CULTURAL ORIENTATION AND EMOTION REGULATION: IMPLICATIONS FOR SOCIAL ANXIETY AND NEURAL RESPONSES TO EMOTIONAL FACES

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Abstract

The current study examined relations among cultural orientation, emotion regulation (ER), and social anxiety in 175 undergraduate students (81.1% female; $M_{age} = 19.7$, $SD = 1.7$). Independent and Interdependent orientation was measured using the Self-Construal Scale (SCS), ER with the Emotion Regulation Questionnaire (ERQ) and the Interpersonal Emotion Regulation Questionnaire (IERQ), and Social Anxiety using the Social Interaction Anxiety Scale (SIAS). Findings revealed distinct ER patterns for each orientation, such that Interdependent orientation was associated with use of Interpersonal ER strategies. Interdependent self-construal and social modeling interacted to predict against social anxiety ($\beta = -.24$, $t = -2.85$, $p = .005$). A subsample of 21 participants completed Emotion Go/NoGo tasks while electroencephalogram (EEG) was recorded. Event-related potential (ERP) components (P100, N170) to fearful, angry, and calm expressions for "Go" trials were measured over occipital and parietal regions. Independent Orientation was associated with reduced N170 amplitude to fearful ($r(21) = -.474$, $p = .03$) and angry ($r(20) = -.546$, $p = .013$) face expressions. Expressive suppression correlated with greater P100 amplitude to fearful ($r(21) = .456$, $p = .038$) and angry faces ($r(20) = .453$, $p = .045$), while Cognitive Reappraisal was related to reduced P100 ($r(20) = -.447$, $p = .048$) and N170 ($r(20) = -.509$, $p = .022$) amplitudes to angry faces. Social Anxiety was associated with greater N170 amplitude to fearful faces ($r(21) = .467$, $p = .033$). The results highlight the role of cultural orientation in ER tendencies and Social Anxiety, and demonstrate extensions to automatic neural responses to emotional faces.

CHAPTER 1: INTRODUCTION

Cultural orientation has been shown to influence how individuals regulate their emotions (e.g. Ford & Mauss, 2015; Klein et al., 2024; Kraus & Kitayama, 2019; Liddel & Williams, 2019). Previous research has shown that those with an independent orientation tend to exhibit greater use of cognitive reappraisal (i.e. changing one's interpretation of a situation to alter its emotional impact) and those with an interdependent orientation tend to rely on expressive suppression (i.e. inhibiting outward emotional expressions) (Ford & Mauss, 2015; Kraus & Kitayama, 2019; Matsumoto et al., 2008a; Soto et al., 2011). Research in emotion regulation and culture have seldomly explored interpersonal strategies, though there is some evidence to suggest that these strategies may be particularly adaptive for those with an interdependent cultural orientation (Liddel & Williams, 2019). Such differences in emotion regulation across cultures can be attributed to differences in cultural values and social norms. Prevalence of social anxiety has also shown to differ across cultures (e.g. Okawa et al., 2021; Scheier et al., 2010; Vriends et al., 2019), with higher prevalence in interdependent cultures (e.g. Butler et al., 2007; Okawa et al., 2021; Scheier et al., 2010). Additionally, differences in emotional face processing have been observed cross-culturally (e.g. Blais et al., 2024; Saumure et al., 2023; Tsai et al., 2019) as a product of differences in attentional biases resulting from one's cultural orientation/context (e.g. Blais et al., 2024; Boduroglu & Shah, 2017; Estéphan et al., 2018). The current study investigates how cultural orientation relates emotion regulation tendencies and social anxiety and examines neural responses to emotional faces within this cultural-emotional framework.

Cultural Orientation

The cultural context in which we live shapes our perception of ourselves, of others, and of ourselves in relation to others. Our thoughts, feelings, and actions are all influenced by the culture that surrounds us (Ford & Moss, 2015). This influence leads to the formation of cognitive schemas that reflect and reinforce the cultural norms and values of our environment. Individualism (IND) and Collectivism (COL) are two of the most widely studied cultural constructs shaping how individuals make sense of themselves and others in society (e.g. Liddel et al., 2017; Triandis & Gelfand, 1998; Yoon et al., 2020). IND is a cultural outlook in which one sees the self as independent, unique, and separate from the collective. Someone who holds this view prioritizes self-advancement, behaves based on their own attitudes and desires rather than group norms, and prioritizes personal goals over those of their in-group (Triandis, 2001). Alternatively, COL is a cultural outlook in which one sees the self as interdependent and part of the larger collective. Collectivists prioritize group goals over personal goals, behave based on group norms, and regulate their behavior to maintain group harmony (Triandis, 1996).

A concept closely related to IND-COL is that of self-construal (SC). SC is defined as how "individuals define and make meaning of the self" (Cross et al., 2011, p. 143) and is often used interchangeably with IND/COL throughout the literature (Cross et al., 2011; Liddel et al., 2017; Markus & Kitayama, 1991) due to high conceptual similarity. Self-construal consists of two dimensions, independent SC (IndSC) and interdependent SC (InterSC), as two ends of a continuum that is the self. Cross et al. (2011) states that all individuals possess both construals of the self and that it is one's cultural context that promotes the development and expression of one more strongly than the other. IndSC corresponds to individualism, whereas InterSC corresponds to collectivism. The independent self is primarily concerned with self-serving motives and behaves based on one's own attitudes, feelings, and desires rather than those of others (Markus & Kitayama, 1991). Alternatively, the interdependent self is primarily concerned with other-serving motives and behaves based on the perceived attitudes, feelings, and desires of others (Markus & Kitayama, 1991).

Although the concepts of individualism-collectivism (IND-COL) and SC are conceptually very similar, there is one key distinction between the two: IND-COL is used in describing *culture* whereas SC is used in describing *individuals* (Cross et al., 2011). Such a distinction does not hinder the fact that these concepts are empirically related, but rather that they go hand-in-hand to establish a more in-depth understanding of a given population on both a cultural and individual level. Cross et al. (2011) describes this fundamental difference between the two constructs such that one cannot exist without the other; a culture cannot be individualistic if the majority of the members within the culture do not hold an independent self-construal. Therefore, both IND-COL and SC are both important in evaluating how one defines and situates themselves within their culture and in relation to others, but operate on different levels of the human experience (the individual vs. the group).

The existing literature provides evidence for a clear East-West dichotomy with regard to prevalence of cultural attitudes in terms of IND/IndSC and COL/InterSC (Hong & Woody, 2006; Kim & Markus, 1999; Kim & Sherman, 2007). Western cultures tend to be individualistic with members exhibiting a largely IndSC, whereas non-Western cultures, tend to be collectivistic with members exhibiting a largely InterSC (Hong & Woody, 2006; Kim & Markus, 1999; Kim & Sherman, 2007). Due to this clear distinction, the majority of cultural research has been conducted on a country/ethnic level, categorizing samples based on cultural background (e.g. Klein et al., 2024; Kraus & Kitayama, 2019; Scheier et al., 2010) rather than on an individual level. Few studies stress the importance of studying culture on the individual level (Akdogan & Cimsir, 2022; Liddel et al., 2017; Markus & Kitayama, 1991) to further understand cultural influences on the attitudes, thoughts, and behavior of its members.

Emotion Regulation

Emotions are subjective, time-limited, situationally bound, and valanced (positive or negative) states (McRae & Gross, 2020). Emotion regulation refers to one's ability to manage and/or modify their emotional experience and expression (Matsumoto et al., 2008a). People engage in ER based on a variety of contextual factors and to achieve goal-directed outcomes (Matsumoto et al., 2008a). ER can involve both up-regulation (i.e. increasing/enhancing) and down-regulation (i.e. decreasing/repressing) of positive and negative emotions (McRae & Gross, 2020), and can prove to be adaptive or maladaptive based on the type of emotion regulation strategy used (e.g. Goldin et al., 2008; Hofman et al., 2016; Hofman, 2014) and whether that strategy, and the consequent behavioral outcome, is contextually appropriate.

Emotion regulation strategies can be divided into intrapersonal and interpersonal subgroups. Intrapersonal strategies are those in which one attempts to regulate their emotions themselves and include strategies such as *Expressive Suppression* (ES) and *Cognitive Reappraisal* (CR). ES is an emotion regulation strategy in which one consciously attempts to inhibit emotional expression (i.e. facial expressions) while emotionally aroused (Butler et al., 2003, John & Gross, 2004). CR is an emotion regulation strategy in which one attempts to alter their thinking with regard to an emotion-eliciting stimulus/event (John & Gross, 2004, Matsumoto et al., 2008a). Interpersonal strategies involve attempting to regulate one's emotions with help from others or through others and include strategies such as *enhancing positive affect*: looking to others to increase positive affect, *perspective taking*: intentionally shifting one's perspective, *soothing*:

looking to others to provide comfort, and *social modeling*: learning about how others have dealt with a situation. Much of the existing emotion regulation literature has focused on intrapersonal strategies, specifically ES and CR (e.g. Dryman & Heimberg, 2018; Klein et al., 2024; Kraus & Kitayama, 2019). Meanwhile, interpersonal ER strategies have received little attention (e.g. Hofman et al., 2016; Liddel & Williams, 2019; MacNamara et al., 2022).

Ineffective emotion regulation strategies, such as ES, have been shown to lead to emotional distress (Butler et al., 2003; Hoffman et al., 2016) and poor mental health (e.g. Akkus & Peker, 2021; Hofman, 2014; Musella et al., 2024). Within the ER literature, ES is most consistently considered a maladaptive emotion regulation strategy (Butler et al., 2003; Gross & Levenson, 1993; Hoffman, 2014), whereas CR is generally considered an adaptive emotion regulation strategy (Goldin et al., 2008; Gross & John, 2003; John & Gross, 2004). Explanations behind these findings refer to the nature of one's emotional experience upon using either of these strategies. ES only inhibits/controls the regulator's *external* emotional expression, not their subjective emotional experience (Gross & Levenson, 1993), which can have considerable psychological effects (Gross & John, 2003). Alternatively, CR has been shown to improve the regulators' emotional experience and promote positive mental health (Gross & John, 2003) through down-regulation of negative emotions at the subjective (Gross & John, 2003), behavioral, and neural levels (Goldin et al., 2008). Butler et al. (2003) observed that reappraisers experienced more positive emotion than suppressors, and suppressors experienced less positive emotion than controls. These findings suggest that CR is not only effective for down-regulating negative emotions, but also for up-regulating positive emotions to improve overall emotional experience.

Few studies have examined the effectiveness of interpersonal emotion regulation strategies (e.g. Hoffman et al., 2016; Liddel & Williams, 2019; MacNamara et al., 2022), and findings have been inconclusive. MacNamara et al. (2022) provides a basis for why perspective taking may be advantageous in regulating one's emotions when processing an unsettling stimulus (e.g. taking the perspective of a doctor when viewing blood); the shift in perspective may provide emotional distance between the regulator and the emotionally salient stimulus. Hoffman et al. (2016) claims that interpersonal emotion regulation strategies are essential in emotion regulation since our emotional experience/regulation develops within the broader social context and strongly affects our interactions with others. Alternatively, interpersonal strategies have been considered maladaptive because they rely on external assistance for emotion regulation, potentially leading regulators to doubt their ability to self-regulate. Over time, this reliance may reinforce a self-fulfilling prophecy (Hoffman et al., 2016). Hoffman (2014) describes interpersonal emotion regulation strategies as "avoidance behaviours"; using others as an emotional cushion to avoid self-regulation due to discomfort or feelings of incapability. However, social support has been shown to strongly predict positive psychological health (Hoffman et al., 2016). Hence, the existing literature is inconclusive as to whether interpersonal strategies are effective forms of emotion regulation.

Cultural Factors in Emotion Regulation

People employ certain types of emotion regulation strategies based on their cultural context and attitudes to produce the most socially advantageous outcome. Culture is a highly important area of study in emotion regulation because cultural norms and values are deeply embedded in human cognition and behavior. The exploration of cultural factors in emotion regulation has been a growing topic in the emotion regulation literature over past decades. Many studies have found significant relations between cultural orientation and emotion regulation tendencies (e.g. Klein et al., 2024; Kraus & Kitayama, 2019; Liddel & Williams, 2019). Matsumoto et al. (2008a) proposed that culture functions to preserve social order through the creation of value systems and norms that guide emotion regulation.

Culture influences how individuals engage in emotion regulation (Ozkarar-Gradwohl, 2019). One's cultural orientation, in combination with their cultural context, shapes motivation to engage in emotion regulation (Ford & Mauss, 2015) as well as the strategies they use to do so. Use of ES has been shown to be the dominant emotion regulation strategy among those with an interdependent cultural orientation (i.e. InterSC/COL) and use of CR has shown to be the dominant strategy among those with an independent cultural orientation (i.e. IndSC/IND) (e.g. Ford & Mauss, 2015; Kraus & Kitayama, 2019; Matsumoto et al., 2008a). Such cultural differences in use of ES and CR can be attributed to variations in social values associated with different cultural orientations, which influence whether emotional expression or inexpression is encouraged.

Cultural context actively reinforces certain behaviors, including emotional expression, that foster culturally congruent values (Mesquita & Boiger, 2014). Collectivist cultures place high value in maintaining group harmony and the maintenance of social order whereas individualist cultures place high value in self-expression. Hence, individuals with an interdependent orientation tend to use ES to reduce behavioral expression of emotion, as it is socially advantageous in their cultural context for maintaining group harmony and avoiding interpersonal conflict. (Matsumoto et al., 2008a). Conversely, those with an independent orientation tend to use CR to regulate their emotions and maintain expressive freedom, as is encouraged within their cultural context.

The way in which emotionality is embedded within one's cultural context significantly influences intentions behind emotion regulation. Emotions are *individually embedded* in Western cultural contexts (i.e. IndSC/IND) and are *relationally embedded* in East Asian (i.e. InterSC/COL) cultural contexts (Chentsova-Dutton & Tsai, 2010). These differences in emotionality across cultures causes emotion regulation strategies to have different social consequences in such cultures (Butler et al., 2007). Given the emphasis on group harmony in interdependent cultures, the state of one's relationships with others is of great importance. Self-concept in interdependent cultural contexts is established based on one's relations with others, as well as the expectations and thoughts of others (Markus & Kitayama, 1991). Hence, individuals in such cultures regulate their emotions with the intention of minimizing/preventing emotional expression to avoid risk of group upset/disharmony. Interdependently oriented people are highly concerned regarding others' opinions of them and will tend to try to remain neutral in emotional expression. In independent cultures, one's own affect is prioritized over that of others, and individuals within such cultures will therefore try to express their emotions. In support of this notion, Matsumoto et al. (2008b) concluded that individualism is positively correlated with norms encouraging emotional expression. Therefore, intentions behind emotion regulation in independent cultures prioritize emotional expression, potentially at the cost of others or social harmony.

