CROSS-CULTURAL EMOTION RECOGNITION IN ADULTS AND CHILDREN

by

Belle Nicole Reyes

BA, York University, 2011

A thesis presented to Ryerson University

in partial fulfillment of the

requirements for the degree of

Masters of Arts

in the Program of

Psychology

Toronto, Ontario, Canada, 2014

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Belle Nicole Reyes

Psychology

Ryerson University

The current studies investigated cross-cultural emotion recognition in South Asian and Caucasian Canadian adults and children. The two main goals of the current research were to disentangle the effects of culture and race on cross-cultural emotion recognition and to chart the development of cross-cultural differences in emotion recognition. Both adults and children completed an emotion recognition task, viewing faces of four different racial/cultural groups (South Asian Canadians and immigrants, Caucasian Canadian and immigrants). Adults completed a cultural identification task with these four racial/cultural groups and a contact questionnaire that assessed their exposure to Caucasian and South Asian individuals. Findings revealed that Caucasian and South Asian Canadian adults showed cross-cultural differences in emotion recognition; however, children did not. Furthermore, adults were able to identify the cultural background of Caucasian and South Asian faces at above-chance levels. Finally, results indicated that higher levels of cross-cultural exposure were related to improved cross-cultural emotion recognition for Caucasian adults only.

Acknowledgements

I would like to express my sincerest gratitude to Dr. Margaret Moulson for her constant guidance, expertise and support without which, this thesis would not be possible. I would also like to thank Dr. Stephan Want for his help and feedback in the planning of this thesis and Dr. Lixia Yang for serving on my examining committee. I would like to thank all the members of the BEE Lab especially Nicole Sugden for her help in creating the stimulus set, Jamie Juarez, Vaunam Venkadasalam, Olga Khazov, and Jessica Lima for their time and contribution to making sure all my studies ran smoothly. A special thank you to Dr. Lili Ma and the ECC Lab, the Ontario Science Centre, the principals, teachers, parents and children from the elementary schools that participated, and everyone else that participated in my research. Finally, I would like to thank my family for their continuous support, love and patience.

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Cross-Cultural Emotion Recognition in Adults and Children

The expression and recognition of emotions are crucial elements in social interaction. When there is miscommunication, it may lead to negative consequences. For example, recognizing anger is important when dealing with interpersonal conflict. Furthermore, emotion recognition has adaptive functions as many studies have found these abilities to be correlated with constructs related to adjustment such as social anxiety, academic achievement, emotional disturbance, depression, and general social competence (Eisenberg, Fabes, Guthrie, Murphy, & Maszk, 1996; Izard, 2001; McClure & Nowicki, 2001; Nowicki & Carton, 1997; Yoo, Matsumoto, & LeRoux, 2006). In a multicultural city such as Toronto, in which individuals from different cultures interact with each other on a daily basis whether through personal or professional relationships, it is important to understand whether emotions are recognized universally—that is, whether individuals are able to recognize emotions when expressed by people who are culturally dissimilar to them. Early studies in the field emphasized the universality of emotional expression and recognition (Ekman & Friesen, 1971; Ekman, Sorenson, & Friesen, 1969; Izard 1971). Researchers argued that the six primary emotions (happiness, sadness, fear, disgust, anger, and surprise) are expressed similarly across all cultures, and are thus recognized accurately by individuals from diverse cultures. However, more recent research has found evidence for cross-cultural differences in emotion expression and recognition, particularly for negative emotions such as anger, fear, and sadness (Elfenbein & Ambady, 2003). The goal of this thesis is to investigate this debate further by extending previous research on cross-cultural emotion recognition. To do so, in a series of four studies, we address certain methodological issues in the literature and take a developmental perspective.

Universality Hypothesis

The universality hypothesis posits that certain primary emotions (specifically happiness, sadness, fear, disgust, anger and surprise) are expressed similarly across all cultures and thus, are recognized with the same accuracy across all cultures. This suggests the existence of a universal schema or internal representation of basic emotions, in which members of all cultures associate discrete emotions (at least the six primary emotions) with certain facial behaviours (Ekman & Friesen, 1971; Ekman, Friesen, O'Sullivan, Chan, Diacoyanni-Tarlatzis, Heider et al., 1987; Ekman, Sorenson, & Friesen, 1969; Izard 1971). In one of the first studies in this area, Ekman and Friesen (1971) evaluated the universality hypothesis of emotion recognition by testing members of the isolated South Fore culture in New Guinea (a cultural group that had very little contact with Americans) and Americans on an emotion judgment task using Western emotional expressions. The researchers found no differences in accuracy scores between the two cultures. In addition, Ekman and colleagues (1987) found high cross-cultural agreement amongst observers from 10 different countries spanning Europe, North America, and Asia about which emotion was the strongest (i.e., the dominant emotion) when looking at a facial expression. There was also high cross-cultural agreement when asked what the second strongest emotion was in the expressions.

Matsumoto, Olide, Schug, Willingham, and Callan (2009) investigated emotion recognition in spontaneous rather than posed expressions of emotion when expressed by Olympic athletes from around the world (32 different countries and 6 continents). The researchers found that American, Japanese, British, and international students (countries of origin were not specified, but all international students were not US-born) reliably attributed the same emotions to the expressions they viewed. In addition, the researchers measured the muscle

movements of the spontaneous expressions and compared them to the muscle movements in prototypical expressions to obtain the signal clarity of the spontaneous expressions. Signal clarity refers to how certain facial behaviours directly signal certain emotions; clearer signals should lead to better recognition. They found that higher signal clarity was associated with higher accuracy across cultures, suggesting that different cultures use the same facial cues. These findings of high levels of agreement across cultures, among many others (Ekman & Friesen, 1971; Ekman, Friesen, O'Sullivan, Chan, Diacoyanni-Tarlatzis, Heider et al., 1987; Ekman, Sorenson, & Friesen, 1969; Izard 1971) have supported the universality hypothesis.

Although cross-cultural recognition of emotions at above-chance accuracy has been reported, these classic studies have suggested some cultural discrepancies. As Elfenbein and Ambady (2002b) discuss, because the researchers' main purpose was to investigate the universality of emotions, cultural differences were not directly examined. Izard (1971, as cited in Marsh, Elfenbein, & Ambady, 2003) found cultural differences in recognition when non-American participants were tested using American stimuli. He found that Americans correctly identified the emotions of American faces in 83% of the photos, while Europeans correctly identified the emotion in 75% of the photos, Japanese correctly identified only 65% of the photos, and Africans identified only 50% of the photos. In another study, Matsumoto (1992) found that Americans and Japanese individuals accurately recognized all six basic emotions at above-chance levels when expressed by Asian and Caucasian faces; however, Americans were significantly more accurate at recognizing anger, disgust, fear, and sadness than their Japanese counterparts. Due to these findings, many researchers have questioned the universality hypothesis (Elfenbein & Ambady, 2002b; Jack, Caldara, & Schyns, 2011; Jack, Garrod, Yu, Caldara, & Schyns, 2012; Nelson & Russell, 2013; Russell, 1994) and have examined cross-

cultural differences in emotion recognition more closely.

Cross-Cultural Differences

In their meta-analysis of studies on cross-cultural emotion recognition, Elfenbein and Ambady (2002b) found that higher recognition scores were obtained when the emotions were both expressed and perceived by members of the same national, ethnic, or regional group (i.e., there was an in-group advantage). They found that a third of the 97 studies included in their meta-analysis indicated strong evidence for an in-group advantage. This in-group advantage, however, decreases with greater cross-cultural exposure and geographical proximity as it allows for familiarity and practice with out-group expressions of emotion (Wickline et al., 2009; Elfenbein et al., 2007; Elfenbein & Ambady, 2002a; 2002b; Elfenbein & Ambady, 2003).

A study conducted by Prado, Mellor, Byrne, Wilson, Xu and Liu (2013) investigated cultural differences in emotion recognition and the role of acculturation. Using Chinese and Caucasian stimuli, the researchers examined emotion recognition in Caucasian Australians, Mainland Chinese and people of Chinese heritage living in Australia (PCHA). The PCHA group completed an acculturation questionnaire that assessed their adoption of Australian culture and adherence to their Chinese cultural values. Prado and colleagues (2013) found that both Caucasian Australians and PCHA were more accurate than the Mainland Chinese on both Caucasian and Chinese faces, and there were no differences between the Caucasian Australians and PCHA. Furthermore, PCHA with higher scores on acculturation—the adoption of Australian culture—had higher emotion recognition scores for Caucasian faces. Similarly, a study that tested immigrants of different ethnicities living abroad found that greater out-group exposure led to more accurate and faster recognition of emotions posed by members of the out-group (Elfenbein & Ambady, 2003). Furthermore, Wickline and colleagues (2009) reported a positive

correlation between the length of time in a new country and emotion recognition accuracy, where individuals become better at recognizing emotions of another cultural group as they are exposed to them longer. This is likely due to the increased exposure and familiarization with the non-verbal communication with out-group members.

