# INVESTIGATING THE RELATIONSHIP OF SELF-REPORTED EMOTIONS AND EXPRESSION OF EMOTION

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INVESTIGATING THE RELATIONSHIP OF SELF-REPORTED EMOTIONS AND  
EXPRESSION OF EMOTION

Appendix A: Stimulus Film Set

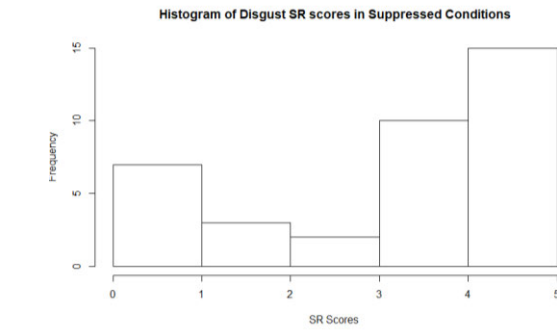
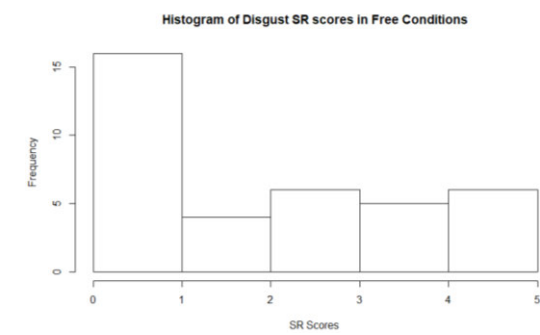
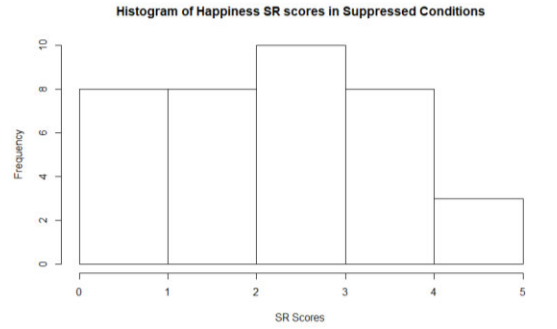
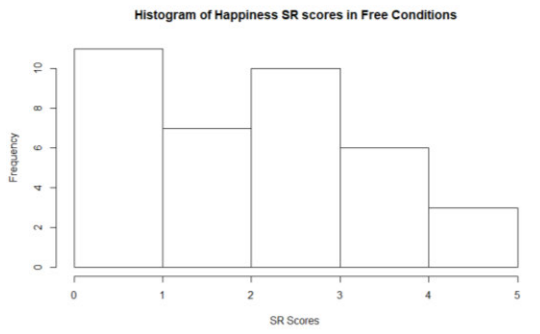
Target Emotion	Clip Name and Film Name	Length	Description	Time
Neutral	'Stigmata' -Stigmata (Mancuso, Lazarus, & Wainwright, 1999)	1 min	Camera pans around the room and shoots close ups of a woman sleeping in bed	8:24-9:24
Happiness	'Marie Antoinette' from Marie Antoinette (Coppola & Coppola, 2006)	2 min, 15 sec	Marie Antoinette spends time with her daughter, friends and farm animals at her picturesque country house.	1:23:02-1:25:15
Happiness	'Deep Dolphins' from Deep Blue (Tasioulis, Tidmarsh, Fothergill, & Byatt, 2003)	2 min	Dolphins are shown swimming through the ocean	0:01:46-0:03:45
Disgust	'Amputation' –Gross and Levenson, 1995 retrieved from <a href="https://spl.stanford.edu/resources">https://spl.stanford.edu/resources</a>	1 min 5 sec	Clip shows the amputation of the upper limb	- -
Disgust	'Pink' -Pink Flamingos (Waters, 1973)	30 sec	Person eats dog faeces	UK