Additionally, cultural beliefs about different emotions play a role in emotion regulation, particularly regarding how individuals deal with negative emotions (Miyamoto et al., 2014). European Americans are more motivated than Asians to engage in hedonic emotion regulation, which involves increasing positive emotions while decreasing negative emotions (Miyamoto et al., 2014). This can be explained by an increased desire to decrease negative emotions in

Western cultures than in Asian cultures due to the perceived utility behind emotions. In Asian cultures, negative emotions are perceived to be of particular motivational and cognitive utility (Miyamoto et al., 2014) whereas negative emotions are not embraced in such a way in Western cultures. With regard to positive emotions, positive affect is strongly encouraged in independent/individualistic cultures (Matsumoto et al., 2008b) whereas expression of positive affect should be kept under control in interdependent/collectivistic cultures (Ozkarar-Gradwohl, 2019). Ozkarar-Gradwohl (2019) observed that in Turkish (interdependent/collectivist) culture, individuals were allowed to experience positive emotion but only to a certain point so that it would not disrupt group harmony. Hence, regulation of both positive (Ozkarar-Gradwohl, 2019) and negative (Ma & Petermann, 2019) affect differs across cultures based on independence/interdependence.

In addition to differences in regulation tendencies, cultural studies have found that the effectiveness of emotion regulation strategies is dependent on one's cultural orientation (Kraus & Kitayama, 2019). ES is considered to be an effective strategy for those with a highly interdependent orientation (InterSC), compared to those who score low on interdependent orientation (Kraus & Kitayama, 2019). In an experiment with European American and Asian cultural groups, where participants were instructed to use either ES or CR upon exposure to stimuli eliciting negative affect, Ford & Mauss (2015) observed that European Americans were not able to effectively attenuate emotional expression in the ES condition. Conversely, Asian participants effectively suppressed emotional expression and showed evidence of down-regulation of emotion processing (Ford & Mauss, 2015). This finding can be attributed to the notion that ES is congruent with cultural values in those with an interdependent orientation and is incongruent with cultural values in those with a more independent orientation. Thus, individuals in different cultures are conditioned and experienced in the use of the most socially advantageous strategy (Ford & Mauss, 2015); ES in interdependent cultural contexts and CR in independent cultural contexts. The authors suggest that the inability of European Americans' to effectively use ES is because the strategy is highly counter-normative (Ford & Mauss, 2015). Engaging in culturally normative strategies is socially rewarding which can promote well-being (Ford & Mauss, 2015). Conversely, engaging in emotion regulation strategies that are culturally hetero-normative may have negative consequences for well-being. Kraus and Kitayama (2019) observed increased negative emotional arousal in American participants when instructed to suppress emotions, which may be explained by cognitive dissonance due to a discrepancy between ES and Western cultural values. Additionally, Soto et al. (2011) found that ES was negatively associated with psychological functioning in European Americans, but not in Chinese participants. Hence, an important factor in the effectiveness of emotion regulation strategies is whether the chosen strategy is congruent or incongruent with one's cultural context, and thus adaptive or maladaptive (Ford & Mauss, 2015; Liddel & Williams, 2019; Soto et al., 2011).

Additionally, although interpersonal emotion regulation strategies have very seldomly been investigated within the current literature, there is some evidence to suggest that interpersonal emotion regulation strategies may be particularly adaptive for those of interdependent orientation (Liddel & Williams, 2019). Liddel and Williams (2019) observed that East Asian participants (InterSC/COL) reported greater use of social modeling and perspective taking compared to Western European (IndSC/IND) participants. Liddel and Williams (2019) and Taylor et al. (2007) provide theoretical support for this finding through the fact that cultural groups high in interdependent orientation find implicit forms of social support beneficial, due to placing strong value in the maintenance of group harmony and interpersonal relationships.

Hence, individuals with an interdependent orientation tend to take the perspective of another person in both thinking about and in social situations (Liddel & Williams, 2019, Ma et al., 2014). Though the existing literature is sparse in this area, these findings suggest that interpersonal emotion regulation strategies may be socioculturally adaptive for those with an interdependent orientation.

The majority of research examining culture in emotion regulation have investigated group differences categorized based on ethnicity or country (e.g. Ford & Mauss, 2015; Kraus & Kitayama, 2019; Liddel & Williams, 2019) whereas few studies have investigated these concepts in terms of individual differences (Butler et al., 2007; Kraus & Kitayama, 2019; Liddel et al., 2017). Focusing on country/ethnic level differences limits the potential understanding of unique cultural contributions in emotion regulation tendencies on an individual level. Individuals within a particular country-level or ethnic-level cultural group may have vastly different cognitive schemas of emotion regulation, so it is important to avoid generalization across groups. Ford & Mauss (2015) claim that one's tendency to engage in emotion regulation strategies is dependent on the extent to which their values are oriented toward a particular culture, not simply their membership in a particular cultural group.

Social Anxiety

Trait social anxiety can be defined as a stable tendency to experience fear and anxiety in social situations. Individuals with high levels of trait social anxiety commonly experience negative affect during and after social interactions. People high in social anxiety (SA) have more negative thoughts and tend to engage in frequent safety behaviors, such as gaze aversion, during social interactions than people low in SA (Spurr & Stopa, 2003). Feelings of negative affect including apprehension and uneasiness in those with high SA are fueled by a fear of being negatively evaluated by others (Hong & Woody, 2006). Previous research has shown that social anxiety is generally higher in women than in men (Dell'osso et al., 2015, McLean & Anderson, 2009). Women are also more likely to be diagnosed with social anxiety disorder and tend to exhibit heightened social anxiety symptoms in comparison to men (Asher et al., 2017).

Maladaptive cognitive representations of the self in social situations significantly exacerbate SA symptoms (Rapee & Heimberg, 1997, as cited by Hong & Woody, 2006). Taking on an observer perspective, looking at oneself through the eyes of another person, is associated with the etiology and maintenance of SA and with greater SA than the field perspective, viewing the environment from one's own eyes (Spurr & Stopa, 2003). The observer perspective increases self-focused attention (Spurr & Stopa, 2003), which has also been shown to be associated with SA (Clark & Wells, 1995). Self-focused attention involves excessive monitoring of oneself (Vriends et al., 2019). This can involve monitoring one's external behavior such as speech and bodily movement, as well as internal physiological processes (Pineles & Mineka, 2005).

Cultural Factors in Social Anxiety

Cultural context determines social norms, which influence individual perceptions of which social behaviors are deemed acceptable or unacceptable (Hong & Woody., 2006). Hence, cultural context also determines common social fears among the members of that culture (Hofman et al., 2010) as well as the perceived social consequences of socially unacceptable behaviors (Hong & Woody, 2006). Additionally, culture functions to shape one's sense of social self and how they fit into their social context; suggesting that culture is embedded in the sociality of a society. For these reasons, culture is an important factor in the development and maintenance of social anxiety.

Differences in prevalence of SA have been found across cultures (e.g. Okawa et al., 2021; Scheier et al., 2010; Vriends et al., 2019). A common conclusion within cross-cultural research and SA is that those with an interdependent/collectivistic orientation exhibit greater social anxiety than those with an independent/individualistic orientation (e.g. Butler et al., 2007; Okawa et al., 2021; Schrier et al., 2010). This discrepancy may be explained by the emphasis on the importance of maintaining group harmony in interdependent cultures. Due to this, interdependent orientation may endorse a greater predisposition to fear negative evaluation in social contexts out of fear of possible social consequences, such as potential separation from the collective. Okawa et al. (2021) provided evidence for this claim as they observed that individuals from collectivistic cultures reported greater fear of negative evaluation than those from individualistic cultures. Conversely, independent orientation has been found to be negatively associated with SA (Hong & Woody, 2006). One explanation for this proposed by Hong & Woody (2006) is a self-enhancement bias which is proposed to be present in those with an independent orientation. The self-enhancement bias is a concept in which individuals are biased to perceiving themselves in a favorable light. This bias has been shown to be linked with positive mental health (Hong & Woody, 2006) and lower SA levels (Shean & Uchenwa, 1990).

SA has been shown to manifest differently within different cultural contexts. Self-focused attention has been found to vary between cultures in socially anxious individuals (Vriends et al., 2019). Vriends et al. (2019) found that in those with an independent orientation, high SA participants exhibited more self-focused attention than those with low SA. Conversely, in those with an interdependent orientation, high SA participants exhibited less self-focused attention than those with low SA. These findings suggests that SA presents differently in those with different cultural orientations in such a way that is inconsistent with the current, Western-focused understanding of SA. Perhaps in those with an interdependent cultural orientation, SA is associated with an increase in other-focused attention as individuals in these contexts are primarily concerned with monitoring the social group for signals that social norms have been met in an effort to maintain social order and harmony (Vriends et al., 2019).

Ties between Social Anxiety and Emotion Regulation

Social anxiety influences the type of emotion regulation strategies individuals tend to use as well as the effectiveness of these strategies. SA is generally associated with maladaptive emotion regulation strategies (Dryman & Heimberg, 2018; Musella et al., 2024). Research on emotion regulation and SA to date have mainly investigated intrapersonal strategies (e.g. Bates et al., 2020; Dryman & Heimberg, 2018; Musella et al., 2024) while few have studied interpersonal ER strategies (Akkus & Peker, 2021). In the emotion regulation literature, there is a circular relationship between social anxiety and use of ES to regulate one's emotions; elevated social anxiety has been linked with greater use of ES (Musella et al., 2024) and ES is used more frequently by those with SA (Bates et al., 2020; Dryman & Heimberg, 2018). One explanation for these findings is that repeated efforts to suppress one's emotions can be thought of as 'unhelpful safety behaviors' which are fueled by potential negative evaluation from others (Clark & Wells, 1995; Rapee & Heimberg, 1997 as cited by Bates et al., 2020) which inevitably maintains SA behavior. In addition to an overreliance on ES, SA is characterized by ineffective use of CR (Dryman & Heimberg, 2018). Although findings on interpersonal ER strategies and SA are limited, soothing and social modeling have been found to be positively correlated with SA whereas perspective-taking has been shown to be negatively correlated with SA (Akkus & Peker, 2021). However, more research is needed to investigate the effectiveness of interpersonal emotion regulation strategies in SA.

Emotional Face Processing

Cultural Differences

Perceiving emotional information displayed on faces allows individuals to perceive the emotional state and possible intentions of others (Itier & Neath-Tavares, 2017). Differences in social norms across cultures influence the attentional processes of individuals within such cultures (e.g. Blais et al., 2024; Boduroglu & Shah, 2017; Estéphan et al., 2018). Previous research has shown that East Asian (InterSC/COL) cultures tend to exhibit a global attentional bias, attending to the broader whole of a scene/stimulus, when processing visual information in their environment (Blais et al., 2024). Conversely, Western (IndSC/COL) cultures tend to exhibit a local bias in which attention is focused on the individual elements/details of a visual scene/stimulus (Blais et al., 2024). Additionally, previous research has shown that the spatial resolution in processing visual information differs across cultures, such that it is lower (i.e. less detailed) for Asian (InterSC/COL) versus Western (IndSC/IND) cultural groups (Boduroglu & Shah, 2017; Tardif et al., 2017). Due to such differences in visual processing across cultures, cultural groups have been shown to differ in processing of emotional face expressions (Blais et al., 2024). In Western cultural groups, individuals tend to fixate on the eyes and mouth of faces (Jack et al., 2009), whereas in Asian cultural groups individuals tend to fixate on the eyes (Blais et al., 2008). Such differences may be attributed to cultural differences in facial display of emotion; expression is expected through the eyes within Asian cultures and through the eyes and mouth in Western cultures (Jack et al., 2012). This ties into differences in how emotional expression is perceived/valued in different cultures. In Western cultures, authentic emotional expression is valued and encouraged. In an authentic smile, also known as a Duchenne smile, the corners of the eyes narrow as the smile deepens, indicating genuine positive affect (Ekman et al., 1990). Such overt expression of happiness is highly valued and is perceived warmly within Western cultures, which may explain why individuals in these cultures fixate on the eyes and mouth when looking for emotional cues. Conversely, East Asian cultures may pay more attention to the eyes, such as eyelid shape and tension (Jack et al., 2012), for emotional cues due to the tendency to suppress emotional expression (i.e. smile emphatically) to maintain group harmony within these cultures.

Culture has also been shown to influence the perceived valence of emotional expressions displayed on faces (Tsai et al., 2019). Given the emphasis on emotional suppression within interdependent cultures to maintain social harmony, Tsai et al. (2019) observed that Asian cultural groups perceived calm faces more positively than Western cultural groups. Further, Western cultural groups perceive faces expressing excitement more positively than Asian cultural groups (Tsai et al., 2019). Additionally, Western cultural groups have been shown to be able to more accurately identify emotion intensity displayed on faces than Asian cultural groups, such that Asians require more visual information than Westerners to achieve equal accuracy (Saumure et al., 2023). This finding suggests a decreased sensitivity to emotional expressions in Asian than in Western cultures which may be attributed to generally suppressed expression of emotionality in interdependent cultures.

Social Anxiety

The cultural differences in self- and other-focused attention observed in socially anxious individuals suggest that the ways in which social anxiety manifests may influence how emotional information is processed. The ways in which individuals with social anxiety process emotional faces could be shaped by both their cultural orientation and the underlying social concerns related to their anxiety. In general, SA has been shown to be associated with attentional biases toward emotional faces at both the behavioral and neural levels (Ball et al., 2012; Boehme et al., 2015; Moser et al., 2008). High socially anxious individuals tend to exhibit increased emotional reactivity to emotional face expressions, particularly expressions of negative valence (Moser et al., 2008). Studies using Event-Related-Potential (ERP) methodology have also found that internalizing symptoms (e.g., fearfulness and social withdrawal) are associated with heightened reactivity to emotional faces displaying negative emotions (e.g. fear, anger) compared to neutral face expressions (Moser et al., 2008; Willner et al., 2020). Such processing biases suggest increased processing/monitoring of cues indicating social threat (Willner et al., 2020). Interestingly, these early biases have downstream effects on later conscious processing, increasing reactivity and the need for more effortful regulation (Willner et al., 2020). Given that socially anxious individuals tend to focus on potential social threats, it follows that the processing of emotional cues, especially from facial expressions, may be crucial in understanding cross-cultural differences in the manifestation of social anxiety.