Elfenbein, Beaupre, Levesque, and Hess (2007) conducted a study that investigated the cultural differences in both the facial activation and recognition of posed facial expressions by African (Gabonese) and Caucasian (French Canadian) participants—two groups who are culturally dissimilar but who both speak French. The researchers first gathered a stimulus set that captured cultural differences in expression by instructing participants to pose an emotion as if to communicate how they were feeling to their friends. Expressions where then coded using the Facial Action Coding System (FACS), which measured all facial movements (i.e., brow raise, chin raise, nose wrinkle, etc.). Results indicated the presence of culture-specific variations in expressive style, in that the two groups systematically used different facial muscles to express certain emotions. For example, when expressing sadness, African participants tended to tilt their head to the left or right while Caucasian participants mainly tilted their head down. Furthermore, more Caucasian participants compared to African participants expressed sadness with an eyebrow frown. They then tested a different set of participants from the same racial/cultural groups as the expressers on emotion recognition by using the stimulus set they had created in addition to a standardized set of expressions, in which posers were told how to move facial muscles to produce specific expressions. The findings revealed that participants who were of a different culture than the expresser made more errors on the emotional expressions with greater variations in cross-cultural expression (i.e., the emotions that were expressed as if to communicate to friends) rather than the posed emotions. These findings demonstrate that there

are systematic cultural differences in the expression of emotions.

Correspondingly, there may also be systematic cultural differences in the decoding of emotions. Yuki, Maddux, and Masuda (2007) looked at cross-cultural differences in emotion recognition when American and Japanese participants were shown faces with competing emotions (i.e., a face with happy eyes and a sad mouth). The findings revealed that Japanese participants focused more strongly on the eyes of the expresser as a cue for emotion. Thus, Japanese participants rated faces with happy eyes/sad mouth and happy eyes/neutral mouth as happier, and faces with sad eyes/happy mouth and sad eyes/neutral mouth as sadder compared to their American counterparts. On the other hand, the American participants focused more strongly on the mouth of the expresser as a cue for emotion. They rated faces with happy eyes/sad mouth and neutral eyes/sad mouth as sadder and sad eyes/happy mouth and neutral eyes/happy mouth as happier compared to the Japanese participants. These findings are important when looking at how culture shapes the way emotions are recognized. Since individuals in collectivistic cultures tend to suppress negative emotions, it has been suggested that members of these cultures have learned to focus on the eyes of the expresser for important cues signalling emotion, as the eyes may be more difficult to control when expressing emotion (Yuki et al., 2007). These findings demonstrate a relationship between cultural norms and the production and perception of facial expressions. Emotion recognition reflects the experiences that observers have with their social environment.

Since many studies have now demonstrated cross-cultural differences in emotion recognition, likely due to differences in both expression and perception in different cultural groups, it is possible that adults are able to guess the cultural background of an individual simply based on their facial expressions. Thus far, however, evidence has been somewhat inconclusive.

Matsumoto (2007) investigated the relationship between emotion judgments and perceived nationality. He tested whether American and non-American participants would label Caucasian expressers (who were all American) as being American and Asian expressers (including both Japanese Americans and Japanese Nationals) as being Japanese. Participants completed an emotion recognition task and afterwards they had to identify the nationality of each expressive face as either American, French, German, other European, Japanese, Chinese, Korean, other Asian, "don't know," or "other" (answer was open-ended). The Caucasian and Asian faces were expressing seven standardized emotions. The results revealed that American participants labelled the Caucasian-American faces as American only 45% of the time, and Asian faces as Japanese only 20% of the time. These results were similar in the non-American sample. Thus, participants were not able to accurately identify the nationality of the face when expressing standardized emotions, which suggests that adults cannot accurately identify an individual's nationality based on their facial expression.

However, Marsh and colleagues (2003) found contradicting results. In their study, American participants viewed photos of Japanese Americans and Japanese nationals posing either neutral or standardized expressions of emotion (anger, disgust, fear, sadness, surprise) and were told that half of the faces were Japanese Americans and the other half were Japanese nationals. Participants were able to identify the nationality of the face at above-chance levels for both neutral and emotional expressions. Cultural identification was significantly better when participants viewed the faces expressing emotions compared to the neutral faces. Thus, it seems that the facial expressions of emotion contained cues that identified the nationality or culture of the expresser even when the expressions were all standardized. Marsh, Elfenbein, and Ambady (2007) replicated the results with American and Australian faces. They also found that accuracy

was moderated by the extent to which perceivers viewed the expresser as stereotypical of the culture (e.g., the more likable and less dominant an Australian expresser looked, the more likely participants identified him/her as Australian). Taken together, the findings suggest that emotion communication conveys information about individuals' nationality that is detectable to naïve observers (Elfenbein, 2013; Marsh, Elfenbein & Ambady 2003, 2007).

Display Rules and Dialect Theory

Earlier researchers have cited the concept of display rules within a certain culture that may account for cross-cultural differences in emotion expression and recognition (Ekman, 1972, as cited in Elfenbein, 2013; Matsumoto, 1989; 1990; 1992). Display rules in the context of culture can be conceptualized as consciously using management techniques to de-intensify, intensify, neutralize, or mask certain facial expressions of emotions according to the social norms of the culture to which one belongs (Ekman, 1972, as cited in Elfenbein, 2013). Furthermore, Jack and colleagues (2012) argued that facial expressions of emotion have evolved to serve the primary role of communication and have thus been moulded by the social practices and norms of the cultural groups who use them. For example, Matsumoto (1989; 1990; 1992) discussed the presence of display rules in collectivistic cultures such as Japan, where displaying negative emotions is discouraged as they are seen to disrupt social harmony. Correspondingly, Japanese participants had lower accuracy scores for negative emotions (anger, disgust, fear and sadness). This suggests that not only displaying but also perceiving negative emotions is discouraged (Matsumoto, 1992), although it is also possible that negative emotions are recognized less accurately by Japanese individuals because they are seen less often. In addition, Matsumoto (1990; 1992) found that Americans were more accurate at recognizing negative emotions, presumably because American culture does not dictate the suppression of negative

emotional displays out of concern for group harmony. More recently, an alternative explanation that has been gathering a substantial amount of support is the dialect theory.

Dialect theory uses a linguistic metaphor; it likens emotion to a universal language with different cultures having different dialects that account for the differences in emotion expression and recognition across cultures (Elfenbein, 2013; Elfenbein et al., 2007). Elfenbein (2013) theorised that first, members of a different cultural group have different styles in expressing emotions (i.e., different cultural groups use different facial muscles to express the same emotion); secondly, when recognizing emotions, people tend to appraise emotions based on their own cultural style or a style that is familiar to them. Thus, if there is a discrepancy in either the style of the expresser or the style of expression expected by the perceiver, there are greater errors in emotion recognition. While display rules are actions in which individuals consciously alter their expressions, dialect theory suggests that the variations in expressions and recognition within different cultures are not deliberate. However, it is noted in the literature that display rules and dialect theory are not opposing views; rather together they both contribute to a better understanding of why there are differences in emotion recognition among different cultures.

Cross-Cultural Emotion Recognition in Development

There is a wealth of literature examining cross-cultural differences in emotion recognition in adults, but there are fewer studies examining the same phenomenon in children. Kilbride and Yarczower (1976) conducted one of the earliest developmental studies examining cross-cultural differences in emotion recognition in children. They tested American children (ages 6-7) and children belonging to the Baganda ethnic group in Uganda (ages 6-15). Children were shown a series of drawings of girls' faces and were then asked, "Which of the girls is happy/sad? How can you tell?" The researchers found cross-cultural agreement between the two

groups, but also found cultural differences. During the task, drawings were manipulated and children were given the option to change their answers. When a sad girl was drawn wearing a red dress, 75% of the Baganda children changed their answers from "sad" to "happy". This may have been due to the importance of clothes and the colour red within Baganda culture. When drawings showed an open mouth with teeth, 75% of Baganda children changed their answers to happiness compared to 8.7% of the American children. Kilbride and Yarczower (1976) reasoned that this was because American children had more experiences with happy emotions being expressed by a curved line representing a smile, whereas Baganda children drew from life experiences of thinking about happiness in the context of laughter.