*Note. Min= Minutes, Sec= Seconds, UK= Unknown*

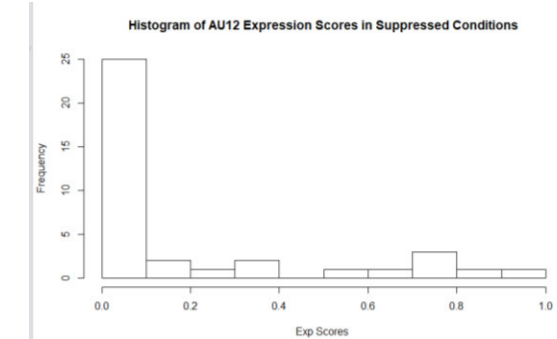
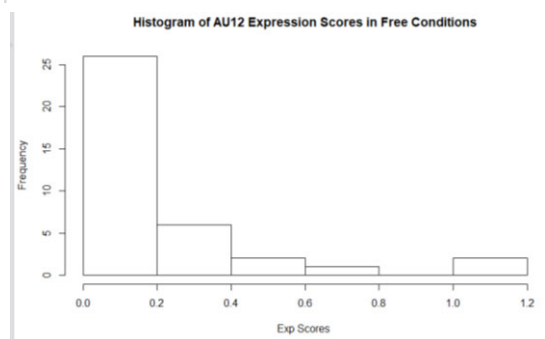
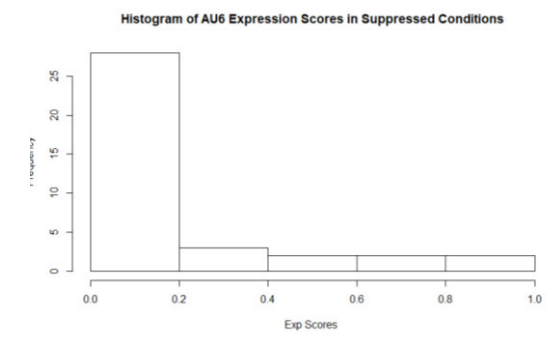
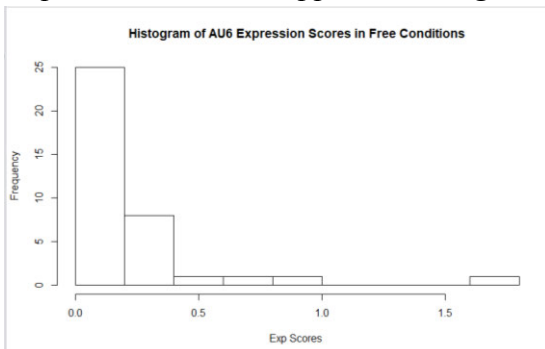
# INVESTIGATING THE RELATIONSHIP OF SELF-REPORTED EMOTIONS AND EXPRESSION OF EMOTION

## Appendix B: Checking assumptions of normality

### *Self-Report Scores Histograms*

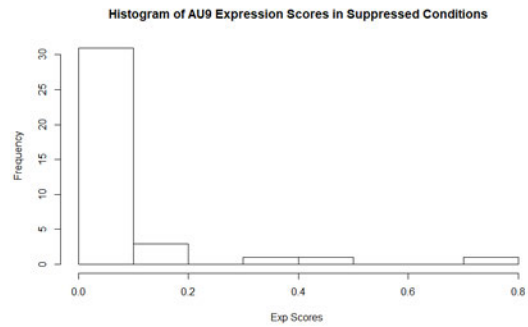
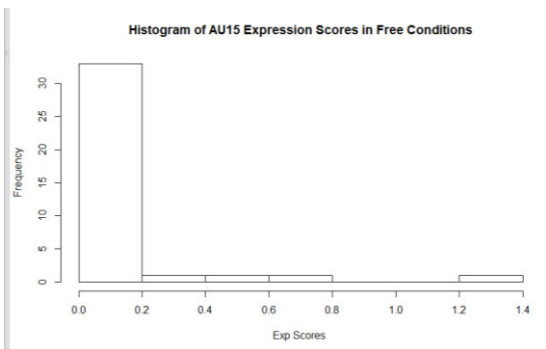
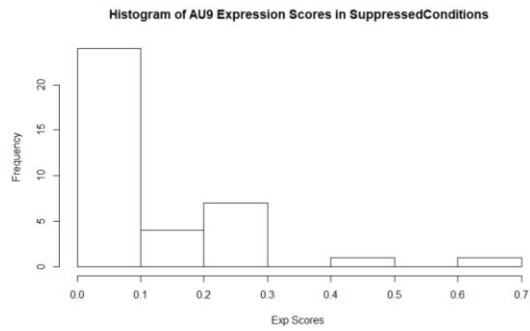
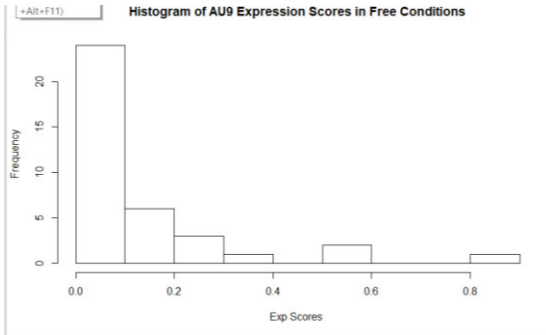