ERP Components in Emotional Face Processing

Event-related potential (ERP) methods, measured using EEG (electroencephalography), are often used to study brain activity related to how we process faces. ERPs are electrical brain responses that happen in sync with a stimulus and can be measured with millisecond accuracy. One of the earliest ERP components linked to emotional expressions is the P100, which peaks around 80 to 130 milliseconds after a stimulus appears. The P100 comes from the ventral extrastriate cortex and responds to basic visual features like contrast, brightness, and spatial frequency (Nakashima et al., 2008; Rossion & Jacques, 2011), as well as to visual attention (Hillyard & Anllo-Vento, 1998). Following the P100 is the N170, which peaks between 140 and 180 milliseconds after the stimulus. The N170 is generated in several areas, including the inferior occipital and temporal cortices on both sides of the brain (Herrmann et al., 2005; Itier & Taylor, 2004). It is thought to reflect how the brain detects and processes faces based on their overall structure or configuration (Eimer et al., 2011). Although the study of automatic and unconscious processing of emotional faces may enhance our understanding of culture-related emotional processing and regulation, a search of PubMed and PsycInfo using the terms 'Culture,' 'Face Processing'/'Emotional Face Processing,' and 'ERP' (from 1960-2025) revealed that P100 and N170 ERP components related to variations in emotional face processing have not been examined cross-culturally in the existing literature.

The Current Study

The majority of emotion regulation literature has investigated cultural differences at the country or ethnic level (e.g. Klein et al., 2024; Liddel & Williams, 2019; Scheier et al., 2010), but few studies have examined cultural differences at the *individual* level (Akdogan & Cimsir, 2022; Liddel et al., 2017; Markus & Kitayama, 1991). Cultural orientation has been shown to influence both emotion regulation (e.g. Klein et al., 2024; Liddel & Williams, 2019; Ozkarar-Gradwhol, 2019) and social anxiety (e.g. Okawa et al., 2021; Scheier et al., 2020; Schrier et al., 2010). Cultural values shape the motivation and intentions behind emotion regulation and the strategies individuals employ (Ford & Mauss, 2015; Ozkarar-Gradwohl, 2019) to achieve the most socially advantageous outcome. Expressive suppression is more commonly employed in collectivistic cultures, while cognitive reappraisal is more prevalent in individualistic cultures (Ford & Mauss, 2015; Kraus & Kitayama, 2019; Matsumoto et al., 2008a). Additionally, certain strategies may be adaptive or maladaptive depending on congruency/incongruency with one’s cultural context (Ford & Mauss, 2015; Liddel & Williams, 2019; Soto et al., 2011). Although there is extant literature examining emotion regulation cross-culturally (e.g., Ramzan & Ahmad, 2017; Kraus & Kitayama, 2019; Matsumoto et al., 2008a), most studies focus on intrapersonal strategies (e.g., Ford & Mauss, 2015; Goldin et al., 2008; Gross & John, 2003). Few studies have examined the use of interpersonal emotion regulation strategies (e.g., Hoffman et al., 2016; Hoffman, 2014; MacNamara et al., 2022), and even fewer have investigated them within a cross-cultural context (Liddel & Williams, 2019).

Cultural orientation has been shown to shape attentional patterns in socially anxious individuals: those with an independent orientation tend to exhibit increased self-focused attention, whereas those with an interdependent orientation demonstrate greater other-focused attention (Vriends et al., 2019) suggesting that SA may manifest differently cross-culturally. The existing literature demonstrates a connection between self-focused attention and SA (Clark & Wells, 1995; Spurr & Stopa, 2003), but it is important to note that this evidence was found in Western populations. Additionally, SA is associated with attentional biases toward emotional faces at both the behavioral and neural levels (Ball et al., 2012; Moser et al., 2008; Willner et al., 2020), but such attentional processing biases have not been examined with regard to individual differences in cultural orientation (e.g. independent/interdependent).

Previous research has examined the relationships between cultural orientation and intrapersonal emotion regulation (e.g. Butler et al., 2007; Chentsova-Dutton & Tsai, 2010; Ford & Mauss, 2015), cultural orientation and social anxiety (e.g., Norasakkunkit & Kalick, 2002; Okawa et al., 2021; Okazaki, 2000) and emotion regulation and social anxiety (e.g. Akkus & Peker, 2021; Bates et al., 2020; Dryman & Heimberg, 2018). In sum, the existing literature fails to address how cultural orientation and emotion regulation interact to influence social anxiety. In addition, few studies have examined the use of interpersonal emotion regulation strategies cross-culturally. The current study will fill this gap in the literature through examining these relationships at the self-report and neural levels. The current study will test the following hypotheses: H1: As found in previous studies using intrapersonal measures (e.g. Ford & Mauss, 2015; Kraus & Kitayama, 2019; Matsumoto et al., 2008a), it is predicted that interdependent orientation will be associated with the higher use of expressive suppression whereas independent orientation will be associated with the higher use of cognitive reappraisal. It is hypothesized that individuals with an interdependent orientation will demonstrate greater use of interpersonal emotion regulation strategies than those with independent orientations, replicating findings from Liddell and Williams (2019). H2: Based on previous findings that demonstrate a relationship between social anxiety and greater use of expressive suppression (Bates et al., 2020; Dryman & Heimberg, 2018; Musella et al., 2024), as well as higher levels of social anxiety in interdependent cultures (e.g. Butler et al., 2007; Okawa et al., 2021; Schrier et al., 2010), it is predicted that interdependent orientation and the use of expressive suppression will interact to predict social anxiety, and H3: Given that individuals in interdependent cultures closely monitor group cues to maintain social harmony and order, it is predicted that interdependent orientation will be associated with heightened early ERP responses, specifically greater P100 and N170 amplitude and shorter latency, to emotional facial expressions of fear and anger, compared to independent orientation.

CHAPTER 2: METHOD

Participants

Participants were 175 undergraduate students from Cape Breton University aged 18-25 (M_{age} = 19.73, *SD* = 1.7) with normal or corrected to normal vision. A total of 204 questionnaire responses were collected, but 27 were removed due to missing values, resulting in a final sample size of 175. The sample was female in majority: 81.1% female (*n* = 142), 17.7% male (*n* = 42), and 1.1% Two-Spirited (*n* = 2). Participants were of various ethnic backgrounds: 65.7% White/Caucasian (*n* = 115), 16.6% South Asian (*n* = 29), 7.4% Black/African (*n* = 13), 4% Indigenous (*n* = 7), 4% Other (*n* =7), 2.3% East Asian (*n*= 4). Participants were recruited from online and in-person classes through SONA systems and classroom recruitment at CBU in Cape Breton, Nova Scotia. Upon completion of the online questionnaires, participants were prompted to enter their contact information if they wish to participate in the EEG portion of the study. A subsample of 21 participants were contacted for the lab portion of the study (M_{age} = 19.9, *SD* = 1.7); 76.2% female (*n* = 16), 23.8% male (*n* = 5). Participants in this sample were of various ethnicities: 47.6% White/Caucasian (*n* = 10), 19.0% South Asian (*n* = 4), 14.3% Other (*n* = 3), 9.5% East Asian (*n* = 2), 4.8% Black/African (*n* = 1), and 4.8% Indigenous (*n* = 1). Participants were offered bonus marks in one of their eligible CBU Psychology courses for participating in the questionnaire portion of the study and were offered $25 for participation in the lab portion of the study. Exclusion criteria for the lab portion of the study included head injury and chronic neurological disorders that would affect data collection.

Materials and Procedures

Self-Construal Scale (SCS). The SCS (Singelis, 1994) was used to measure Independent and Interdependent Self-Construal styles; i.e. cultural orientation on the *individual* level. The SCS is a 30-item scale consisting of 15 independent items and 15 interdependent items. Items are answered on a 7-point scale ranging from 1= strongly disagree to 7= strongly agree. This scale produces individual scores for the independent and interdependent aspects of the self; each participant receives a score for Independent SC and a score for Interdependent SC. This scale measures to what extent individuals define and make meaning of the self on an individual level. Example items include: “I enjoy being unique and different from others in many respects.” (independent item) and “Even when I strongly disagree with group members, I avoid an argument.” (interdependent item). The SCS has demonstrated good reliability and validity (Singelis, 1994; Singelis & Sharkey, 1995).

Emotion Regulation Questionnaire (ERQ). The ERQ developed by Gross and John (2003) measures participants’ habitual use of Expressive Suppression and Cognitive Reappraisal as emotion regulation strategies. The ERQ is a 10-item questionnaire consisting of 5 suppression items and 5 reappraisal items. Items are answered on a 7-point scale ranging from 1= strongly disagree to 7= strongly agree. This scale produces individual suppression and reappraisal scores. Example items include: “I control my emotions by *not expressing them*.” (suppression item) and “When I’m faced with a stressful situation, I make myself *think about it* in a way that helps me stay calm.” (reappraisal item). The ERQ has demonstrated good reliability across different samples (Gross & John, 2003; Preece et al., 2019; Wang et al., 2022).

Interpersonal Emotion Regulation Questionnaire (IERQ). The IERQ (Hoffman et al., 2016) measures one’s tendency to use others in order to regulate their emotions by assessing the habitual use of four interpersonal emotion regulation techniques: Enhancing Positive Affect, Perspective Taking, Soothing, and Social Modeling). The IERQ is a 20-item questionnaire consisting of 5 items per category. Items are answered on a 5-point scale ranging from 1= not true for me at all to 5= extremely true for me. Example items include: “Having people remind me that others are worse off helps me when I’m upset.” (perspective taking item) and “I look to others for comfort when I feel upset.” (soothing item). The IERQ has demonstrated excellent reliability across different samples (Hoffman et al., 2016; Soleimani et al., 2018).

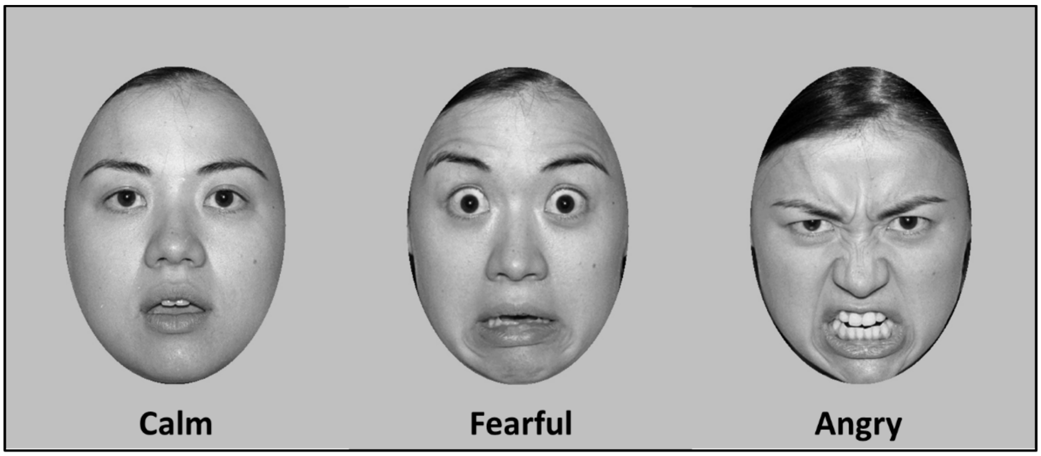
Social Interaction Anxiety Scale (SIAS). The SIAS (Mattick & Clarke, 1998) measures participants’ feelings of anxiety in, and in thinking about, various social situations and general social interactions. The SIAS is a 19-item scale that produces a single Social Anxiety score for each participant. Items are answered on a 5-point scale ranging from 0= not at all characteristic to 4= extremely characteristic. Example items include: “I worry about expressing myself in case I appear awkward.” and “I am tense mixing in a group.”. The SIAS demonstrated excellent reliability across different samples (Mattick & Clarke, 1998; Sahu et al., n.d.).

Computerized Emotional Face Go/NoGo Tasks. These tasks were used to measure participants’ ability to produce and inhibit behavioral responses when confronted with emotionally salient face stimuli. Participants were presented with grey-scaled images of emotional face expressions (i.e. angry, fearful, and calm face expressions; see Figure 1) while seated in front of a computer screen. Participants were tested in four conditions: AngryGo/CalmNoGo, CalmGo/AngryNoGo, FearGo/CalmNoGo, CalmGo/FearNoGo. In each condition, participants were instructed to press a button when presented with a “Go” signal and withhold pressing the button when presented with a “NoGo” signal (e.g. for the

AngryGo/CalmNoGo condition participants were instructed to press the button when they see an angry face and withhold when they see a calm face).

Figure 1

Examples of Affective Faces (Calm, Fearful, Angry).



Electroencephalography (EEG) Procedure. Participants' EEG data was recorded in the Developmental Social Neuroscience Laboratory at Cape Breton University. Upon arrival, participants were asked to sign a consent form and then directed to the EEG testing chair situated in front of a computer screen where the Go/NoGo tasks were administered. Participants were asked to sit comfortably in the chair and the 128-channel EGI Geodesic Sensor Net was placed and adjusted on the participants' head. Impedances were checked using NetStation Acquisition software. The position of the chair and computer screen were adjusted so that the participant was 75 cm viewing distance from the computer screen and at eye level with the face stimuli. The participant was instructed to use their index finger on their dominant hand to respond to Go stimuli by pressing a button on the response pad, which was situated on the table in front of them. First, the participant's resting EEG was recorded for 5 minutes while they attended to a fixation point on the computer screen, after which they began the 4 Go/NoGo tasks, which each took approximately 4.5 minutes to complete. While the participant was completing the tasks, the EEG recording was monitored for poor connectivity and adjustments were made between trials if necessary.