Markham and Wang (1996) conducted a more recent study looking at cross-cultural emotion recognition in Chinese and Australian children (ages 4, 6, and 8). The researchers used Chinese and Caucasian (American) faces for the tasks. They used two tasks to assess emotion recognition. In the situation-discrimination task, emotional situations were described and children had to choose a face that best fitted the situation. In the situation inference/labeling task children were shown faces and asked to either label the face with an emotion or describe a situation that would give rise to the emotional expression. Findings revealed that there were significant cross-cultural differences. In the situation discrimination task, Chinese children were better at recognizing emotions (i.e., choosing the facial expression that best fit the situation) in Chinese faces than Australian children were. In the situation inference/labeling task, Australian children were significantly better at recognizing emotions in Caucasian faces compared to Chinese faces. Thus, even at 4 years of age, there is evidence for an own-culture advantage.

Building on this research, Gosselin and Larocque (2000) examined how the facial morphology of standardized expressions of emotion expressed by Caucasian and Asian

(Japanese) faces influenced French Canadian children's (ages 5-10) categorization of emotional expressions. Children were shown picture cards of Asian and Caucasian faces expressing emotions and were read short stories (1-2 sentences long) that described where the character experienced one of the emotions. The child had to choose the picture that best depicted the emotion. Results indicated that overall accuracy was almost identical on both Asian and Caucasian faces; however, there were substantial differences on particular emotions. Children were better at categorizing fear and surprise displayed by Asian faces, while disgust was better categorized when displayed by Caucasian faces. The researchers proposed that perhaps cross-cultural differences in emotion recognition might be due to morphological characteristics of faces of different ethnicities rather than specific ways of posing expressions. Since all emotional expressions were standardized, it may be that certain facial characteristics that distinguished Caucasian from Asian faces affected recognition. For example, the authors noted that for disgust expressions, the presence of a nose wrinkle was more prevalent in Caucasian faces, which children identified as a cue for disgust. From these previous studies, it appears that some cross-cultural differences in emotion recognition are present in early childhood; however, more research must be done in order to get a clearer picture of its development.

The Current Studies

The goal of this thesis was to investigate cross-cultural differences in emotion recognition. In addition, this thesis addresses several methodological issues that have limited our ability to interpret previous findings in the literature. The first major goal of the current studies was to disentangle the effects of race and culture on emotion recognition. Many studies examining cross-cultural emotion recognition have confounded culture and race by asking participants to recognize emotions in faces that differ from them on both dimensions. For

example, Caucasian Americans would judge expressions posed by Japanese individuals living in Japan; therefore, these Japanese expressers differed in both race and culture from the perceivers. In studies like these, it is unclear if the differences in emotion recognition are due to cross-cultural differences, cross-race differences, or both. Numerous studies on face recognition have now demonstrated the cross-race effect—individuals are less accurate at recognizing and remembering faces that belong to a race other than their own (for a review, see Meissner & Brigham, 2001). Thus, it is conceivable that the "cross-cultural" emotion recognition deficits observed in previous studies may be due to differences in race in addition to differences in culture. In Study 1, we created and validated a stimulus set that varied systematically on both racial and cultural dimensions (racial groups were defined as groups of individuals who are similar in physiology and origin—Wickline et al., 2009; culture was defined by geographical proximity—Matsumoto, Yoo, and Nakagawa, 2008; Wickline et al., 2009). In our stimulus set we included South Asian Canadians and Caucasian Canadians, which allowed for cross-race comparisons and we included South Asian immigrants and Caucasian immigrants for cross-race and cross-cultural comparisons. For example South Asian Canadians and South Asian immigrants are similar in race but differ in culture. Moreover, South Asian Canadians and Caucasian Canadians are similar in culture but differ in race. In Study 2, we used this stimulus set to evaluate cross-race and cross-cultural emotion recognition in Caucasian Canadian and South Asian Canadian adults. Additionally, we used the stimuli in Study 4 to examine whether the variations in emotional expressions contained cues that indicate the culture of the expresser.

The second major goal of the current studies was to add to the scarce literature on the developmental trajectory of cross-cultural differences in emotion recognition. Study 3 used the stimulus set created in Study 1 with younger children (6- to 7-year-olds), older children (8- to

10-year-olds), and another group of adults in order to investigate whether the cross-cultural emotion recognition deficit is present in children as young as 6 years of age, and whether the size of the deficit changes over developmental time.

The third major goal of the current studies was to extend the literature by examining cross-cultural differences in emotion recognition in a cultural group that has not been frequently examined in this context before: South Asian individuals. The majority of studies have focused on Western, East Asian, and African cultures. In Elfenbein and Ambady's (2002b) meta-analysis, only 8 of the 97 studies included Indian participants. More practically, with a growing South Asian population in Canada (Statistics Canada, 2011), a focus on this particular population seems worthwhile.

Study 1a: Stimulus Creation

To goal of Study 1a was to create a stimulus set that could be used to investigate the cross-cultural emotion recognition deficit in children and adults. The main reason to create a new stimulus set was to address a methodological issue in the literature. With some notable exceptions (e.g., Elfenbein & Ambady, 2003; Wickline et al., 2009), in most previous studies investigating cross-cultural emotion recognition the stimulus set used contained faces with posed expressions of emotion. Posed expressions are those that are elicited by instructing posers to move certain facial muscles. Several researchers, such as Naab and Russell (2007) have argued that posed expressions are not representative of the emotional expressions that one encounters in everyday interactions. Beaupré and Hess (2005) reported that the in-group advantage disappeared when photos of emotional expressions from different groups are constrained to have an identical appearance across cultures. In contrast, spontaneous expressions (i.e., facial expressions elicited naturally by experiencing a particular emotion) likely capture greater cultural variations in expressive style (Elfenbein & Ambady, 2003; Elfenbein, et al., 2007; Jack et al., 2012); however, it is very difficult to elicit and photograph genuine emotional expressions, especially in a laboratory setting. Therefore, in the current study we aimed to elicit "free-posed" expressions. Free-posed expressions are a middle ground between posed and spontaneous expressions, in that participants were not instructed on how to move their facial muscles to represent particular emotions, but the facial expressions were not entirely spontaneous. Instead, participants posed the expression, but in a way that felt natural to them. We expect that this method is better able to capture cultural variations in the expression of emotion than methods focused on the prescribed movement of particular facial muscles.

Method

Participants. For study 1a, a total of 63 adults were recruited from four different racial and cultural groups. The first group included 10 Caucasian females and 6 Caucasian males (M = 22.31, SD = 5.41, Range: 18-37), all of whom were born and raised in Canada. The second group included 9 South Asian females and 7 South Asian males (M = 22.94, SD = 5.04, Range: 18-37), all of whom were born and raised in Canada. The third group included 10 Caucasian females and 8 Caucasian males (M = 23.83, SD = 4.05, Range: 20-33), all of whom were born and raised in Western Europe (e.g., Ireland, Germany, etc.) and had spent on average 1.5 months (M = 1.50, SD = 1.32, Range: 0.13-5.06 months) in Canada. Finally, the fourth group included 6 South Asian females and 7 South Asian males (M = 23.69, SD = 2.78, Range: 19-28), all of whom were born and raised in South Asia (e.g., India, Pakistan, etc.) and had spent on average 2.5 months (M = 2.54, SD = 1.92, Range: 0.23-7.42 months) in Canada. Participants were recruited through the Ryerson Undergraduate Research Participant Pool, flyers posted on the Ryerson and surrounding university campuses, and online postings through Kijiji and Craigslist. For their participation, participants received either partial course credit or were compensated $15 for their time.

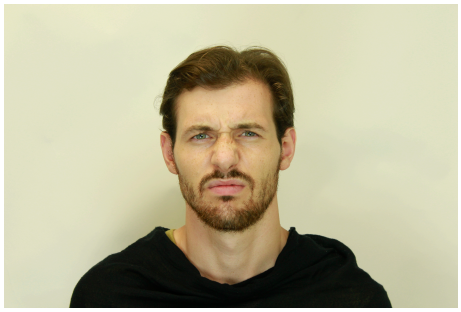
Procedure. The Ryerson Research Ethics Board approved all procedures. Participants read through and signed a consent form and a photo-release form before participating. They also provided demographic information about themselves (see Appendix A for demographic questionnaire). A black scarf was draped across each participant's body so that everyone looked like they were wearing the same thing. Participants were asked to remove glasses and jewellery and to tie long hair back. Each participant was photographed posing happiness, sadness, angry, fearful, surprised, disgusted, and neutral facial expressions. A Canon EOS Rebel T3i camera was

used to take the full colour photographs (see Figure 1).