### *Expression Scores: Happiness Histograms*



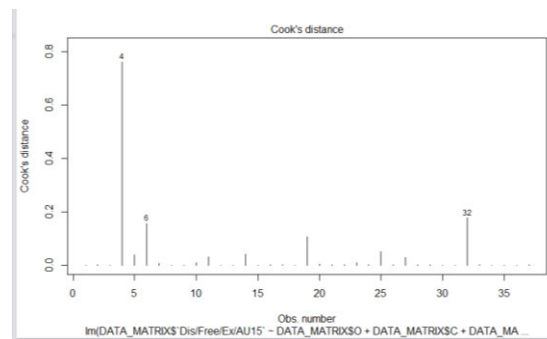
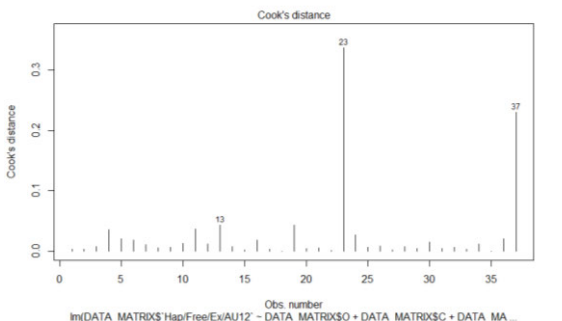
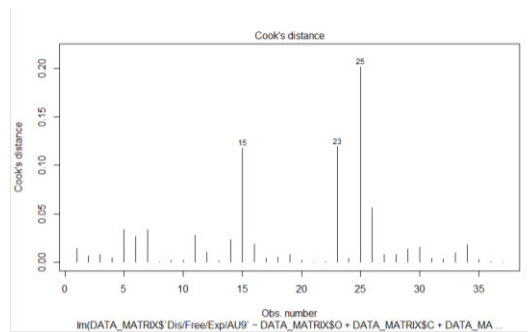
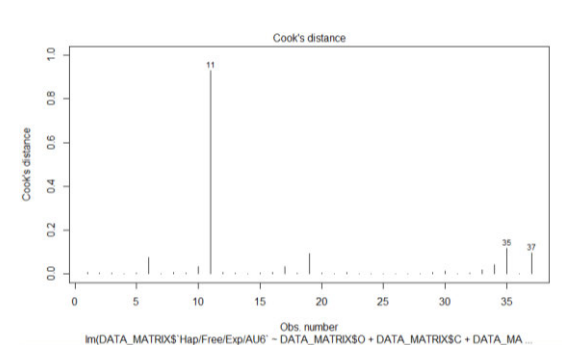
# INVESTIGATING THE RELATIONSHIP OF SELF-REPORTED EMOTIONS AND EXPRESSION OF EMOTION

## Expression Scores: Disgust Histograms



Checking assumptions of linearity for regression models:

*Cooks Distance : AU6, AU9, AU12, AU15*



# INVESTIGATING THE RELATIONSHIP OF SELF-REPORTED EMOTIONS AND EXPRESSION OF EMOTION

## Appendix C: Demographics Questionnaire

### DEMOGRAPHIC INFORMATION

Please indicate your age

18-24

25-34

35-44

45-54

55-64

65 or above

Please write your Gender in the box below:

Please indicate your ethnicity

Australian

Indigenous Australian or Torres Strait Islander

Asian

Indian

New Zealander

Middle Eastern

European

North American

South American

African

Other, please specify in the box below

INVESTIGATING THE RELATIONSHIP OF SELF-REPORTED EMOTIONS AND  
EXPRESSION OF EMOTION

Appendix D: Questionnaires

*PANAS-X*

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This scale consists of a number of words and phrases that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space next to that word. Indicate to what extent you feel this way presently. Use the following scale to record your answers:

1	2	3	4	5
very slightly or not at all	a little	moderately	quite a bit	extremely
_____ cheerful	_____ sad	_____ active	_____ angry at self	
_____ disgusted	_____ calm	_____ guilty	_____ enthusiastic	
_____ attentive	_____ afraid	_____ joyful	_____ downhearted	
_____ bashful	_____ tired	_____ nervous	_____ sheepish	
_____ sluggish	_____ amazed	_____ lonely	_____ distressed	
_____ daring	_____ shaky	_____ sleepy	_____ blameworthy	
_____ surprised	_____ happy	_____ excited	_____ determined	
_____ strong	_____ timid	_____ hostile	_____ frightened	
_____ scornful	_____ alone	_____ proud	_____ astonished	
_____ relaxed	_____ alert	_____ jittery	_____ interested	
_____ irritable	_____ upset	_____ lively	_____ loathing	
_____ delighted	_____ angry	_____ ashamed	_____ confident	
_____ inspired	_____ bold	_____ at ease	_____ energetic	
_____ fearless	_____ blue	_____ scared	_____ concentrating	
_____ disgusted with self	_____ shy	_____ drowsy	_____ dissatisfied with self	

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Item Composition of the PANAS-X Scales

INVESTIGATING THE RELATIONSHIP OF SELF-REPORTED EMOTIONS AND EXPRESSION OF EMOTION

Appendix E: IPIP Big 5 Factor Markers

**How Accurately Can You Describe Yourself?**

Describe yourself as you generally are now, not as you wish to be in the future. Describe yourself as you honestly see yourself, in relation to other people you know of the same sex as you are, and roughly your same age. So that you can describe yourself in an honest manner, your responses will be kept in absolute confidence. Indicate for each statement whether it is 1. Very Inaccurate, 2. Moderately Inaccurate, 3. Neither Accurate Nor Inaccurate, 4. Moderately Accurate, or 5. Very Accurate as a description of you.



	Very Inaccurate	Moderately Inaccurate	Neither Accurate Nor Inaccurate	Moderately Accurate	Very Accurate
1. Am the life of the party.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Feel little concern for others.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. Am always prepared.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. Get stressed out easily.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. Have a rich vocabulary.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. Don't talk a lot.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. Am interested in people.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. Leave my belongings around.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. Am relaxed most of the time.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10. Have difficulty understanding abstract ideas.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11. Feel comfortable around people.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
12. Insult people.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
13. Pay attention to details.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
14. Worry about things.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
15. Have a vivid imagination.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
16. Keep in the background.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
17. Sympathize with others' feelings.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
18. Make a mess of things.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
19. Seldom feel blue.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
20. Am not interested in abstract ideas.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
21. Start conversations.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
22. Am not interested in other people's problems.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
23. Get chores done right away.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
24. Am easily disturbed.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
25. Have excellent ideas.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
26. Have little to say.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
27. Have a soft heart.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

INVESTIGATING THE RELATIONSHIP OF SELF-REPORTED EMOTIONS AND EXPRESSION OF EMOTION

28. Often forget to put things back in their proper place.	0	0	0	0	0
29. Get upset easily.	0	0	0	0	0
30. Do not have a good imagination.	0	0	0	0	0
31. Talk to a lot of different people at parties.	0	0	0	0	0
32. Am not really interested in others.	0	0	0	0	0
33. Like order.	0	0	0	0	0
34. Change my mood a lot.	0	0	0	0	0
35. Am quick to understand things.	0	0	0	0	0
36. Don't like to draw attention to myself.	0	0	0	0	0
37. Take time out for others.	0	0	0	0	0
38. Shirk my duties.	0	0	0	0	0
39. Have frequent mood swings.	0	0	0	0	0
40. Use difficult words.	0	0	0	0	0
41. Don't mind being the center of attention.	0	0	0	0	0
42. Feel others' emotions.	0	0	0	0	0
43. Follow a schedule.	0	0	0	0	0
44. Get irritated easily.	0	0	0	0	0
45. Spend time reflecting on things.	0	0	0	0	0
46. Am quiet around strangers.	0	0	0	0	0
47. Make people feel at ease.	0	0	0	0	0
48. Am exacting in my work.	0	0	0	0	0
49. Often feel blue.	0	0	0	0	0
50. Am full of ideas.	0	0	0	0	0

Note. These five scales were developed to measure the Big-Five factor markers reported in the following article: Goldberg, L. R. (1992). The development of markers for the Big-Five factor structure. *Psychological Assessment*, 4, 26-42.