ERP Reduction and Measures. Data were analog filtered 0.1 to 100 Hz, digitized at 500 samples per second, and referenced to the vertex (Cz). Sensor impedances were kept below 50 kΩ. EEG data were digitally filtered offline using a bandpass of 1–30 Hz, re-referenced to the common average of all scalp electrodes, segmented, from 200 ms before to 1000 ms after stimulus onset, and baseline corrected using the 200 ms baseline prior to stimulus onset. Vertical and horizontal electrooculogram (EOG) activity were corrected (Gratton et al.,1983), and epochs with EEG greater than ±75 μV on any channel were excluded from further analysis. Artifact-free trials were then averaged separately for each condition. ERP components were assessed for Go trials. The P100 was measured over left and right occipital (O1, O2, Oz) and lateral occipital-temporal (PO7, PO8) brain regions. P100 was scored as the largest positive deflection with a latency of approximately 80-130ms post stimulus-onset. The N170 was measured over left and right lateral occipital-temporal (P07, PO8) and parietal (P7, P8) brain regions. N170 was scored as the largest negative deflection with a latency of approximately 140-180ms post stimulus-onset. All waveforms had clear peaks within these ranges. P100 and N170 amplitude and latency values were exported using Brain Vision Analyser software.

CHAPTER 3: DATA ANALYSIS

Analyses of Predicted Relationships Based on Prior Research

To confirm well-established relationships reported in the literature, independent t-tests and Pearson's correlation analyses were conducted. First, an independent t-test was used to examine whether the prevalence of Social Anxiety is higher in women than in men (e.g., Asher et al., 2017; Dell'Osso et al., 2024; McLean & Anderson, 2009). Second, Pearson's correlation analyses were conducted to test whether Social Anxiety is positively associated with interdependent orientation and negatively associated with independent orientation (e.g., Butler et al., 2007; Okawa et al., 2021; Schrier et al., 2010). Finally, a Pearson's correlation analysis was used to examine the predicted positive correlation between Social Anxiety and Expressive Suppression, and the negative correlation between Social Anxiety and Cognitive Reappraisal (e.g., Bates et al., 2020; Dryman & Heimberg, 2018; Musella et al., 2024).

Cultural Orientation and Emotion Regulation

To examine the impact of cultural orientation on emotion regulation strategies, Pearson's correlation analyses were conducted with data from all participants. For intrapersonal emotion regulation (measured with the ERQ), separate Pearson's correlations were conducted between each strategy (Cognitive Reappraisal and Expressive Suppression) and both Independent and Interdependent Self-Construal. For interpersonal emotion regulation (measured with the IERQ), separate Pearson's correlations were conducted between each of the four subscales (Enhancing

Positive Affect, Social Modeling, Perspective Taking, and Soothing) and both Independent and Interdependent Self-Construal. Pairwise deletion was used to handle missing data.

Interdependent Orientation and ES

To test the hypothesis that interdependent orientation and the use of Expressive Suppression interact to predict Social Anxiety, a multiple regression analysis was conducted using data from female participants only. Preceding analysis, variables were mean centered to improve interpretation of the interaction term (Interdependent SC and Expressive Suppression) and reduce multicollinearity. The regression analysis was then conducted with Interdependent SC, Expressive Suppression, and the interaction term as predictors, and Social Anxiety as the dependent variable. Pairwise deletion was used to handle missing data.

Interdependent Orientation and Social Modeling

An exploratory multiple regression analysis was conducted to explore the relation between Interdependent SC and Social Modeling using data from female participants only. Preceding analysis, variables were mean centered to improve interpretation of the interaction term (Interdependent SC and Social Modeling) and reduce multicollinearity. The regression analysis was conducted with Interdependent SC, Social Modeling, the interaction term as predictors, and Social Anxiety as the dependent variable. Pairwise deletion was used to handle missing data.

Behavioural Data

Behavioral performance on the computerized Go/NoGo task was examined to verify that participants were attending to the stimuli and remained on task, and to ensure they were not responding randomly.

Confirming accurate representation of social anxiety in EEG sample

To ensure that the EEG subsample of participants accurately represented the larger female sample in terms of Social Anxiety prevalence, descriptive statistics were obtained for Social Anxiety in each group.

ERP Analysis

P100 amplitude and latency: P100 amplitude was defined as the peak amplitude within 80–130ms following stimulus onset. P100 latency was defined as the time point of the peak amplitude within the same window. Peaks were identified at posterior electrode sites (O1, O2, Oz, PO7, and PO8), and were measured relative to a 100ms pre-stimulus baseline. To isolate neural responses specific to emotional processing, difference scores were calculated by subtracting P100 amplitudes and latencies in the Calm condition from those in the emotional condition (Fear– Calm, Angry– Calm), such that positive scores reflect greater P100 responses or longer latencies to emotional faces.

N170 peak-to-peak amplitude and latency: For the N170 component, peak-to-peak amplitude was calculated to more accurately capture component magnitude by controlling for baseline variability. Specifically, N170 amplitude was defined as the voltage difference between the preceding P100 peak and the subsequent N170 negative peak. Peaks were identified at posterior electrode sites (P7, P8, PO7, and PO8), with P1 peaks detected within 80–130ms and N170 peaks within 140–180ms following stimulus onset. N170 latency was defined as the time point of the N170 peak, regardless of its position relative to baseline. To isolate neural responses specific to emotional processing, difference scores were calculated for both amplitude and latency were computed by subtracting Calm condition values from emotional condition values

(Fear– Calm, Angry– Calm), such that positive amplitude scores reflect greater N170 responses to emotional faces, and positive latency scores indicate slower responses to emotional faces.

ERP analyses with variables of interest: To explore the relations among SC, ER, and Social Anxiety on the neural level, separate Pearson's correlation analyses were conducted to examine associations between P1 and N170 amplitude and latency difference scores and the following psychological variables: Independent and Interdependent Self-Construal, each of the intrapersonal and interpersonal emotion regulation subscales, and Social Anxiety.

CHAPTER 4: RESULTS

Confirmatory Analyses

As predicted, an independent samples t-test revealed that women (n = 142; M = 36.93, SD = 15.31) reported significantly higher Social Anxiety than men (n = 31; M = 28.84, SD = 16.2), $t(171) = –2.64$, $p = .009$ and Social Anxiety was positively correlated with Interdependent SC ($r(174) = .191$, $p = .012$) and negatively correlated with Independent SC ($r(173) = –.429$, $p < .001$). Additionally, and as predicted, Social Anxiety was found to be positively correlated with use of Expressive Suppression ($r(175) = .196$, $p = .009$) and negatively correlated with use of Cognitive Reappraisal ($r(175) = – .193$, $p = .011$).

Cultural Orientation and Emotion Regulation

*Intrapersonal ER strategie*s: As predicted, Pearson's correlation analyses revealed a positive correlation between Independent SC and reappraisal ($r(173) = .403$, $p < .001$) and Interdependent SC ($r(174) = .200$, $p = .008$). However, Expressive Suppression was not correlated with either Independent or Interdependent SC.

Interpersonal ER strategies: Pearson's correlation analyses revealed a positive correlation between Interdependent SC and all Interpersonal ER strategies; Enhancing Positive Affect ($r(173) = .317$, $p < .001$), Perspective Taking ($r(173) = .187$, $p = .014$), Soothing ($r(173) = .275$, $p < .001$), and Social Modeling ($r(173) = .330$, $p < .001$). Independent SC was positively correlated with Perspective Taking ($r(172) = .240$, $p = .002$) and Social Modeling ($r(172) = .207$, $p = .006$), but was not correlated with Enhancing Positive Affect or Soothing.

Table 1

Correlations between SC and Interpersonal ER strategies.

	Enhancing Positive Affect	Perspective Taking	Soothing	Social Modeling
INDSC	$r = .043$ $p = .575$	$r = .240$** $p = .002$	$r = –.005$ $p = .944$	$r = .207$** $p = .006$
INTERSC	$r = .317$** $p < .001$	$r = .187$* $p = .014$	$r = .275$** $p < .001$	$r = .330$** $p < .001$

Note. Correlation is significant at 0.01**, 0.05* (2-tailed).

Interdependent Orientation and ES

A multiple regression analysis was conducted to test the hypothesis that Interdependent SC and use of Expressive Suppression will interact to predict Social Anxiety. Given the significant difference in measures of social anxiety for men and women and the small sample of men relative to women in the current sample, males were excluded from this analysis. The multiple regression model was significant, $F(3, 142) = 3.5$, $p = .017$, $R^2 = .07$, and use of Expressive Suppression significantly predicted Social Anxiety, $\beta = .20$, $t = 2.44$, $p = .016$. Interdependent SC approached significance, $\beta = .16$, $t = 1.96$ $p = .052$. The interaction term (Interdependent SC and Expressive Suppression) did not predict Social Anxiety, $\beta = –.009$, $t = –.105$, $p = .917$.

Table 2

Regression coefficients and significance: INTERSC and Expressive Suppression.

	Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
INTERSC	.127	.162	1.96	.052
SUPPRESSION	.238	.202	2.44	.016*
INTERSC*SUPPRESSION	.024	-.009	–.105	.917

Note: Predictor is significant at 0.05*.

Interdependent Orientation and Social Modeling

A multiple regression analysis was conducted to test the predictive effect of the interaction between Interdependent SC and Social Modeling on Social Anxiety. As with the previous analysis, only female participants were included in this analysis. The multiple regression model was significant, $F(3, 142) = 4.6$, $p = .004$, $R^2 = .09$. Interdependent SC significantly predicted Social Anxiety, $\beta = .21$, $t = 2.43$ $p = .016$, and the interaction of Interdependent SC and Social Modeling predicted against Social Anxiety, $\beta = -.24$, $t = -2.85$, $p = .005$. Social Modeling did not independently predict Social Anxiety, $\beta = -.055$, $t = -.621$ $p = .54$.

Table 3

Regression coefficients and significance: INTERSC and Social Modeling.

	Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
INTERSC	.136	.214	2.43	.016*
SOCIAL MODELING	.306	–.055	–.621	.535
INTERSC*SOCIAL MODELING	.028	–.235	–2.85	.005**

Note: Predictor is significant at 0.01**, 0.05*.

Social Anxiety Prevalence Across Samples

Descriptive statistics for Social Anxiety in the larger female sample (M = 36.93, SD = 15.31) and the sample of participants who participated in the EEG testing (M = 36.95, SD = 16.85) revealed very similar mean scores, confirming equivalent representation of Social Anxiety in the smaller EEG sample.

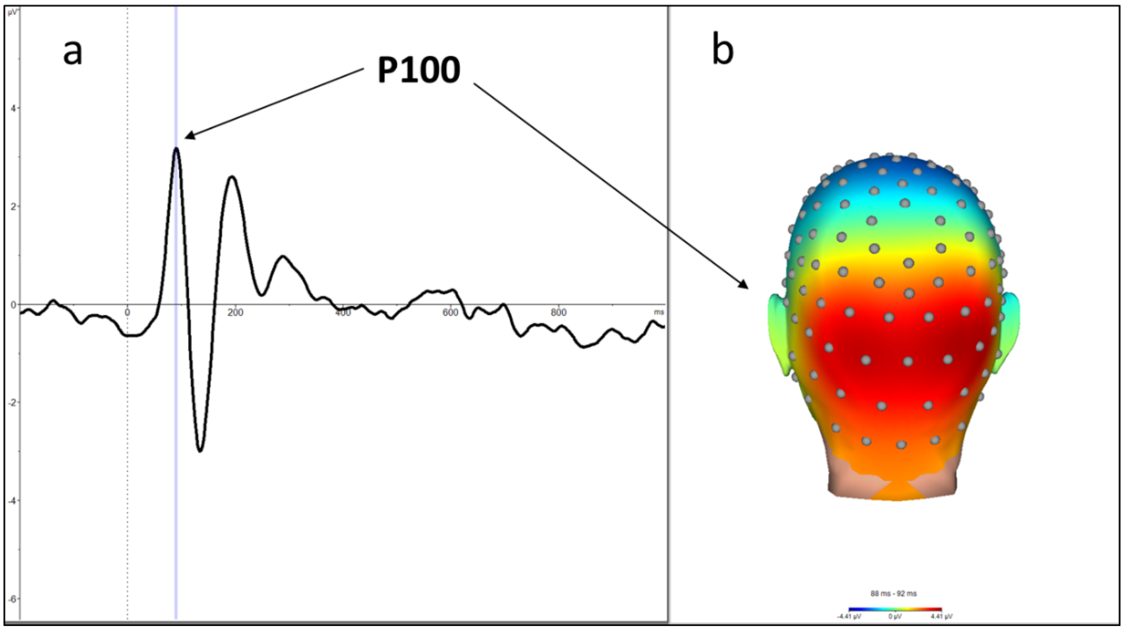
Event-Related Potentials (ERPs) to Emotional Faces

To evaluate the integrity of the ERP data and ensure consistency across participants, grand average waveforms were computed for P100 and N170 components. The grand average waveforms were used to visually inspect the timing and morphology of the components. The timing and morphology of P100 and N170 components both appeared consistent with expectations. Additionally, to confirm the expected spatial distribution of the components, scalp topographies were examined. The topography maps showed expected spatial distributions of electrical activity for each component, supporting the assumption of appropriate neural sources.

Figure 2 presents the grand averaged wave forms and topography for the P100 components for 21 participants.

Figure 2

P100 grand average waveform and topography at O2 electrode site (*n* = 21).

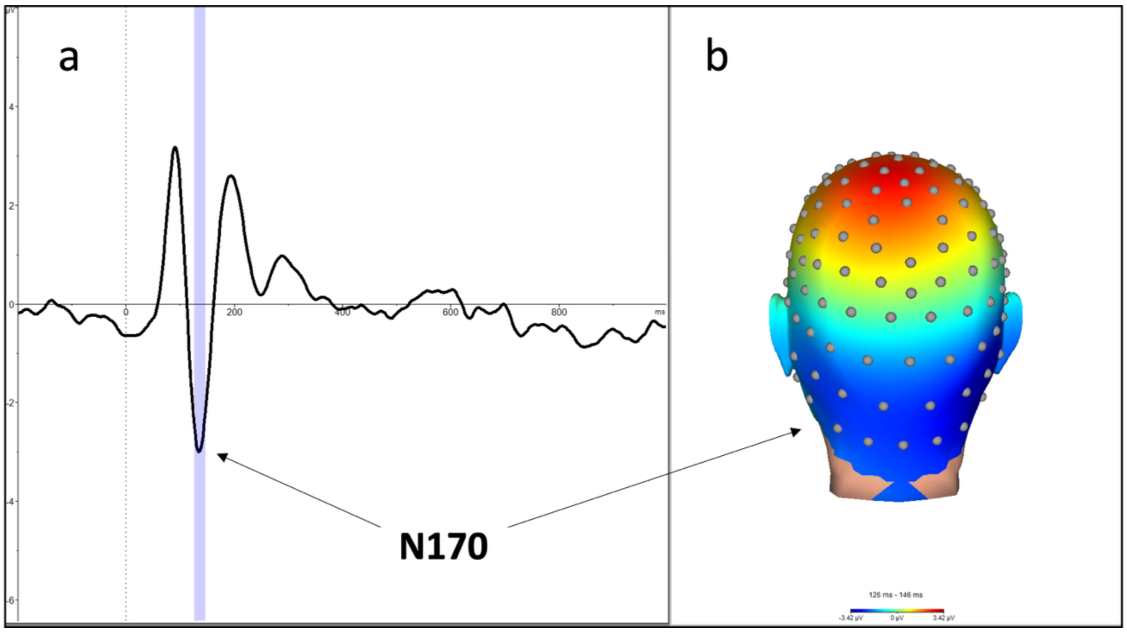


Note. (a) P100 grand average to calm face expressions. (b) Topographic map: positivity (red) shown over occipital regions.