South Asian immigrant expressing Surprise

South Asian Canadian expressing Happiness

Caucasian immigrant expressing Angry



Caucasian Canadian expressing Disgust

Figure 1. Examples of emotional expressions.

In order to achieve each emotion, the participant was asked to think of a time in their life when they felt that certain emotion and practiced expressing the emotion in a mirror in a way that they felt was most natural to them. To further help the participant portray the emotion, the experimenter read scenarios intended to elicit the required emotion (see Table 1). Some scenarios were created by members of the Brain and Early Experiences Lab and others were taken from a previous study investigating emotion recognition (Jones, Happe, Glibert, Burnett, & Viding, 2010). No feedback was provided to the participant and the experimenter refrained from explaining how to pose emotions. Participants were given as much time as they needed until they were ready to have their picture taken.

Table 1

Emotion scenarios

Emotion	Scenarios
Happiness	You just received a promotion at work! You are going on your dream vacation! You have won a contest to win an iPod!
Angry	While doing a group project, someone took credit for your great work. Someone bumped into your car in the parking lot and did not leave a note with their information. Your best friend reveals your secrets to others.
Sadness	You've applied for a job that you really wanted and are qualified for and have just discovered that you have not been selected for the job. Your favourite grade school teacher passed away. Your plane got delayed and you're going to miss your best friend's wedding.
Fear	[If participant is a woman] A strange man's face appeared at your window in the night. [If participant is male] A strange face appeared at your window in the night. You were riding your bike down a hill, when suddenly your brakes stopped working.
Surprise	A man on a motorbike suddenly swerved and almost hit you. You open the door and someone is unexpectedly on the other side. You come home and find that your roommate has repainted the rooms. You walk inside your home and find that your friends threw you a party and yell 'HAPPY BIRTHDAY!!'
Disgust	You are eating lunch and you find a cockroach in your sandwich. You go to wash the dishes and find maggots in the sink. Someone had left the toilet seat dirty and you sat on it by mistake.

Study 1b: Stimulus Validation

The goal of Study 1b was to validate the stimulus set created in Study 1a. In the literature, posed expressions often use the Facial Action Coding System (FACS) (Ekman & Friesen, 1976); however, this system was created and validated using North American individuals. Thus, it can be argued that FACS expressions of emotions are biased towards Western representations of those emotions. If one single racial/cultural group validates all

emotional expressions, the chosen stimuli would represent only one group's idea of how emotions are expressed. Essentially, the expressions would go through a "filter" in which any cultural differences in the expressions are erased (Elfenbein & Ambady, 2002a). To address this issue and retain the cultural variations in expressive style, each photo was validated by adults from the same cultural and racial group as the expresser. This validation process, which included viewing each face and choosing its emotion as well as rating the intensity of that emotion, guided the choice of stimuli that were then used in Studies 2, 3, and 4 of this thesis. The goal was to choose five female and five male faces from each cultural group that represented the most accurate and intense portrayals of each emotion, as rated by members of their own cultural group.

Method

Participants. For study 1b, a total of 67 adults were recruited from the same racial and cultural groups as in study 1a. The first group included 11 Caucasian females and 13 Caucasian males (M = 23.50, SD = 4.34, Range: 18-33), all of whom were born and raised in Canada. The second group included 12 South Asian females and 11 South Asian males (M = 23.57, SD = 4.45, Range: 19-34), all of whom were born and raised in Canada. The third group included 7 Caucasian females and 3 Caucasian males (M = 25.50, SD = 5.42, Range: 18-33), all of whom were born and raised in Western Europe and had spent on average 2.6 months in Canada (M = 2.58, SD = 2.20, Range: 0.22-5.32 months). Finally, the fourth group included 5 South Asian females and 5 South Asian males (M = 22.6, SD = 4.22, Range: 18-32), all of whom were born and raised in South Asia and had spent on average 2.4 months in Canada (M = 2.35, SD = 1.74, Range: 0.81-5.33 months). Participants were recruited in the same way as in study 1a.

Procedure. The Ryerson Research Ethics Board approved all procedures. All participants

read through and signed a consent form before participating. Participants also provided demographic information. Each photograph included in the stimulus set was validated by raters of the same racial and cultural group as the person in the photograph. The validation task was created in Qualtrics software and presented on a desktop computer with a 23" Samsung widescreen LCD monitor and a screen resolution of 1920 x 1080. Participants sat approximately 55 cm from the screen and used a mouse to make their decisions. Participants only validated faces from their own racial/cultural group (i.e., Caucasian Canadian participants only validated Caucasian Canadian faces). For each face, participants answered two different questions. Firstly, participants had to choose which emotion the face was expressing (happiness, angry, sadness, fear, surprise, disgust, neutral or none of the emotions listed). Secondly, participants rated each face on a set of 7-point Likert scales (1 – not at all; 7 – maximum intensity) describing how intense the expression was for each emotion (happiness, angry, sadness, fear, surprise, and disgust). Participants were given an unlimited amount of time to make their decision and the stimulus appeared on the screen until they made their decision. Based on these ratings, the final stimulus set of 280 photographs was chosen: 5 female and 5 male faces from each of the four groups (i.e., Caucasian Canadian, South Asian Canadian, Caucasian Immigrant, South Asian Immigrant), each face expressing all seven emotions.

Results

All statistical analyses were conducted using IBM's *Statistical Package for the Social Sciences* (SPSS) version 20. Mean accuracy and intensity, separated by racial/cultural group and emotion, are reported in Tables 2 and 3. These means represent the average accuracy and intensity ratings for the faces that were chosen for use in Studies 2, 3, and 4. One–sample t-tests were conducted for each category of face against chance (chance level = .13 because the task had

eight choices: happiness, angry, sadness, fear, surprise, disgust, neutral, none of the emotions listed).

Table 2

Label ratings for stimulus

Culture of Validators	Happiness		Angry		Sadness		Fear		Surprise		Disgust		Neutral	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
SA Canadian	.98 ***	.03	.58 **	.28	.60 ***	.27	.25	.20	.85 ***	.13	.60 ***	.23	.82 ***	.10
SA Immigrant	.99 ***	.03	.38 *	.27	.61 **	.29	.18	.14	.67 **	.32	.52 **	.24	.68 ***	.18
CA Canadian	.95 ***	.08	.48 **	.32	.71 ***	.26	.25	.22	.85 ***	.13	.65 ***	.30	.77 ***	.13
CA Immigrant	.95 ***	.07	.79 ***	.24	.72 ***	.30	.37 **	.18	.63 ***	.25	.80 **	.28	.75 ***	.17

Note: SA = South Asian; CA = Caucasian.
*$p < .05$. **$p < .01$. ***$p < .001$.

Table 3

Intensity ratings for stimulus

Culture of Validators	Happiness		Angry		Sadness		Fear		Surprise		Disgust		Neutral[a]	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
SA Canadians	6.11	.26	3.73	1.05	3.30	1.41	2.69	.89	5.04	.78	4.09	1.12	1.38	.15
SA Immigrants	6.12	.70	3.20	1.26	3.48	.81	1.92	.52	4.13	1.47	3.66	1.06	1.33	.15
CA Canadians	5.19	.64	3.14	1.12	3.58	1.15	2.51	.92	5.00	.59	4.33	1.14	1.42	.13
CA Immigrants	5.84	.66	4.60	1.28	4.69	1.04	3.37	.88	4.74	1.08	4.97	.72	1.39	.24

Note: SA = South Asian; CA = Caucasian
[a]For neutral expressions, intensity ratings on all emotions were averaged. There was no question asking how intense the neutral expression was; rather, we expected a rating of 1 (not at all intense) for all emotions.