# INVESTIGATING THE RELATIONSHIP OF SELF-REPORTED EMOTIONS AND EXPRESSION OF EMOTION

## Appendix F: Advertisement

*This study has been approved by the Human Research Ethics Committee at the University of Adelaide (approval number: [REDACTED])*



**Ever wondered if your facial expressions reflect how you feel?  
PARTICIPANTS WANTED!**

**Please email:** [REDACTED]

**For more details!**

You are invited to partake in a lab-based study about investigating the relationship of self-reported emotion and expression of emotion.

#### Benefits?

- You will be contributing to our understanding on the relationship of experiences emotion and emotion expression and what factors influence this.
- Firstyear University of Adelaide Psychology students will receive course credit for participation

#### Who can participate?

- 18 years and older
- Fluent in English

#### What does it involve/how can I participate?

The experiment will be 1hr-1.5hr undertaken at the University of Adelaide. Please email: [REDACTED]

For more information please contact the email above to read the Information Participation Sheet and consent form or contact the researchers. [REDACTED]





## **PARTICIPANT INFORMATION SHEET**

**PROJECT TITLE: Relationship between self-reported emotion and expression of emotion.**

**HUMAN RESEARCH ETHICS COMMITTEE APPROVAL NUMBER: ■■■■■**

**PRINCIPAL INVESTIGATOR: Dr. Carolyn Semmler**

**STUDENT RESEARCHER: Natasha Jovic**

**STUDENT'S DEGREE: Bachelor of Psychological Science Honours**

Dear Participant,

You are invited to participate in the research project described below.

### **What is the project about?**

This project is about investigating the relationship between self-reported emotion and expression of emotions in both free conditions and suppressed conditions. The aims will include discovering what the relationship is and what factors influence this relationship by looking at research questions such as

- Are some emotions harder to suppress than others
- Does whether emotion is expressed or not influence experience of emotions
- What personality factors are more likely to influence expression of emotion

This project will help towards filling the gaps in previous literature as well as contribute to new knowledge to understand what differences there are and why there are differences in emotional expression.

### **Who is undertaking the project?**

This project is being conducted by Natasha Jovic. This research will form the basis for the degree of Bachelor of Psychological Science Honours at the University of Adelaide under the supervision of Dr Carolyn Semmler.

### **Why am I being invited to participate?**

## INVESTIGATING THE RELATIONSHIP OF SELF-REPORTED EMOTIONS AND EXPRESSION OF EMOTION

You are being invited as you are above the age of 18 and are fluent in English.

### **What am I being invited to do?**

You are being invited to partake in a lab-based study conducted at the University of Adelaide. The location of the study will be held on Level 2 (219- ACEP lab) at...

*The University of Adelaide  
Adelaide, South Australia  
5005 Australia*

During the study you will be asked to fill out various answers to questions on personal demographics, present mood and a personality test. This will be followed by watching a series of videos which you will be asked to fill out a self-report in-between each video on your current emotional state. In one condition you will be asked to keep your expression neutral.

While you are watching these videos, your expressions will be recorded using a high-tech camera. The footage of your expressions will be translated by a machine using action unit algorithms to determine the expression of emotion.

All participants will be de identified by a process of using alpha numeric codes to ensure confidentiality of results.

It is expected that the video recordings will be used in other projects relevant to emotion detection however your details will not be linked back to you at all.

There will be an opportunity provided for you to review your data after the completion of the study.

### **How much time will my involvement in the project take?**

Altogether involvement in the project will take a 1hr-1.5hrs. This will include the process of all self-reports and viewing of videos. There will be no follow up visits required.

Participants who consist of first year university of Adelaide students that choose to undertake in the study will receive units of course credit.