Figure 3 presents the grand averaged wave forms and topography for the N170 components for 21 participants.

Figure 3

N170 grand average waveform and topography at O2 electrode site (*n* = 21).



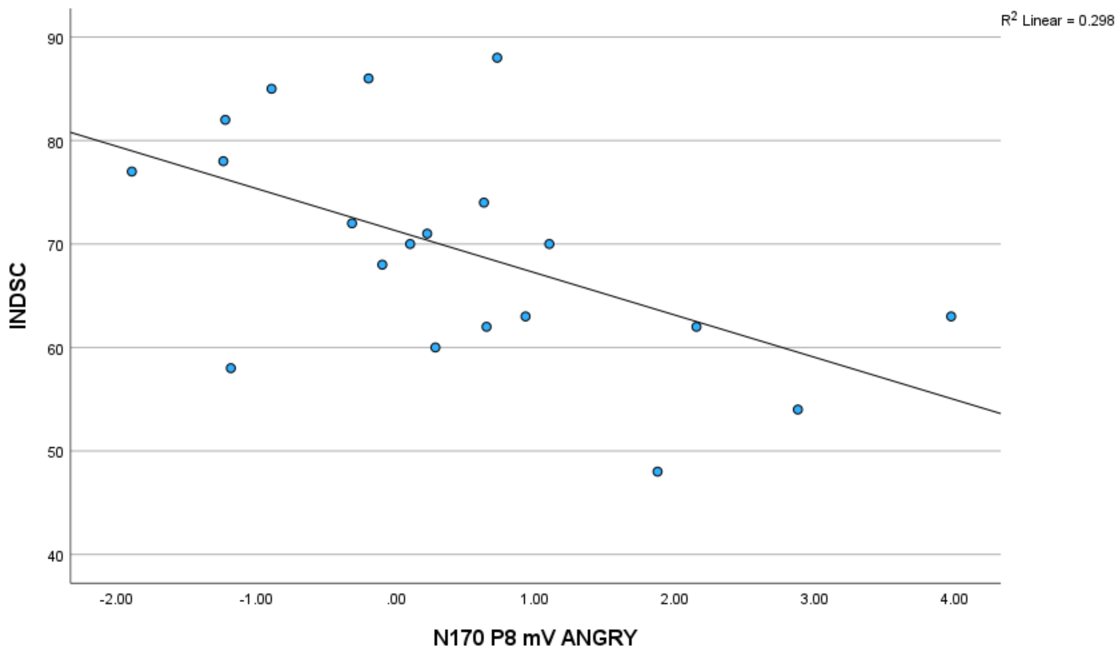
Note. (a) N170 grand average to calm face expressions. (b) Topographic map: negativity (blue) shown over lateral occipital-temporal regions.

ERPs to Emotional Faces and Variables of Interest

Cultural orientation: N170 amplitude to fearful expressions at P8 ($r(21) = –.474$, $p = .03$) and to angry expressions at PO8 ($r(20) = –.546$, $p = .013$) and P8 ($r(20) = –.546$, $p = .013$) was negatively correlated with Independent SC.

Figure 4

Scatter plot: INDSC and N170 amplitude to angry expressions at P8.



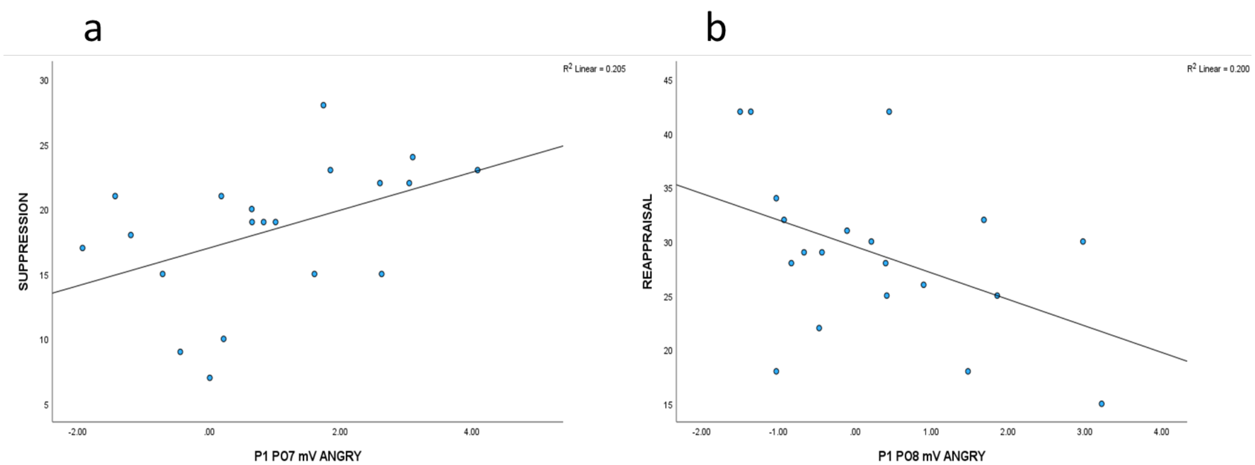
Note: y = 71.28–4.08*x

Emotion regulation: Expressive Suppression was positively correlated with P1 amplitude to fearful expressions at PO8 ($r(21) = .456$, $p = .038$) and to angry expressions at PO7 ($r(20) = .453$, $p = .045$). Cognitive Reappraisal was negatively correlated with P1 amplitude at PO8 ($r(20) = –.447$, $p = .048$) as well as N170 amplitude at P8 ($r(20) = –.509$, $p = .022$) and PO8 ($r(20) = –$

.483, *p* = .031) to angry expressions. Perspective Taking was positively correlated with P1 latency to fearful faces at PO7 (*r*(21) = .478, *p* = .028) and N170 amplitude at PO7 (*r*(20) = .500, *p* = .025).

Figure 5

Scatter plot: Intrapersonal emotion regulation strategies and P1 amplitude to angry faces.

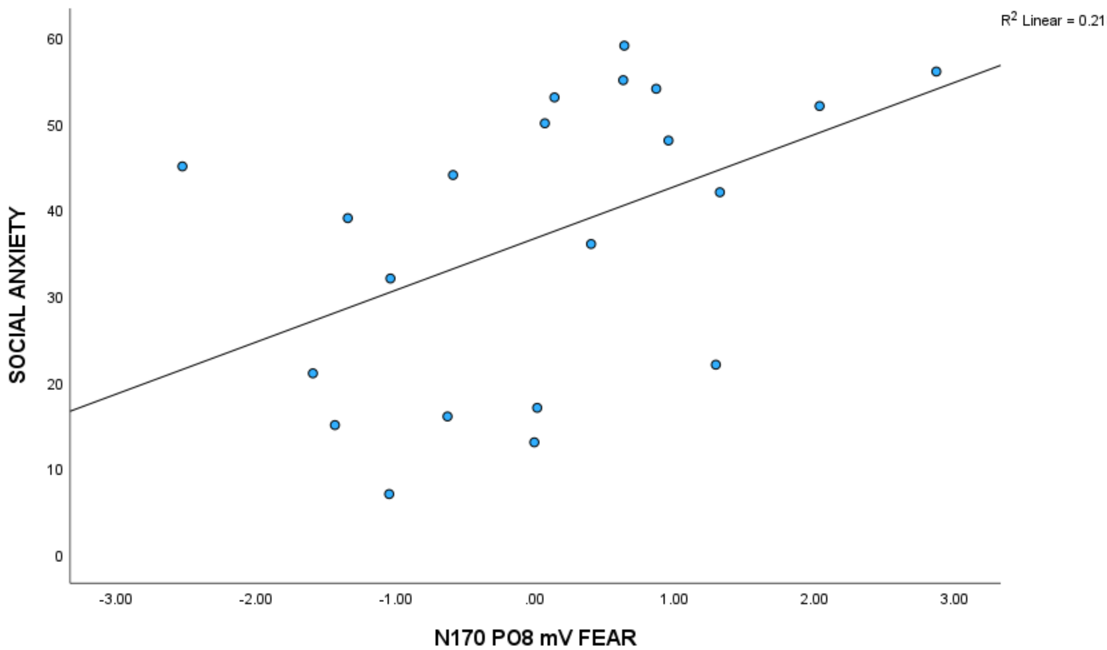


Note: (a) Suppression and P1 amplitude to angry expressions at PO7; y = 17+1.46*x. (b) Reappraisal and P1 amplitude to angry expressions at PO8; y = 29.54–2.45*x.

Social anxiety: Social Anxiety was positively correlated with N170 amplitude to fearful expressions at P8 ($r(21) = .442$, $p = .045$) and PO8 ($r(21) = .467$, $p = .033$).

Figure 6

Scatter plot: social anxiety and N170 amplitude to fearful expressions.



Note. y = 36.66+6.02*x.

CHAPTER 5: DISCUSSION

Cultural Orientation and ER

Firstly, we hypothesized that emotion regulation strategies would differ based on cultural orientation. Based on previous studies examining intrapersonal emotion regulation strategies (cognitive reappraisal and expressive suppression) (e.g. Dryman & Heimberg, 2018; Klein et al., 2024; Kraus & Kitayama, 2019), we expected to find positive associations between cognitive reappraisal and independent cultural orientation, and between expressive suppression and interdependent cultural orientation. Our results partially support this notion, such that reappraisal was found to be more strongly correlated with independent than interdependent self-construal, however, both were positively correlated. Contrary to our expectations, suppression strategies were not significantly correlated with either independent or interdependent self-construal. This finding is inconsistent with existing research linking interdependent cultural orientation with suppression (e.g. Ford & Mauss, 2015; Kraus & Kitayama, 2019; Matsumoto et al., 2008a). One potential explanation for this finding is that use of emotion regulation strategies may be context dependent. Matsumoto et al. (2008a) found significant associations between interdependent orientation and suppression in a large sample ($n > 3000$) of participants residing in 23 different countries with the largest numbers of participants from the United States ($n = 458$), Japan ($n = 277$), India ($n = 246$), and Mexico ($n = 231$). Hence, this study had a very diverse sample of participants in variety of cultural environments which may explain their significant findings in this area. The present study was conducted with participants who are currently residing in

Canada, a largely individualistic country where self-expression is encouraged. In this case, it is possible that the larger cultural context outweighs one's individual cultural values and thus promotes use of reappraisal rather than suppression, even in individuals with a largely interdependent orientation.

Interpersonal emotion regulation strategies have rarely been explored in cross-cultural research. Due to the interconnected nature of interdependent cultures, it was hypothesized that use of interpersonal emotion regulation would be associated with interpersonal orientation. In line with this hypothesis, all four interpersonal emotion regulation strategies (enhancing positive affect, social modeling, soothing, perspective taking) were positively correlated with interdependent self-construal. This finding extends previous research by Liddel and Williams (2019) who found that collectivist individuals reported greater use of social modeling and perspective taking compared to individualist participants. Greater use of interpersonal emotion regulation strategies in those with an interdependent orientation can be explained by the finding that emotions are relationally embedded in interdependent cultures (Chentsova-Dutton & Tsai, 2010). Therefore, utilizing emotion regulation strategies that integrate others' experiences (social modeling, perspective taking) or support from others (soothing, enhancing positive affect) may be particularly adaptive for individuals with an interdependent orientation.

Independent orientation was found to be positively correlated with perspective taking and social modeling, but not with soothing or enhancing positive affect. Perspective taking and social modeling can be thought of as having a cognitive-focus whereas soothing and enhancing positive affect are more emotion-focused. One explanation for this is that those with an independent orientation prioritize personal autonomy and therefore may lean towards emotion regulation strategies that allow them to independently regulate their emotions in a self-directed manner.

Perspective taking and social modeling function as regulatory processes through changing one's cognitions. On the other hand, soothing and enhancing positive affect function by emphasizing emotionality, and may pose a risk of emotional dependence on others which is vastly incongruent with independent cultural values.

Social Anxiety

Second, the hypothesis that interdependent orientation would interact with suppression to predict social anxiety proved to be insignificant. However, use of suppression independently predicted social anxiety within this model. A possible explanation for this finding lies in the findings of Kraus and Kitayama (2019) where suppression was found to be an adaptive emotion regulation strategy for those with an interdependent orientation. These findings suggest that suppression may be maladaptive for social anxiety when considered alone or within incongruent cultural contexts, but that it may not be a maladaptive strategy when the behavior aligns with cultural values. Suppression promotes emotional neutrality and thus group harmony, which therefore serves to foster culturally congruent values in interdependent cultures and may serve as a protective factor against social anxiety in this context. This finding highlights the importance of one's cultural context in the adaptiveness of emotion regulation strategies, and subsequent mental health effects.

Further, in the exploratory analyses, interdependent self-construal and social modeling interacted to negatively predict social anxiety. Within this model, interdependent self-construal independently predicted social anxiety. Therefore, the use of social modeling may serve as a protective factor against social anxiety in those with a more interdependent view of the self. Someone who has largely interdependent cultural values may find comfort in observing and modeling socially adaptive behavior of others, as it can serve to reduce uncertainty at the root of social anxiety. This model suggests that increased other-focused attention as seen in interdependent, socially anxious individuals may serve to facilitate adaptive emotion regulation strategies.