Summary

The initial goal of the validation procedure was that each photograph chosen for inclusion in the following studies would have a 70% agreement rate on which emotion was being

expressed and have an average intensity rating of 4 on the chosen emotion. However, due to time constraints, the final stimulus set for Studies 2, 3, and 4 was chosen based on preliminary validation ratings while validation was ongoing. As seen in Table 2, although not all expressions were rated at 70% accuracy or above, all expressions were recognized at above chance level, except for fear in South Asian Canadians, South Asian Immigrants, and Caucasian Canadians. Consistent with previous literature (Elfenbein & Ambady, 2002b; Matsumoto, 1992), negative emotions such as fear, sadness, angry, and disgust were rated less accurately than happiness and neutral, and fear had the lowest intensity ratings. The implications of the validation data will be discussed in the context of the results of Studies 2 and 3.

Study 2: Cross-Cultural Emotion Recognition in Adults

As reviewed in the General Introduction, there is wide disagreement in the literature about the universality of emotional expression and recognition. Researchers arguing for the universality hypothesis suggest that there exists a universal representation of the six basic emotions across all cultural groups. A majority of the early research in the field (Ekman & Friesen, 1971; Ekman, Friesen, O'Sullivan, Chan, Diacoyanni-Tarlatzis, Heider et al., 1987; Ekman, Sorenson, & Friesen, 1969; Izard 1971) supported this argument. More recent research has examined differences rather than agreement in emotion recognition among different cultural groups and argues that different cultural groups express and recognize emotions in systematically different ways (Elfenbein & Ambady, 2002b; Jack, Caldara, & Schyns, 2011; Jack, Garrod, Yu, Caldara, & Schyns, 2012; Nelson & Russell, 2013; Russell, 1994). However, the majority of the previous studies have confounded race (i.e., individuals who are similar in physiology and origin) and culture (i.e., individuals born and raised within the same geographical proximity), making it difficult to conclude whether "cross-cultural" differences in emotion recognition are due to culture, race, or some combination of the two factors.

While a few studies have attempted to separate the effects of race and culture on cross-cultural emotion recognition (Elfenbein & Ambady, 2002a; Prado et al., 2013; Wickline, Bailey, & Nowicki 2009), these studies are still missing at least one cultural or racial/ethnic group in their methodology. For example, a study conducted by Wickline, Bailey, and Nowicki (2009) explored the in-group advantage in European and African Americans, and European and African nationals on facial and vocal emotion recognition. Consistent with the in-group advantage framework, they found that individuals were generally more accurate in judging emotions expressed by members of their own cultural or racial groups. In particular, there were both cross-

cultural and cross-race differences in recognizing facial expressions of emotion but only cross-race differences for vocal recognition of emotion. In this particular study, the researchers separated race and culture by having both Americans and International students of different races. However, the stimulus set they used contained only American faces and voices. Another study conducted by Prado and colleagues (2013) examined emotion recognition in Caucasian Australians, people of Chinese heritage living in Australia, and Mainland Chinese individuals, but their stimulus set included only Caucasian (American) faces and Chinese faces (from Singapore); they did not include Chinese Australian faces.

The current study attempted to disentangle the effects of race and culture on emotion recognition by including stimuli from four different racial/cultural groups (Caucasian Canadians, Caucasian immigrants born and raised in Western Europe, South Asian Canadians, and South Asian immigrants born and raised in South Asia) and testing Caucasian Canadian and South Asian Canadian participants on their ability to accurately identify the emotions in all four racial/cultural groups. Our hypotheses were as follows:

Hypothesis 1: Participants would be fastest and most accurate at recognizing emotions when expressed by people similar to them in both race and culture and slowest and least accurate on faces that were dissimilar on both dimensions. Participants would show intermediate performance on faces that matched on only one dimension (i.e., match on race but not culture; match on culture but not race).

Hypothesis 2: South Asian participants (minority group members) would be more accurate and faster at recognizing emotions expressed by Caucasian faces (majority group members) than Caucasian participants would be at recognizing emotions expressed by South Asian faces. This hypothesis arose from Elfenbein and Ambady's (2002b) meta-analysis, where numerous studies

investigated cross-cultural differences and minority and majority status. Seven of the 11 studies found that minority group members were better at judging emotions of majority group members than the reverse, perhaps because minority group members have more exposure to majority group members than the reverse (Henley, 1977, as cited in Elfenbein & Ambady, 2002b). This leads to the third hypothesis.

Hypothesis 3: Cultural differences in emotion recognition would be moderated by the amount of cross-cultural exposure. Participants with greater cross-cultural exposure would be faster and more accurate at recognizing emotions expressed by people who are racially and/or culturally dissimilar to them, compared to participants with less cross-cultural exposure.

Method

Participants. A total of 82 adults were recruited. The first group included 39 Caucasian females and 2 Caucasian males (M = 19.37, SD = 2.01, Range: 18-27), all of whom were born and raised in Canada. The second group included 30 South Asian females and 11 South Asian males (M = 19.19, SD = 1.50, Range: 17-23), all of whom were born and raised in Canada. Participants were recruited through the Ryerson Undergraduate Research Participant Pool as well as through flyers on campus and online postings on Kijiji and Craigslist. For their participation, participants received either partial course credit or were compensated $10 for their time. Data from non-Canadian participants or participants belonging to different ethnic groups were excluded.

Procedure. The Ryerson Research Ethics Board approved all procedures. All participants read through and signed a consent form before participating. The consent form described the study as a general emotion recognition task and did not mention the cross-cultural aspect of the study. This is because research on the other-race effect has found that making participants aware

of the other-race effect diminishes the effect, likely due to increased motivation to individuate faces of out-group members (Hugenberg, Miller, & Claypool, 2007); when participants were only instructed to individuate faces but were not given specific knowledge about the other-race effect, the effect was still present (Hugenberg et al., 2007). Thus, adults in this study were not provided with information regarding the cross-cultural aspect in order to avoid biasing their responses. Following informed consent, participants completed the emotion recognition task. The task was a forced-choice design and was created in E-Prime (Psychology Software Tools, Inc). All 280 photos were presented one by one in random order on a desktop computer with a 23" Samsung widescreen LCD monitor and a screen resolution of 1920 x 1080. Participants sat approximately 55 cm from the screen and used a mouse to make their decisions. Participants were instructed to identify the emotion (happiness, angry, sadness, fear, disgust, surprised or neutral) expressed by each face and to answer as quickly and as accurately as possible. Each face was presented in the middle of the screen against a white background and appeared on the screen until the participant made his/her decision. Accuracy and reaction time were recorded. After the emotion recognition task, participants completed a cultural identification task (results reported in Study 4) and a 43-item Contact Questionnaire. The questionnaire was created using Qualtrics software and presented on the computer. On a 4-point Likert scale (1 = strongly disagree; 2 = disagree; 3 = agree; 4 = strongly agree) participants reported how often they came into contact with Caucasian and South Asian people (see Appendix B for Contact Questionnaire). Approximately half of the questions assessed close contact (i.e., "Of my 3 best friends, 1 or more are South Asian/Caucasian people"), while the other half assessed average contact (i.e., "In public, I encounter mostly South Asian/Caucasian people"). Scores were then calculated separately for close contact and average contact. After the questionnaire, the participants were

verbally debriefed and were also given a debriefing form that explained the true purpose of the study and contained the contact information for the researchers.

Results

All statistical analyses were conducted using IBM's *Statistical Package for the Social Sciences* (SPSS) version 20. The first set of analyses examined performance collapsed across all emotions. To investigate whether culture differentially impacted the recognition of specific emotions, a second set of analyses was conducted to examine performance on each emotion.

The effects of race and culture on overall emotion recognition. A repeated measures analysis of variance (ANOVA) was conducted with participant group (South Asian vs. Caucasian) as a between-subjects factor and face type (South Asian Canadian vs. South Asian immigrant vs. Caucasian Canadian vs. Caucasian immigrant) as the within-subject factor. Mauchley's test indicated that the assumption of sphericity had not been violated, $\chi^2(5) = 6.48, p = .263$. There was no main effect of participant group, $F(1, 80) = 1.71, p = 209, \eta^2 = .02$. However, there was a significant main effect of face type, $F(3, 240) = 169.92, p < .001, \eta^2 = .68$. Post hoc tests using a Bonferroni correction for multiple comparisons revealed that participants performed more accurately on the Caucasian immigrant faces compared to South Asian Canadian faces ($p = .001$), South Asian Immigrant faces and Caucasian Canadian faces (both *ps* < .001). Participants performed less accurately on the South Asian immigrant faces (all *ps* < .001) compared to all other face types. There was no difference in performance on Caucasian Canadian and South Asian Canadian faces ($p = 162$). Refer to Table 4 for means.