### **Are there any risks associated with participating in this project?**

There are no foreseeable risks or side effects in relation to this study. Potentially, the videos used to elicit emotion may be slightly discomforting to some, however participants will be informed of the nature of the video prior viewing. The risk of discomfort will be mitigated by ensuring

## INVESTIGATING THE RELATIONSHIP OF SELF-REPORTED EMOTIONS AND EXPRESSION OF EMOTION

participants leave in a neutral or positive mood state by eliciting one final video to view at the end of the experiment.

In the case of any adverse events if you request to be removed from the study, the data collected via the participant will be removed. Further, the contact details of the researchers, ethics committee as well as the university counselling service for students of the University of Adelaide and life line if part of the general population are provided. Following this the researchers will report to ORECI contacts with any concerns.

### Student Life Counselling support:

*Address: Ground Floor, Horace Lamb Building*

*North Terrace Campus*

*THE UNIVERSITY OF ADELAIDE SA 5005 AUSTRALIA*

*T: +61 8 83135663*

*Email: [counsellingcentre@adelaide.edu.au](mailto:counsellingcentre@adelaide.edu.au)*

### Lifeline 24-Hour Counselling and Crisis Support Chat:

*T: 13 11 41*

*[www.lifeline.org.au/crisischat](http://www.lifeline.org.au/crisischat)*

### **What are the potential benefits of the research project?**

There are no immediate benefits to the participant.

### **Can I withdraw from the project?**

Participation in this project is completely voluntary. If you agree to participate, you can withdraw from the study at any time. However withdrawal of data may only be possible until the submission of the thesis.

### **What will happen to my information?**

The first line of contact will be through private email accounts. After consent is gathered each participant will be de-identified and assigned an alpha-numeric code to ensure confidentiality. The data will remain anonymous throughout the rest of the study.

## INVESTIGATING THE RELATIONSHIP OF SELF-REPORTED EMOTIONS AND EXPRESSION OF EMOTION

Information of data will be securely stored on university drives and will be accessed by the student researcher as well as supervisors. In accordance with the Australian Freedom of Information legislation the data will be securely stored for a minimum of five years in the School of Psychology as non-identifiable data.

Results of this study will be used to complete an honours thesis with the intent of being sent out to an external journals for publication. Participant will remain unidentifiable throughout this process.

The videos recorded in this study may also be used for further research in use of detection of micro expressions, where your details will not be linked to you.

Your information will only be used as described in this participant information sheet and it will only be disclosed according to the consent provided, except as required by law.

### **Who do I contact if I have questions about the project?**

If you have any further questions, please feel free to contact the researchers on the contact details listed below.

### **What if I have a complaint or any concerns?**

The study has been approved by the Human Research Ethics Committee at the University of Adelaide (approval number [REDACTED]). This research project will be conducted according to the NHMRC National Statement on Ethical Conduct in Human Research 2007 (Updated 2018). If you have questions or problems associated with the practical aspects of your participation in the project, or wish to raise a concern or complaint about the project, then you should consult the Principal Investigator. If you wish to speak with an independent person regarding concerns or a complaint, the University's policy on research involving human participants, or your rights as a participant, please contact the Human Research Ethics Committee's Secretariat on:

Phone: +61 8 8313 6028

Email: [hrec@adelaide.edu.au](mailto:hrec@adelaide.edu.au)

Post: Level 4, Rundle Mall Plaza, 50 Rundle Mall, ADELAIDE SA 5000

Any complaint or concern will be treated in confidence and fully investigated. You will be informed of the outcome.

### **If I want to participate, what do I do?**

INVESTIGATING THE RELATIONSHIP OF SELF-REPORTED EMOTIONS AND  
EXPRESSION OF EMOTION

In order to participate please make sure you have read the information sheet and consent form. Then email the student researcher below expressing you're interested to volunteer as a participant. From there you will be given all the details necessary and will arrange an appointment in one of the session times.

Consent forms can be signed at home then emailed back to student researcher or signed in person before completion of the study.

Yours sincerely,

**Natasha Jovic**  
**Student researcher**

██

**Dr Carloyn Semmler**  
**Supervisor**

██

INVESTIGATING THE RELATIONSHIP OF SELF-REPORTED EMOTIONS AND  
EXPRESSION OF EMOTION

Appendix H: Laboratory set up