ERP Responses to Emotional Faces

Third, the present study aimed to identify the neural correlates of emotional face processing in the context of cultural orientation, emotion regulation, and social anxiety. With respect to cultural orientation, we found that individuals with more independent self-construal showed reduced N170 amplitudes to fearful and angry expressions, suggesting reduced depth of processing for faces expressing emotion. This finding aligns with the notion that those with a largely independent orientation are less concerned with social feedback and perhaps engage in greater self-focused rather than other-focused attention. Interdependent orientation was not significantly correlated with P100 or N170 amplitude, contrary to expectations. A potential explanation for this is that static face stimuli may not have been perceived as socially meaningful to interdependent individuals without associated relational context. Alternatively, habitual use of suppression, as reported in interdependent individuals (e.g. Kraus & Kitayama, 2019; Matsumoto et al., 2008a; Soto et al., 2011), may cause these individuals to automatically and unconsciously suppress processing of socially threatening face expressions.

Suppression was positively correlated with P100 amplitude in response to fearful and angry facial expressions, suggesting that individuals who report more frequent use of suppression may exhibit heightened early sensitivity to threat-related emotional cues. Although suppression is typically understood as a later-stage emotion regulation strategy, this pattern may reflect a broader tendency toward greater emotional reactivity in these individuals. In other words, those who habitually suppress their emotions might experience stronger automatic responses to emotional stimuli, potentially indicating a need for more effortful regulation later in processing. Conversely, reappraisal was negatively correlated with P1 and N170 amplitudes in response to angry facial expressions, suggesting reduced early attentional engagement and less detailed structural encoding of threat-related emotional faces. Individuals who habitually use reappraisal may exhibit an automatically dampened neural response to emotional stimuli, potentially reflecting a reduced perception of threat. This blunted early response may be linked to the cognitive control processes involved in reappraisal, which engages top-down regulation strategies aimed at reframing emotional meaning. Additionally, perspective taking was positively correlated with P1 latency and N170 amplitude to fearful and angry faces, respectively. This finding indicates perspective taking is associated with slower speed of early visual perception (less vigilance) and more elaborate structural encoding of emotional faces. Like reappraisal, perspective taking may engage top-down cognitive mechanisms that modulate emotional responses. Specifically, the recruitment of cognitive resources to reframe or reinterpret the emotional meaning of a stimulus may lead to reduction in the perceived threat/emotional salience measured at the P100 stage of processing.

Finally, social anxiety was positively correlated with N170 amplitude to fearful expressions. This finding indicates more elaborate processing of threatening face expressions in socially anxious individuals. Aligning with previous studies, this provides evidence of heightened attentional biases to social threat in individuals with social anxiety (e.g. Moser et al., 2008; Willner et al., 2020).

Limitations and Future Directions

While the present study has several strengths, there are also important limitations to consider. First, independent and interdependent self-construal scores were distributed such that there were very few participants who were high in independent and low in interdependent self-construal, or vice versa. This prevented statistically sound exploration of group differences within both the larger sample and the smaller EEG sample. Larger sample sizes may be beneficial for future research to explore group differences regarding the extremes (very high/very low) of cultural orientation and other variables of interest. Similarly, the sample of participants recruited for EEG data collection was very small. A greater number of participants would have allowed for the creation of groups based on cultural orientation, and thus the examination of group differences in neural responses to emotional faces.

The diversity of the EEG sample was affected by methodological limitations of EEG data collection. As the electrodes on the EEG net must come in contact with the participants' scalp, hair thickness was a significant setback as it interferes with this contact. Unfortunately, several participants were not able to participate in the present study due to this limitation, the majority of which identified as Black/African– limiting representation of this cultural group and associated perspectives within the study. Given the cultural foundation of the present study design, gaining diverse perspectives is of vast importance. Future studies should explore use of EEG methodology that can accommodate different hair types, subsequently allowing for more diverse sampling and generalizability of results.

Finally, the current study may have benefit from obtaining geographical information such as participants' country of birth, country of major residence, and how long someone has been living in Canada. Ma et al. (2022) found that N170 amplitudes to grey-scaled face expressions were greater in individuals who recently moved to a novel ethnic environment compared to long-term residents. This finding indicates greater face-sensitive processing in those experiencing a new cultural context rather than those whom are attuned to their cultural environment. Future research should explore these contextual variables further to deepen our understanding of cultural influences in face processing, emotion regulation, and subsequent implications in mental health difficulties such as social anxiety.

Conclusion

The present study explored the relations between cultural orientation on the individual level, emotion regulation strategies, and social anxiety in the context of neural responses to emotional face expressions. Results indicated significant relations between cultural orientation, emotion regulation tendencies, and social anxiety. The current study presented evidence supporting the adaptive nature of culturally congruent emotion regulation strategies in the context of social anxiety. Further, relations were supported on the neural level as evidenced by ERP responses to emotional face expressions.

The current study provides evidence that one's culture influences not only their behavior, but also the autonomic, unconscious processing of their social environment. This may have important implications in cross-cultural mental health research such that individuals with different cultural orientations may benefit from different interventions, or in our case, different emotion regulation strategies, to help with mental health difficulties. Future research is warranted to add to our understanding of the etiology of mental health difficulties across cultures and the development of culturally sensitive interventions.

References

Akdoğan, R., & Çimşir, E. (2022). Collectivistic ambivalence: A potential source of social anxiety for individuals with higher inferiority feelings. *International Journal of Intercultural Relations, 89*, 195–207.

Akkuş, K., & Peker, M. (2021). Exploring the relationship between interpersonal emotion regulation and social anxiety symptoms: The mediating role of negative mood regulation expectancies. *Cognitive Therapy and Research, 46*(2), 287–301.

Asher, M., Asnaani, A., & Aderka, I. M. (2017). Gender differences in social anxiety disorder: A review. *Clinical Psychology Review, 56*, 1–12.

Ball, T. M., Sullivan, S., Flagan, T., Hitchcock, C. A., Simmons, A., Paulus, M. P., & Stein, M. B. (2012). Selective effects of social anxiety, anxiety sensitivity, and negative affectivity on the neural bases of emotional face processing. *NeuroImage, 59*(2), 1879–1887.

Bates, G. W., Elphinstone, B., & Whitehead, R. (2020). Self-compassion and emotional regulation as predictors of social anxiety. *Psychology and Psychotherapy: Theory, Research and Practice, 94*(3), 426–442.

Blais, C., Fiset, D., Gingras, F., Plouffe-Demers, M. P., & Charbonneau, I. (2024). Diversity in visual perception: How cultural variability in face processing can inform policymakers. *Policy Insights from the Behavioral and Brain Sciences, 11*(2), 141–148.

Blais, C., Jack, R. E., Scheepers, C., Fiset, D., & Caldara, R. (2008). Culture shapes how we look at faces. *PLOS ONE, 3*(8), e3022.

Boduroglu, A., & Shah, P. (2017). Cultural differences in attentional breadth and resolution. *Culture and Brain, 5*, 169–181.

Boehme, S., Miltner, W. H., & Straube, T. (2015). Neural correlates of self-focused attention in social anxiety. *Social Cognitive and Affective Neuroscience, 10*(6), 856–862.

Butler, E. A., Egloff, B., Wlhelm, F. H., Smith, N. C., Erickson, E. A., & Gross, J. J. (2003). The social consequences of expressive suppression. *Emotion, 3*(1), 48.

Butler, E. A., Lee, T. L., & Gross, J. J. (2007). Emotion regulation and culture: Are the social consequences of emotion suppression culture-specific? *Emotion, 7*(1), 30.

Chentsova-Dutton, Y. E., & Tsai, J. L. (2010). Self-focused attention and emotional reactivity: The role of culture. *Journal of Personality and Social Psychology, 98*(3), 507.

Clark, D. M., & Wells, A. (1995). A cognitive model of social phobia. In *Social phobia: Diagnosis, assessment and treatment*.

Cross, S. E., Hardin, E. E., & Gercek-Swing, B. (2011). The what, how, why, and where of self-construal. *Personality and Social Psychology Review, 15*(2), 142–179.

Dell'Osso, L., Abelli, M., Pini, S., Carpita, B., Carlini, M., Mengali, F., ... & Massimetti, G. (2015). The influence of gender on social anxiety spectrum symptoms in a sample of university students. *Rivista di Psichiatria, 50*(6), 295–301.

Dryman, M. T., & Heimberg, R. G. (2018). Emotion regulation in social anxiety and depression: A systematic review of expressive suppression and cognitive reappraisal. *Clinical Psychology Review, 65*, 17–42.

Eimer, M., Gosling, A., Nicholas, S., & Kiss, M. (2011). The N170 component and its links to configural face processing: A rapid neural adaptation study. *Brain Research, 1376*, 76–87.

Ekman, P., Davidson, R. J., & Friesen, W. V. (1990). The Duchenne smile: Emotional expression and brain physiology: II. *Journal of Personality and Social Psychology, 58*(2), 342.

Estéphan, A., Fiset, D., Saumure, C., Plouffe-Demers, M. P., Zhang, Y., Sun, D., & Blais, C. (2018). Time course of cultural differences in spatial frequency use for face identification. *Scientific Reports, 8*(1), 1816.

Ford, B. Q., & Mauss, I. B. (2015). Culture and emotion regulation. *Current Opinion in Psychology, 3*, 1–5.

Goldin, P. R., McRae, K., Ramel, W., & Gross, J. J. (2008). The neural bases of emotion regulation: Reappraisal and suppression of negative emotion. *Biological Psychiatry, 63*(6), 577–586.

Gratton, G., Coles, M. G., & Donchin, E. (1983). A new method for off-line removal of ocular artifact. *Electroencephalography and Clinical Neurophysiology, 55*(4), 468–484.

Gross, J. J., & John, O. P. (2003). Individual differences in two emotion regulation processes: Implications for affect, relationships, and well-being. *Journal of Personality and Social Psychology, 85*(2), 348.

Gross, J. J., & Levenson, R. W. (1993). Emotional suppression: Physiology, self-report, and expressive behavior. *Journal of Personality and Social Psychology, 64*(6), 970.

Herrmann, M. J., Ehlis, A. C., Muehlberger, A., & Fallgatter, A. J. (2005). Source localization of early stages of face processing. *Brain Topography, 18*, 77–85.

Hillyard, S. A., & Anllo-Vento, L. (1998). Event-related brain potentials in the study of visual selective attention. *Proceedings of the National Academy of Sciences, 95*(3), 781–787.

Hofmann, S. G. (2014). Interpersonal emotion regulation model of mood and anxiety disorders. *Cognitive Therapy and Research, 38*, 483–492.

Hofmann, S. G., Anu Asnaani, M. A., & Hinton, D. E. (2010). Cultural aspects in social anxiety and social anxiety disorder. *Depression and Anxiety, 27*(12), 1117–1127.

Hofmann, S. G., Carpenter, J. K., & Curtiss, J. (2016). Interpersonal emotion regulation questionnaire (IERQ): Scale development and psychometric characteristics. *Cognitive Therapy and Research, 40*, 341–356.

Hong, J. J., & Woody, S. R. (2006). Cultural mediators of self-reported social anxiety. *Behaviour Research and Therapy, 45*(8), 1779–1789.

Itier, R. J., & Neath-Tavares, K. N. (2017). Effects of task demands on the early neural processing of fearful and happy facial expressions. *Brain Research, 1663*, 38–50.

Itier, R. J., & Taylor, M. J. (2004). N170 or N1? Spatiotemporal differences between object and face processing using ERPs. *Cerebral Cortex, 14*(2), 132–142.

Jack, R. E., Blais, C., Scheepers, C., Schyns, P. G., & Caldara, R. (2009). Cultural confusions show that facial expressions are not universal. *Current Biology, 19*(18), 1543–1548.

John, O. P., & Gross, J. J. (2004). Healthy and unhealthy emotion regulation: Personality processes, individual differences, and life span development. *Journal of Personality, 72*(6), 1301–1334.

Kim, H., & Markus, H. R. (1999). Deviance or uniqueness, harmony or conformity? A cultural analysis. *Journal of Personality and Social Psychology, 77*(4), 785.

Kim, H. S., & Sherman, D. K. (2007). "Express yourself": Culture and the effect of self-expression on choice. *Journal of Personality and Social Psychology, 92*(1), 1.

Klein, N. D., Bravo, A. J., Conway, C. C., Keough, M. T., Pilatti, A., & Mezquita, L. (2024). Individualism, collectivism, and emotion regulation: A cross-cultural examination among young adults from seven countries. *Current Psychology, 43*(31), 26007–26018.

Kraus, B., & Kitayama, S. (2019). Interdependent self-construal predicts emotion suppression in Asian Americans: An electro-cortical investigation. *Biological Psychology, 146*, 107733.

Liddell, B. J., & Williams, E. N. (2019). Cultural differences in interpersonal emotion regulation. *Frontiers in Psychology, 10*, 999.

Liddell, B. J., Felmingham, K. L., Das, P., Whitford, T. J., Malhi, G. S., Battaglini, E., & Bryant, R. A. (2017). Self-construal differences in neural responses to negative social cues. *Biological Psychology, 129*, 62–72.

Ma, Y., Bang, D., Wang, C., Allen, M., Frith, C., Roepstorff, A., & Han, S. (2014). Sociocultural patterning of neural activity during self-reflection. *Social Cognitive and Affective Neuroscience, 9*(1), 73–80.

Ma, X., Modersitzki, N., Maurer, U., & Sommer, W. (2022). Neural sensitivity to faces is increased by immersion into a novel ethnic environment: Evidence from ERPs. *Psychophysiology, 60*(1), e14147.

MacNamara, A., Joyner, K., & Klawohn, J. (2022). Event-related potential studies of emotion regulation: A review of recent progress and future directions. *International Journal of Psychophysiology, 176*, 73–88.

Markus, H. R., & Kitayama, S. (1991). Culture and the self: Implications for cognition, emotion, and motivation. In *College Student Development and Academic Life* (pp. 264–293). Routledge.

Matsumoto, D., Yoo, S. H., & Nakagawa, S. (2008a). Culture, emotion regulation, and adjustment. *Journal of Personality and Social Psychology, 94*(6), 925.

Matsumoto, D., Yoo, S. H., & Fontaine, J. (2008b). Mapping expressive differences around the world: The relationship between emotional display rules and individualism versus collectivism. *Journal of Cross-Cultural Psychology, 39*(1), 55–74.

Mattick, R. P., & Clarke, J. C. (1998). Development and validation of measures of social phobia scrutiny fear and social interaction anxiety. *Behaviour Research and Therapy, 36*(4), 455–470.

McLean, C. P., & Anderson, E. R. (2009). Brave men and timid women? A review of the gender differences in fear and anxiety. *Clinical Psychology Review, 29*(6), 496–505.