Table 4

Mean accuracy on each face type for South Asian and Caucasian participants.

Participant Group	Face Type							
	South Asian Canadian Faces		South Asian Immigrant Faces		Caucasian Canadian Faces		Caucasian Immigrant Faces	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
South Asian Canadians	.66	.08	.55	.09	.63	.06	.69	.07
Caucasian Canadians	.67	.07	.55	.06	.67	.05	.70	.05

Consistent with our hypothesis, the interaction between face type and participant group was marginally significant, $F(3, 240) = 2.28$, $p = .08$, $\eta^2 = .03$. Post-hoc analyses using an independent samples t-test revealed that Caucasian participants performed significantly better than South Asian participants on Caucasian Canadian faces, $t(80) = 2.97$, $p = .004$, $r = .34$, but there were no group differences in performance on any other face type (Figure 2).

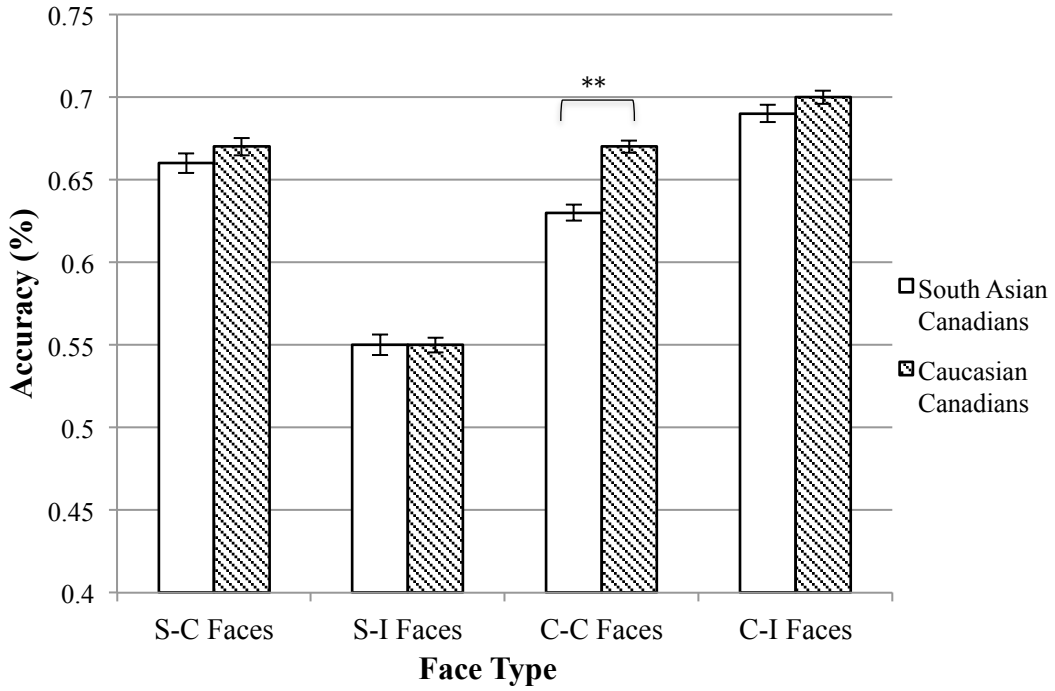


Figure 2. Overall accuracy on each face type for both participant groups. Error bars represent

standard errors. S-C = South Asian Canadian; S-I = South Asian Immigrant; C-C = Caucasian Canadian; C-I = Caucasian Immigrant.
**$p < .01$.

To investigate differences in reaction time, a repeated measures ANOVA was conducted with participant group (South Asian vs. Caucasian) as the between-subjects factor and face type (South Asian Canadian vs. South Asian immigrant vs. Caucasian Canadian vs. Caucasian immigrant) as the within-subject factor. Mauchley's test indicated that the assumption of sphericity had not been violated, $\chi^2(5) = 6.48, p = .263$. There was a significant main effect of face type, $F(3, 240) = 5.48, p = .001, \eta^2 = .06$. Post hoc tests using the Bonferroni correction for multiple comparisons revealed that participants were slower at recognizing South Asian Canadian faces than Caucasian Canadian faces ($p = .004$) and Caucasian immigrant faces ($p = .032$) (see Table 5). Reaction times for South Asian immigrant faces were not significantly different from any other group, and reaction times for Caucasian Canadian and Caucasian immigrant faces did not differ from each other. There was no main effect of participant group, $F(1, 80) = 1.71, p = .195, \eta^2 = .02$ and, contrary to our hypothesis, no significant interaction of participant group and face type, $F(3, 240) = 1.36, p = .255\ \eta^2 = .02$.

Table 5

Means for reaction time (in milliseconds) on each face type for South Asian and Caucasian participants.

	Face Type							
Participant Group	South Asian Canadian Faces		South Asian Immigrant Faces		Caucasian Canadian Faces		Caucasian Immigrant Faces	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
South Asian Canadians	2067.06	549.84	1931.10	505.43	1911.29	472.49	1887.76	416.51
Caucasian Canadians	2132.74	589.53	2129.81	577.92	2005.60	440.85	1975.38	495.46

Minority status and cross-race differences in emotion recognition. To examine differences in accuracy and reaction time in relation to minority status (per our second hypothesis), scores on South Asian Canadian faces and South Asian immigrant faces were combined and scores on Caucasian Canadian and Caucasian immigrant faces were combined (Tables 6 and 7). A paired samples t-test was conducted for each participant group to compare their performance on own-race vs. other-race faces. For Caucasian participants, results indicated that they were significantly better at recognizing their own-race faces compared to other-race faces, $t(40) = 11.03$, $p < .001$, $r = .88$. South Asian participants performed significantly better on other-race faces compared to own-race faces, $t(40) = 9.02$, $p < .001$, $r = .82$. Regarding reaction time, Caucasian participants responded significantly faster on their own-race faces compared to other-race faces, $t(40) = -2.55$, $p = .015$, $r = .37$. South Asian participants responded significantly faster on other-race faces compared to their own-race faces, $t(40) = -2.29$, $p = .027$, $r = .34$. As predicted, Caucasian participants (majority group members) showed an own-race advantage, whereas South Asian participants (minority group members) did not; in fact, South Asian participants showed an other-race advantage.

Table 6

Mean accuracy on each face type for South Asian and Caucasian participants.

	Face Type			
	South Asian Faces		Caucasian Faces	
Participant Group	*M*	*SD*	*M*	*SD*
South Asian Participants	0.60	.07	0.66	.06
Caucasian Participants	0.61	.05	0.69	.04

Table 7

Mean reaction time (in milliseconds) on each face type for South Asian and Caucasian participants.

	Face Type			
	South Asian Faces		Caucasian Faces	
Participant Group	*M*	*SD*	*M*	*SD*
South Asian Participants	1999.08	496.02	1899.52	416.34
Caucasian Participants	2131.28	558.71	2034.30	438.41

While it looks as though South Asian participants show an other-race advantage, this effect may be driven by the low performance by both groups on South Asian immigrant faces. Thus, to evaluate cross-race differences in accuracy, paired samples t-tests were conducted for each participant group comparing performance on South Asian Canadian faces and Caucasian Canadian faces only (excluding the immigrant faces). Results indicated that Caucasian participants performed similarly on both South Asian Canadian and Caucasian Canadian faces, $t(40) = -.034$, $p = .973$. On the other hand, South Asian participants performed significantly better on South Asian Canadian faces compared to Caucasian faces, $t(40) = 3.40$, $p = .002$. Theses results indicate that when comparing emotion recognition for faces that differ on the race dimension but not the culture dimension, South Asian participants demonstrate an own-race advantage, while Caucasian participants do not.