McRae, K., & Gross, J. J. (2020). Emotion regulation. *Emotion (Washington, D.C.), 20*(1), 1–9.

Mesquita, B., & Boiger, M. (2014). Emotions in context: A sociodynamic model of emotions. *Emotion Review, 6*(4), 298–302.

Moser, J. S., Huppert, J. D., Duval, E., & Simons, R. F. (2008). Face processing biases in social anxiety: An electrophysiological study. *Biological Psychology, 78*(1), 93–103.

Musella, K. E., DiFonte, M. C., Michel, R., Stamates, A., & Flannery-Schroeder, E. (2024). Emotion regulation as a mediator in the relationship between childhood maltreatment and symptoms of social anxiety among college students. *Journal of American College Health*, 1–8.

Nakashima, T., Goto, Y., Abe, T., Kaneko, K., Saito, T., Makinouchi, A., & Tobimatsu, S. (2008). Electrophysiological evidence for sequential discrimination of positive and negative facial expressions. *Clinical Neurophysiology, 119*(8), 1803–1811.

Norasakkunkit, V., & Kalick, S. M. (2002). Culture, ethnicity, and emotional distress measures: The role of self-construal and self-enhancement. *Journal of Cross-Cultural Psychology, 33*(1), 56–70.

Okawa, S., Arai, H., Sasagawa, S., Ishikawa, S. I., Norberg, M. M., Schmidt, N. B., ... & Shimizu, E. (2021). A cross-cultural comparison of the bivalent fear of evaluation model for social anxiety. *Journal of Behavioral and Cognitive Therapy, 31*(3), 205–213.

Okazaki, S. (2000). Asian American and White American differences on affective distress symptoms: Do symptom reports differ across reporting methods?. *Journal of Cross-Cultural Psychology, 31*(5), 603–625.

Özkarar-Gradwohl, F. G. (2019). Cross-cultural affective neuroscience. *Frontiers in Psychology, 10*, 794.

Pineles, S. L., & Mineka, S. (2005). Attentional biases to internal and external sources of potential threat in social anxiety. *Journal of Abnormal Psychology, 114*(2), 314.

Preece, D. A., Becerra, R., Robinson, K., & Gross, J. J. (2019). The emotion regulation questionnaire: Psychometric properties in general community samples. *Journal of Personality Assessment, 102*, 1–9.

Ramzan, N., & Amjad, N. (2017). Cross cultural variation in emotion regulation: A systematic review. *Annals of King Edward Medical University, 23*(1).

Rossion, B., & Jacques, C. (2011). The N170: Understanding the time course of face perception in the human brain. In *The Oxford Handbook of ERP Components* (pp. 115–142).

Sahu, N. K., Ajith, B., Gupta, S., & Lone, H. R. (n.d.). Breaking the silence: Validating social interaction anxiety scale (SIAS) and unveiling social anxiety trends among Indian students in the post-COVID era.

Saumure, C., Plouffe-Demers, M. P., Fiset, D., Cormier, S., Zhang, Y., Sun, D., ... & Blais, C. (2023). Differences between East Asians and Westerners in the mental representations and visual information extraction involved in the decoding of pain facial expression intensity. *Affective Science, 4*(2), 332–349.

Schreier, S. S., Heinrichs, N., Alden, L., Rapee, R. M., Hofmann, S. G., Chen, J., ... & Bögels, S. (2010). Social anxiety and social norms in individualistic and collectivistic countries. *Depression and Anxiety, 27*(12), 1128–1134.

Soleimani, S., Mofrad, F., & Kareshki, H. (2018). Interpersonal emotion regulation questionnaire (IERQ) in Persian speaking population: Adaption, factor structure and psychometric properties. *International Journal of Applied Behavioral Sciences, 3*(4), 42–49.

Soto, J. A., Perez, C. R., Kim, Y. H., Lee, E. A., & Minnick, M. R. (2011). Is expressive suppression always associated with poorer psychological functioning? A cross-cultural comparison between European Americans and Hong Kong Chinese. *Emotion, 11*(6), 1450.

Shean, G., & Uchenwa, U. (1990). Interpersonal style and anxiety. *The Journal of Psychology, 124*(4), 403–408.

Singelis, T. M. (1994). The measurement of independent and interdependent self-construals. *Personality and Social Psychology Bulletin, 20*, 580–591.

Singelis, T. M., & Sharkey, W. F. (1995). Culture, self-construal, and embarrassability. *Journal of Cross-Cultural Psychology, 26*(6), 622–644.

Spurr, J. M., & Stopa, L. (2003). The observer perspective: Effects on social anxiety and performance. *Behaviour Research and Therapy, 41*(9), 1009–1028.

Taylor, S. E., Welch, W. T., Kim, H. S., & Sherman, D. K. (2007). Cultural differences in the impact of social support on psychological and biological stress responses. *Psychological Science, 18*(9), 831–837.

Triandis, H. C. (1996). The psychological measurement of cultural syndromes. *American Psychologist, 51*(4), 407.

Triandis, H. C. (2001). Individualism-collectivism and personality. *Journal of Personality, 69*(6), 907–924.

Triandis, H. C., & Gelfand, M. J. (1998). Converging measurement of horizontal and vertical individualism and collectivism. *Journal of Personality and Social Psychology, 74*(1), 118.

Tsai, J. L., Blevins, E., Bencharit, L. Z., Chim, L., Fung, H. H., & Yeung, D. Y. (2019). Cultural variation in social judgments of smiles: The role of ideal affect. *Journal of Personality and Social Psychology, 116*(6), 966.

Vriends, N., Bolt, O. C., Meral, Y., Meyer, A. H., Bögels, S., & Wilhelm, F. H. (2019). Does self-focused attention in social anxiety depend on self-construal?

Evidence from a probe detection paradigm. *Journal of Experimental Psychopathology, 7*(1), 18–30.

Wang, D., Yuan, B., Han, H., & Wang, C. (2022). Validity and reliability of emotion regulation questionnaire (ERQ) in Chinese rural-to-urban migrant adolescents and young adults. *Current Psychology, 41*(4), 2346–2353.

Willner, C. J., Jetha, M. K., Segalowitz, S. J., & Gatzke-Kopp, L. M. (2020). Neurophysiological evidence for distinct biases in emotional face processing associated with internalizing and externalizing symptoms in children. *Biological Psychology, 150*, 107829.

Yoon, E., Chang, H., & Adams, K. (2020). Interrelations of patriarchal beliefs, gender, collectivism/individualism, and mental health. *Counselling Psychology Quarterly, 33*(2), 199–217.

Appendix A.

Demographic Questions

1. How old are you? ____ (age in years).

2. Please provide the year, month, and day of your birth (YYYY-MM-DD).
   ____

3. Please let us know your preferred gender pronouns (e.g., she/her, he/him, they/them, and ze/zir). _______________

4. What is your current gender identity? (How do you identify?)
   __Man
   __Woman
   __Nonbinary person
   __Prefer to self-describe below

   Self-describe: ___________________________

5. What is your ethnic background?
   __White/Caucasian
   __Asian/East Asian
   __African American
   __Indigenous
   __Hispanic or Latino
   __Prefer not to say
   __Other (please specify below)

   Specify: _______________________________

Appendix B.

Self-Construal Scale (SCS)

This 30-item questionnaire measures independent (15 items; #s 1, 2, 5, 7, 9, 10, 13, 15, 18, 20, 22, 24, 25, 27, 29) and interdependent (15 items; #s 3, 4, 6, 8, 11, 12, 14, 16, 17, 19, 21, 23, 26, 28, 30) self construal styles.

To score the scale, add each subject's scores (1 to 7) for the independent items and divide by 15 to give the mean score of the items. Then, do the same for the interdependent items. Each subject receives two scores: one for the strength of the independent self and one for the interdependent self.

INSTRUCTIONS

This is a questionnaire that measures a variety of feelings and behaviors in various situations. Listed below are a number of statements. Read each one as if it referred to you. Beside each statement write the number that best matches your agreement or disagreement. Please respond to every statement. Thank you.

1=STRONGLY DISAGREE 2=DISAGREE 3=SOMEWHAT DISAGREE

4=DON'T AGREE OR DISAGREE 5=AGREE SOMEWHAT 6=AGREE

7=STRONGLY AGREE

Items:

____1. I enjoy being unique and different from others in many respects.

_____2. I can talk openly with a person who I meet for the first time, even when this person is much older than I am.

_____3. Even when I strongly disagree with group members, I avoid an argument.

_____4. I have respect for the authority figures with whom I interact.

_____5. I do my own thing, regardless of what others think.

_____6. I respect people who are modest about themselves.

_____7. I feel it is important for me to act as an independent person.

_____8. I will sacrifice my self interest for the benefit of the group I am in.

_____9. I'd rather say "No" directly, than risk being misunderstood.

_____10. Having a lively imagination is important to me.

_____11. I should take into consideration my parents' advice when making education/career plans.

_____12. I feel my fate is intertwined with the fate of those around me.

_____13. I prefer to be direct and forthright when dealing with people I've just met.

_____14. I feel good when I cooperate with others.

_____15. I am comfortable with being singled out for praise or rewards.

_____16. If my brother or sister fails, I feel responsible.

_____17. I often have the feeling that my relationships with others are more important than my own accomplishments.

_____18. Speaking up during a class (or a meeting) is not a problem for me.

_____19. I would offer my seat in a bus to my professor (or my boss).

_____20. I act the same way no matter who I am with.

_____21. My happiness depends on the happiness of those around me.

_____22. I value being in good health above everything.

_____23. I will stay in a group if they need me, even when I am not happy with the group.

_____24. I try to do what is best for me, regardless of how that might affect others.

_____25. Being able to take care of myself is a primary concern for me.

_____26. It is important to me to respect decisions made by the group.

_____27. My personal identity, independent of others, is very important to me.

_____28. It is important for me to maintain harmony within my group.

_____29. I act the same way at home that I do at school (or work).

_____30. I usually go along with what others want to do, even when I would rather do something different.

Appendix C.

Social Interaction Anxiety Scale (SIAS)

This 19-item questionnaire measures feelings of social interaction anxiety in different social situations. To score the scale, sum all items to produce a single score for each participant. Higher scores indicating higher social interaction anxiety.

INSTRUCTIONS

Below are a number of statements about different social situations. Please indicate how characteristic each statement is of you based on the response options listed below.

0= Not at all characteristic 1= Slightly characteristic 2= Moderately characteristic

3= Very characteristic 4= Extremely characteristic

Items:

___1. I get nervous if I have to speak with someone in authority (teacher, boss, etc.)

___2. I have difficulty making eye-contact with others.

___3. I become tense if I have to talk about myself or my feelings.

___4. I find difficulty mixing comfortably with the people I work with.

___5. I tense-up if I meet an acquaintance in the street.

___6. When mixing socially I am uncomfortable.

___7. I feel tense if I am alone with just one other person.

___8. I am at ease meeting people at parties, etc.*

___9. I have difficulty talking with other people.

___10. I find it easy to think of things to talk about. *

___11. I worry about expressing myself in case I appear awkward.

___12. I find it difficult to disagree with another’s point of view.

___13. I have difficulty talking to attractive persons of the opposite sex.

___14. I find myself worrying that I won’t know what to say in social situations.

___15. I am nervous mixing with people I don’t know well.

___16. I feel I’ll say something embarrassing when talking.

___17. When mixing in a group I find myself worrying I will be ignored.

___18. I am tense mixing in a group.

___19. I am unsure whether to greet someone I know only slightly.

Note: *items reverse scored before summing.

Appendix D.

Emotion Regulation Questionnaire (ERQ):

INSTRUCTIONS

We would like to ask you some questions about your emotional life, in particular, how you control (that is, regulate and manage) your emotions. The questions below involve two distinct aspects of your emotional life. One is your emotional experience, or what you feel like inside. The other is your emotional expression, or how you show your emotions in the way you talk, gesture, or behave. Although some of the following questions may seem similar to one another, they differ in important ways. For each item, please answer using the following scale:

1 = Strongly disagree   2 = Disagree   3 = Somewhat disagree   4 = Neither agree nor disagree   5 = Somewhat agree   6 = Agree   7 = Strongly agree

Items:

___1. When I want to feel more *positive* emotion (such as joy or amusement), I *change what I am thinking about.*

___2. I keep my emotions to myself.

___3. When I want to feel less *negative* emotion (such as sadness or anger), I *change what I'm thinking about.*

___4. When I am feeling *positive* emotions, I am careful not to express them.

___5. When I'm faced with a stressful situation, I make myself *think about it* in a way that helps me stay calm.

___6. I control my emotions by *not expressing them*.

___7. When I want to feel more *positive* emotion, I *change the way I'm thinking* about the situation.

___8. I control my emotions by *changing the way I think* about the situation I'm in.

___9. When I am feeling *negative* emotions, I make sure not to express them.

___10. When I want to feel less *negative* emotion, I *change the way I'm thinking* about the situation.

Reappraisal Items: 1, 3, 5, 7, 8, 10; Suppression Items: 2, 4, 6, 9.

Appendix E.

Interpersonal Emotion Regulation Questionnaire (IERQ):

INSTRUCTIONS

Below is a list of statements that describe how people use others to regulate their emotions. Please read each statement and then write a number next to it to indicate how much this is true for you by using a scale from 1 (not true for me at all) to 5 (extremely true for me). Please do this for each statement. There are no right or wrong answers.

1= Not true for me at all 2= A little bit 3= Moderately

4= Quite a bit 5= Extremely true for me

Items:

___1. It makes me feel better to learn how others dealt with their emotions.

___2. It helps me deal with my depressed mood when others point out that things aren't as bad as they seem.

___3. I like being around others when I'm excited to share my joy.

___4. I look for other people to offer me compassion when I'm upset.

___5. Hearing another person's thoughts on how to handle things helps me when I am worried.

___6. Being in the presence of certain other people feels good when I'm elated.

___7. Having people remind me that others are worse off helps me when I'm upset.

___8. I like being in the presence of others when I feel positive because it magnifies the good feeling.

___9. Feeling upset often causes me to seek out others who will express sympathy.

___10. When I am upset, others make me feel better by making me realize that things could be a lot worse.

___11. Seeing how others would handle the same situation helps me when I am frustrated.

___12. I look to others for comfort when I feel upset.

___13. Because happiness is contagious, I seek out other people when I'm happy.

___14. When I am annoyed, others can soothe me by telling me not to worry.

___15. When I'm sad, it helps me to hear how others have dealt with similar feelings.

___16. I look to other people when I feel depressed just to know that I am loved.

___17. Having people telling me not to worry can calm me down when I am anxious.

___18. When I feel elated, I seek out other people to make them happy.

___19. When I feel sad, I seek out others for consolation.

___20. If I'm upset, I like knowing what other people would do if they were in my situation.

Scoring instructions: All items are forward scored. *Enhancing Positive Affect* = Sum of items 3, 6, 8, 13, 18; *Perspective Taking* = Sum of items 2, 7, 10, 14, 17; *Soothing* = Sum of items 4, 9, 12, 16, 19; *Social Modeling* = Sum of items 1, 5, 11, 15, 20

Appendix F.

Invitation Form Part 1

INVITATION TO PARTICIPATE IN A STUDY

Project Title: Cross-cultural differences in the relationship between emotion regulation and trait social anxiety: An ERP Study

Principle Investigator: Ariel Coish

Dear Participant,

You are invited to take part in our research study! Before you decide whether you wish to take part, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully. Feel free to ask us if there is anything that is not clear or if you would like more information.

Research Purpose
Cultural differences have been shown to influence the emotion regulation strategies that people use, as well as the effectiveness of these strategies. Additionally, cultural orientation has shown to influence prevalence of social anxiety as those from Western cultures tend to report higher levels of social anxiety than those from Eastern cultures. In this study, we will utilize self-report measures to investigate the influence of cultural orientation on the relationship between emotion regulation and social anxiety.

Research Description and Procedures
If you agree to participate in this study, you will be asked to complete a single online survey that will take approximately one (1) hour or less to complete. This survey will ask you about how you typically think and behave in certain situations.

Potential Harm, Injuries, Discomforts, or Inconvenience:
There is no known harm associated with participating in this study. Risks are few and minor. Some questions may potentially touch on a few sensitive issues (e.g., issues surrounding fear or embarrassment), and so some mild emotional discomfort could be experienced by some participants. If you feel any discomfort, you are free to discontinue the questionnaires or task at any time. You can also refuse to answer certain questions if you feel that they make you uncomfortable.

There is no pressure to participate in this research and you may choose to cease your participation at any time. If you choose to withdraw and do not complete the experiment, your data will be discarded. Declining to participate or withdrawing from the study will in no way negatively impact your grade or status in your courses.

Potential Benefits:
You may receive one (1) bonus point for one of your courses for participating in this study. Additionally, your participation and completion of this study will contribute to our understanding of how differences in cultural orientation influence the relationship between emotion regulation strategies and social anxiety.

Will my taking part in this project be kept confidential?
All information collected is confidential and will only be used as part of research work being carried out by the primary researcher/research assistants working directly for the primary researcher at Cape Breton University. Your contact details (i.e., name and email) will be stored separately from other data that is collected. To ensure that you cannot be recognized from the data, we assign each participant with a coded number for identification purposes. Data, when reported, will be in aggregate form. No personally identifiable information will be given out at any time.

Who will have access to this research information?
Any information which you provide, including the questionnaires and behavioural data that is collected will be entered into a secure filing system or database in a locked laboratory. The information and data will only be accessed by authorized researchers involved in the project. The researchers are closely supervised by the faculty advisor, Dr. Michelle Jetha. Information will be kept indefinitely in the secure location.

Withdrawal by the participant
Participation in this research study is completely voluntary. If you choose to participate in this study, you may withdraw at any time without giving a reason. If you wish to withdraw after completing the questionnaires, completed questionnaires without your name will be kept for statistical purposes only.

Reimbursement:
For completing this study, you will receive one (1) bonus point to be applied to one of your eligible courses offering bonus points through participation through SONA.

What will happen to the study results?
The responses we collect during this experiment will be used to advance understanding of the effect of cultural orientation on emotion regulation processes and social anxiety. To maximize the value of this study and to ensure an open scientific process, it is our duty to share the results from this study with other researchers. We will present the results at conferences and publish it in appropriate outlets (e.g., academic journals). When we do this, we typically present the average result from a group of participants. The data will be presented anonymously so that no one would be able to identify you from the data. We will provide simple summary information about our participants (e.g., “40 individuals participated; their average age was 22 years”).

Feedback about the results of this study will be available by contacting the Project Supervisor through email after September 2025.

Invitation to take part in the EEG study:

After completing the surveys, you will be asked if you would like to be contacted for an EEG study that will link these survey results to brain activity measurements. A brief description of the study will be provided, and you will have the opportunity to share your contact information if you interested in participating. If you have already participated in the EEG study, please disregard this request.
If you choose to participate in both the current study and the EEG study, we will seek your permission to combine the data collected from these studies for the purpose of analysis. By doing so, we hope to gain a more comprehensive understanding of the research topic. Please note that your data will be anonymized prior to any combination, ensuring that privacy and confidentiality is maintained.

Ethical review of the study

The project has received ethical approval from the Cape Breton University Research Ethics Board.

Further information
If you have any questions or concerns about the study, please contact the Project Supervisor:

Researchers

Project Supervisor:
Dr. Michelle Jetha
Psychology Department
Cape Breton University
902-563-2814
Email: michelle_jetha@cbu.ca

Researcher:
Ariel Coish
Psychology, Honours
Cape Breton University
Email: cbu21fnj@cbu.ca

If you have any questions that have not been answered satisfactorily by the researchers named above, please contact one of the Board Co-Chairs, Tracey Harris (Tracey_Harris@cbu.ca), (902) 563-1328, or Bishakha Mazumdar (Bishakha_Mazumdar@cbu.ca) (902) 563-1132, or the Research Ethics Board Administrator, Jared Walters (Jarad_Walters@cbu.ca) at (902) 563-1107.

Appendix G.

Invitation Form Part 2

INVITATION TO PARTICIPATE IN FURTHER RESEARCH

We would like to invite you to participate in an additional research study to explore the brain mechanisms that can be related to the survey questions you just answered. Before deciding whether you would like to be contacted for this study, it is important to understand why the research is being conducted and what your participation will involve.

As a participant in the initial screening phase of the study, you will be asked to complete a brief 16-item survey. This survey includes questions designed to understand your thoughts and feelings in various social situations (e.g., calm, anxious, bold, impulsive). These questions aim to capture aspects of your personality relevant to our study.

For the second phase of the study, you may be invited to visit the Developmental Social Neuroscience Lab at CBU. This visit will involve both self-report and behavioral assessments, along with measurements of electroencephalography (EEG). The EEG will be used to measure your brain activity.
Participants who participate in this phase of the study will receive monetary compensation for their time.

If you are interested in participating, please provide your contact information below. Should you be contacted and invited to participate, you will receive a detailed explanation of all procedures and have the opportunity to accept or decline the invitation. Please note that completing the first phase of this study does not obligate you to participate in the second phase.

To be eligible to participate in the EEG study, you must:
Be 18-25 years old; not have any conditions that might affect the nervous system (e.g., epilepsy, head injury, concussion)
If you would like to be informed of future opportunities to take part in this research project, please provide the following contact information:

Name: ____

Email: ______________________________

Appendix H.

Informed Consent Form

INFORMED CONSENT FORM

Project Title: Cross-cultural differences in the relationship between emotion regulation and trait social anxiety: An ERP Study

Principle Investigator: Ariel Coish

Research Purpose:
Cultural differences have been shown to influence the emotion regulation strategies that people use, as well as the effectiveness of these strategies. Additionally, cultural orientation has shown to influence prevalence of social anxiety as those from Western cultures tend to report higher levels of social anxiety than those from Eastern cultures. In this study, we will utilize self-report measures to investigate the influence of cultural orientation on the relationship between emotion regulation and social anxiety.

Research Description and Procedures
If you agree to participate in this study, you will be asked to complete a single online survey that will take approximately one (1) hour or less to complete. This survey will ask you about how you typically think and behave in certain situations.

Potential Harm, Injuries, Discomforts, or Inconvenience:
There is no known harm associated with participating in this study. Risks are few and minor. Some questions may potentially touch on a few sensitive issues (e.g., issues surrounding fear or embarrassment), and so some mild emotional discomfort could be experienced by some participants. If you feel any discomfort, you are free to discontinue the questionnaires or task at any time. You can also refuse to answer certain questions if you feel that they make you uncomfortable.

There is no pressure to participate in this research and you may choose to cease your participation at any time. If you choose to withdraw and do not complete the experiment, your data will be discarded. Declining to participate or withdrawing from the study will in no way negatively impact your grade or status in your courses.

Potential Benefits:
You may receive one (1) bonus point for one of your eligible courses for participating in this study. Additionally, your participation and completion of this study will contribute to our understanding of how differences in cultural orientation influence the relationship between emotion regulation strategies and social anxiety.

Will my taking part in this project be kept confidential?

All information collected is confidential and will only be used as part of research work being carried out by the primary researcher/research assistants working directly for the primary researcher at Cape Breton University. Your contact details (i.e., name and email) will be stored separately from other data that is collected. To ensure that you cannot be recognized from the data, we assign each participant with a coded number for identification purposes. Data, when reported, will be in aggregate form. No personally identifiable information will be given out at any time.

Who will have access to this research information?
Any information which you provide, including the questionnaires and behavioural data that is collected will be entered into a secure filing system or database in a locked laboratory. The information and data will only be accessed by authorized researchers involved in the project. The researchers are closely supervised by the faculty advisor, Dr. Michelle Jetha. Information will be kept indefinitely in the secure location.

Withdrawal by the participant
Participation in research is completely voluntary. If you choose to participate in this study, you may withdraw at any time without giving a reason. If you wish to withdraw after completing the questionnaires, completed questionnaires without your name will be kept for statistical purposes only.

Reimbursement:
For completing this study, you will receive one (1) bonus point to be applied to one of your eligible courses offering bonus points through participation through SONA.

What will happen to the study results?
The responses we collect during the experiment will be used to advance understanding of the brain mechanisms involved in emotion regulation, and the effect of cultural orientation on emotion regulation processes and social anxiety. To maximize the value of this study for brain research and to ensure an open scientific process, it is our duty to share the results from this study with other researchers. We will present the results at conferences and publish it in appropriate outlets (e.g., academic journals). When we do this, we typically present the average result from a group of participants. The data will be presented anonymously so that no one would be able to identify you from the data. We will provide simple summary information about our participants (e.g., “40 individuals participated; their average age was 22 years”).

Invitation to take part in the EEG study
After completing the surveys, you will be asked if you would like to be contacted for an EEG study that will link these survey results to brain activity measurements. A brief description of the study will be provided, and you will have the opportunity to share your contact information if you are interested in participating. If you are invited to participate in the lab visit for the EEG study, monetary compensation will be provided for your time.

If you have already participated in the EEG study, or plan to participate in the future, we seek your permission to combine the data collected from the current study and the EEG study for the purpose of analysis. By doing so, we hope to gain a more comprehensive understanding of the research topic. Please note that your data will be anonymized prior to any combination, ensuring that privacy and confidentiality is maintained.

□ *I consent to my data from the current study and the EEG study to be combined for the purpose of analysis.*

<u>If you have not participated in the EEG study but would like to participate, please see the invitation form at the end of this survey. After you read the invitation form, you will be given an opportunity to enter your contact information to receive further information.</u>

Ethical review of the study
The project has received ethical approval from the Cape Breton University Research Ethics Board.

Informed Consent

I _______________________________________ have been informed of the purpose of this research and agree to participate in this study.

Further information
If you have any questions or concerns about the study, please contact the Project Supervisor:

Researchers

<u>Project Supervisor</u>:
Dr. Michelle Jetha
Psychology Department
Cape Breton University
902-563-2814
Email: michelle_jetha@cbu.ca

<u>Researcher</u>
Ariel Coish
Bachelor of Science, Psychology Honours
Cape Breton University
Email: cbu21fnj@cbu.ca

If you have any questions that have not been answered satisfactorily by the researchers named above, please contact one of the Board Co-Chairs, Tracey Harris (Tracey_Harris@cbu.ca), (902) 563-1328, or Bishakha Mazumdar (Bishakha_Mazumdar@cbu.ca) (902) 563-1132, or the Research Ethics Board Administrator, Jared Walters (Jarad_Walters@cbu.ca) at (902) 563-1107.

Appendix I.

Feedback Form

FEEDBACK FORM

Project Title: Cross-cultural differences in the relationship between emotion regulation and trait social anxiety: An ERP Study

Dear Participant,

Thank you for taking part in this research study! Without the help of volunteers like you, these types of studies would not be possible.

Research has shown cultural orientation influences the efficacy and type of emotion regulation strategies that people tend to use. We want to learn more about why this occurs, and how it is related to social anxiety. You completed a survey which assessed your emotion regulation strategies, and your feelings and behaviours in certain social situations. The results of this study will help us to assess the associations between cultural orientation, emotion regulation strategies, and social anxiety.

As you know, all your data will be kept strictly private and when we talk or write about this study at scientific meetings, you will not be identified in any way. If you would like to learn more about the results of this study, leave your contact information below and we will contact you with the results when the study is complete.

If you have any questions that have not been answered satisfactorily by the researchers named above, please contact one of the Board Co-Chairs, Tracey Harris (Tracey_Harris@cbu.ca), (902) 563-1328, or Bishakha Mazumdar (Bishakha_Mazumdar@cbu.ca) (902) 563-1132, or the Research Ethics Board Administrator, Jared Walters (Jarad_Walters@cbu.ca) at (902) 563-1107.

Thank you again for taking part in this study. Your help was very much appreciated.

Researchers

Project Supervisor:
Dr. Michelle Jetha
Psychology Department
Cape Breton University
902-563-2814
Email: michelle_jetha@cbu.ca

Researcher:
Ariel Coish
Bachelor of Science, Psychology Honours
Cape Breton University
Email: cbu21fnj@cbu.ca

If you require mental health support after participating in this study, the following resources are available:

- For on-campus support, personal counselling is available through the Nancy Dingwall Health and Counselling Centre. To make an inquiry or appointment: Call 902-563- 1359 or email healthservices@cbu.ca.

- Healthy Minds Nova Scotia is an online mental health support program with several resources. Please go to https://healthymindsns.ca/#services.

- Please contact Nova Scotia Mental Health Crisis Line at 1-888-429-8167 if you feel that you are in crisis.

- International students also have access to keep.meSAFE (call 1.844.451.9700) through their guard.me insurance.