The effects of race and culture on the recognition of each emotion. To investigate whether the cross-cultural differences in emotion recognition described above vary based on emotion, this set of analyses included facial emotion as a variable. A repeated measures ANOVA was conducted with participant group (South Asian vs. Caucasian) as the between-subjects factor and face type (South Asian Canadian vs. South Asian immigrant vs. Caucasian Canadian vs. Caucasian immigrant) and emotion (happiness vs. surprise vs. angry vs. fear vs. disgust vs.

sadness vs. neutral) as the within-subject factors. Mauchley's test indicated that the assumption of sphericity had been violated for the main effects of face type, $\chi^2(5) = 11.24$, $p = .047$, emotion, $\chi^2(20) = 89.23$, $p < .001$, and the face type x emotion interaction, $\chi^2(170) = 321.26$, $p < .001$. Therefore, degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity ($\varepsilon = .93$ for the main effect of face type; $\varepsilon = .77$ for the main effect of emotion; $\varepsilon = .71$ for the face type x emotion interaction). Replicating our previous analysis, there was a significant main effect of face type, $F(2.78, 222.19) = 190.31$, $p < .001$, $\eta^2 = .70$. Post hoc tests using the Bonferroni correction for multiple comparisons revealed that participants performed more accurately on the Caucasian immigrant faces compared South Asian Canadian faces ($p = .004$), South Asian immigrant faces and Caucasian Canadian (*ps* < .001) and less accurately on the South Asian immigrant faces compared to all the other face types (all *ps* < .001). In addition, participants were significantly more accurate on South Asian Canadian faces than Caucasian Canadian faces ($p = .002$). There was also a significant main effect of emotion, $F(4.60, 328.12) = 473.32$, $p < .001$, $\eta^2 = .86$. Participants were significantly better at recognizing happiness compared to all other emotions (*ps* < .001) and significantly worse at recognizing fear compared to all other emotions (*ps* < .001). Moreover, participants were significantly better at recognizing neutral compared to all other emotions except for happiness (*ps* < .001); significantly better at recognizing surprise compared to angry ($p = .001$), fear and sadness (*ps* < .001); and significantly better at recognizing disgust compared to angry, fear, and sadness (*ps* < .001) (Table 8).

Table 8

Mean accuracy on emotions, collapsed across participant group and face type.

Happiness		Surprise		Angry		Fear		Disgust		Sadness		Neutral	
M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
.98	.03	.63	.10	.56	.12	.26	.12	.64	.12	.54	.12	.90	.10

These main effects were qualified by a significant 2-way interaction between face type and emotion, $F(12.75, 1019.84) = 53.36$, $p < .001$, $\eta^2 = .40$, and a significant 3-way interaction between participant group, face type, and emotion, $F(12.75, 80) = 1.97$, $p = .009$, $\eta^2 = .02$. To examine this interaction further, I compared the performance of the two groups of participants separately for each emotion and face type. The only significant differences between the groups were found for Caucasian Canadian faces (see Appendix C for means on expressions across all face types). Post-hoc analyses using independent samples t-tests revealed that, compared to South Asian participants, Caucasian participants performed significantly better on Caucasian Canadian expressions of angry, $t(80) = 2.94$, $p = .004$, $r = .31$, and fear $t(80) = 2.88$, $p = .005$, $r = .31$ (Figure 3).

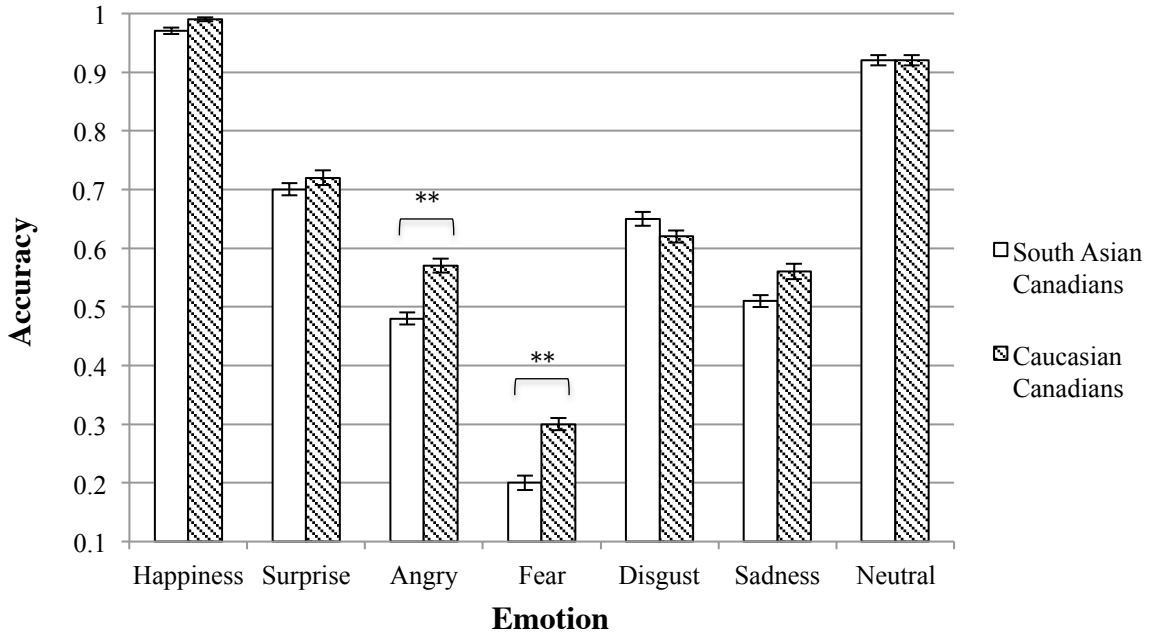


Figure 3. Mean accuracy for both groups on Caucasian expressions of emotion. Error bars represent standard errors.
$^{**}p < .01$.

Cross-cultural exposure and emotion recognition. Prior to running correlational analyses, tests of normality revealed that reaction time scores on Caucasian Canadian faces, $D(41) = .15$, $p = .027$, and Caucasian immigrant faces, $D(41) = .15$, $p = .029$, were significantly non-normal. In all analyses involving variables with non-normal data, Kendall's tau (τ), a nonparametric test statistic, was used. For South Asian participants, bivariate correlations were run between exposure to Caucasians (analyses run separately for average contact and close contact) and accuracy and reaction time on Caucasian Canadian and Caucasian immigrant faces. The only significant finding was a significant correlation between average contact with Caucasians and reaction time on Caucasian immigrant faces, $\tau = -.22$, p (one-tailed) = .027. Thus, participants with more cross-cultural exposure responded significantly faster on Caucasian immigrant faces. All other correlations were non-significant (see Table 9). For Caucasian participants, bivariate correlations were run between exposure to South Asians and accuracy and

reaction time on South Asian Canadian and South Asian immigrant faces. There was a significant correlation between close contact with South Asians and accuracy on South Asian immigrant faces $r = .31$, p (one-tailed) = .024. All other correlations were non-significant (see Table 10). Thus, Caucasian participants with more cross-cultural exposure were more accurate at recognizing emotion in South Asian immigrant faces.

Table 9

Bivariate correlations for South Asian participants (exposure and emotion recognition)

Exposure	C-C Accuracy	C-I Accuracy	C-C Reaction time	C-I Reaction time
Caucasian Close Contact	-.03	-.02	-.01	.10
Caucasian Average Contact	-.11	-.12	-.17	-.22*

Note: C-C = Caucasian Canadian; C-I = Caucasian Immigrant.
*p (one-tailed) < .05

Table 10

Bivariate correlations for Caucasian participants (exposure and emotion recognition)

Exposure	S-C Accuracy	S-I Accuracy	S-C Reaction time	S-I Reaction time
South Asian Close Contact	.02	.31*	-.11	-.17
South Asian Average Contact	.07	.19	-.13	-.11

Note: S-C = South Asian Canadian; S-I = South Asian Immigrant.
*p (one-tailed) < .05

Summary

It was hypothesized that adults would be most accurate and fastest at recognizing emotion in faces similar to them in both race and culture, and least accurate and slowest at recognizing emotion in faces dissimilar to them in both race and culture. Contrary to prediction, both groups were most accurate at recognizing emotion in Caucasian immigrant faces, and least

accurate at recognizing emotion in South Asian immigrant faces, suggesting that these face types were the most and least expressive, respectively. However, the hypothesis was partially borne out in that Caucasian participants were significantly more accurate at recognizing emotion in Caucasian Canadian faces than South Asian participants were. This overall difference seemed to be driven by the recognition of anger and fear, specifically. Both groups of participants were fastest when responding to Caucasian Canadian faces and slowest when responding to South Asian Canadian faces; thus, Caucasian participants showed the expected increased performance on faces of own race and culture, whereas South Asian participants did not. When emotion type was included as a factor in the analysis, the results replicated previous research that has shown that happiness is recognized most accurately and fear is the most difficult to recognize (Elfenbein & Ambady, 2002b; Matsumoto, 1992).

When the data were collapsed across culture, both Caucasian and South Asian participants were more accurate at recognizing emotion in Caucasian faces than South Asian faces. This supports our hypothesis that Caucasian participants, due to their majority status, would show an own-race advantage, whereas South Asian participants, due to their minority status, would not. However, when immigrant faces were excluded, South Asian participants showed an own-race advantage, while Caucasian participants did not. Consistent with the third hypothesis regarding cross-cultural exposure, Caucasian participants with greater close contact with South Asians had higher accuracy on South Asian immigrant faces. However, exposure did not relate to reaction time. On the other hand, South Asian participants with greater average contact with Caucasians were faster at responding to Caucasian immigrant faces but exposure did not relate to accuracy on Caucasian faces. These results suggest that increased cross-cultural interaction is related to improved non-verbal communication.

Study 3: Emotion Recognition in Children and Adults

To further explore cross-cultural differences in emotion recognition, we wanted to investigate how early these differences appeared. Thus, we examined emotion recognition in 6- to 10-year-old children compared to adults. A small number of previous studies have found that, as early as 6 years of age, children begin to show cross-cultural differences in recognizing emotion. Kilbride and Yarczower (1976) found that children from different cultures (i.e., American and African children) may use different facial cues in judging what emotion is being expressed. Markham and Wang (1996) found evidence for an own-race advantage in emotion identification in Chinese and Caucasian Australian children as young as 4 years of age. Taken together, these studies show that culture and/or race may affect how children recognize emotions. However, similar to the adult literature, the previous studies also confound race and culture and often use FACS-coded posed expressions of emotion. Furthermore, to my knowledge, there has not yet been a study directly comparing children and adults on emotion recognition in a cross-cultural context.

Several methodologies for investigating emotion recognition in children have been evaluated and researchers (Camras & Allison, 1985; Markham & Adams, 1992) have found that children are most accurate at recognizing emotions in matching tasks (the child is shown a single emotional expression and must find a matching expression from a set of several emotional expressions) and forced choice labelling tasks (the child chooses an emotional label for target expressions from a list of options). One limitation with the matching task is that children may just be matching facial features (i.e., curved lips) and might not fully understand what the emotion means (Markham & Adams, 1992). Thus, the current study used a forced choice labelling task, like in Study 2; however, the emotions of disgust and surprise were eliminated

from the task as research has shown that children have the most difficulty recognizing these two emotions, perhaps because the conceptual categories for these two emotions develop later than those for the other basic emotions (Camras & Allison, 1985; Markham and Adams, 1992). Surprise and disgust were eliminated from both the child and adult versions of the task to allow us to directly compare the age groups.

The current study attempted to chart the development of cross-cultural differences in emotion recognition by directly comparing performances of children and adults on the same emotion recognition task. As in Study 2, it also attempted disentangle the effects of race and culture on emotion recognition by including stimuli from four different racial/cultural groups (Caucasian Canadian, Caucasian immigrants born and raised in Western Europe, South Asian Canadian, and South Asian immigrants born and raised in South Asian) and testing Caucasian Canadian and South Asian Canadian children and adults on their ability to accurately identify the emotions in all four racial/cultural groups. Our hypotheses were as follows:

Hypothesis 1: Children (regardless of race) would be less accurate at recognizing emotions than adults.

Hypothesis 2: Similar to Study 2, all participants would be fastest and most accurate at recognizing emotions when expressed by people similar to them in both race and culture and slowest and least accurate on faces that are dissimilar on both dimensions. In addition, participants would show intermediate performance on faces that match on only one of the two dimensions (i.e., match on race but not culture; match on culture but not race), but the size of the cross-cultural effects would be larger in adults than children.

Hypothesis 3: South Asian participants (minority group members) would be more accurate and faster at recognizing emotions expressed by Caucasian faces (majority group members) than

Caucasian participants would be at recognizing emotions expressed by South Asian faces, but the minority/majority effects would be larger in adults than children.

Method

Participants. Caucasian and South Asian Canadians belonging to three different age groups were recruited. The "younger children" age group included 8 South Asian children and 19 Caucasian children between the ages of 6 years, 0 months to 7 years, 11 months (M = 6.56, SD = .51). The "older children" age group included 8 South Asian children and 28 Caucasian children between the ages of 8 years, 0 months to 10 years, 11 months (M = 9.06, SD = .89). The child sample was broken down into the two groups to have an approximately equal numbers of younger and older children. Finally, the "adult" age group included 39 South Asian adults (M = 20.00, SD = 3.20, Range: 18-35) and 45 Caucasian adults (M = 19.78, SD = 3.25, Range: 17-34). All participants were born and raised in Canada. Adult participants were recruited as in Study 2. The child participants were recruited through the Ryerson Infant and Child Database, the Ontario Science Centre, as well as several schools in the Greater Toronto Area. Data from non-Canadian participants or participants belonging to different ethnic groups were excluded.

Procedure. The Ryerson Research Ethics Board approved all procedures. All adult participants were tested in the Brain and Early Experiences Lab at Ryerson University. Adults read through and signed a consent form before participating. The informed consent described the study as a general emotion recognition task and did not mention the cross-cultural aspect of the study for the same reasons as Study 2. Following informed consent, participants completed the emotion recognition task. The task was to identify the emotion in each face in a forced-choice design. The task was created in E-Prime (Psychology Software Tools, Inc.). All 200 photos (five emotions—disgust and surprise expressions were removed—expressed by 10 people from each

of the four racial/cultural groups) were presented one by one in random order on a desktop computer with a 23" Samsung widescreen LCD monitor and a screen resolution of 1920 x 1080. Participants sat approximately 55 cm from the screen and used a mouse to make their decisions. Participants were instructed to answer as quickly and as accurately as possible. Each face was presented in the middle of the screen against a white background and appeared on the screen until participants made their decisions. Accuracy and reaction time were recorded. Upon completion, participants were verbally debriefed and given a debriefing form that explained the true purpose of the study and contained the contact information for the researchers.

For the child task, in addition to the Ryerson Research Ethics Board, the school board research review committee and the Ontario Science Centre research committee approved the procedures. Testing environments differed between adult and child participants. Child participants were tested in various locations such as the Brain and Early Experiences Lab, inside the classroom at schools and at the Ontario Science Centre. At all three locations, an experimenter sat beside the child throughout the whole task. In the Brain and Early Experiences Lab, the child sat next to the experimenter while completing the task on a laptop computer in a separate room with a 2-way mirror so that the child's parents could watch. In the classroom, testing took place at the back of the classroom on a laptop computer during class time; thus, it was louder and there were more distractions and interruptions during testing compared to the lab environment. At the Ontario Science Centre, testing took place on a laptop computer in a large room with other researchers conducting other studies. Similar to the classroom, it was louder and there were more distractions during testing compared to the lab environment. Additionally, parents often sat behind their child and watched as the child completed the task. Although distractions from the parents were kept at a minimum, occasionally children would look back at

their parents while completing the task. Whenever the child was distracted, they were gently prompted to continue with the "game."

In all three testing environments, parental consent was obtained from the child's legal guardian and written assent was obtained from each child. The full study was explained in the parental consent, including the cross-cultural aspect, since it was reasoned that this would not interfere with the child's responses. Furthermore, parents filled out a demographic questionnaire asking about their child's age, gender, ethnicity, and place of birth (see Appendix D for child demographic questionnaire). Following the consent process, the children completed a modified version of the adult task. Pilot testing with all 200 faces indicated that children became bored before the end of the task. This led to shortening the task by splitting the faces into two groups of 100 faces, each group of faces containing equal numbers of male and female faces from each cultural group. Which group of faces each child saw was counterbalanced so that an equal number of children saw each group. The task was created in E-Prime (Psychology Software Tools, Inc.). All 100 photos (disgust and surprise expressions were removed) were presented one by one in random order on a 17" Dell laptop with a screen resolution of 1920 x 1080. Participants sat approximately 50 cm from the screen and used a mouse to make their decisions. The task was presented as a game with four "levels"—each level contained 25 faces. In between each level, the child participated in a fun drawing activity to keep them engaged and motivated. In addition, child-friendly language was used throughout the task (i.e., "angry" became "mad," "fear" became "scared," and "neutral" became "nothing"). Similarly to the adult task, the child had to identify the emotion of each face in a forced choice design. Each face was presented in the middle of the screen against a white background and appeared on the screen until the child made his/her decision. Children were instructed to respond as quickly and accurately as possible but

not to worry if they answered incorrectly. The task had five practice trials to make sure that the child understood what the emotions were and how to complete the task. For children who had difficulty reading or had difficulty using the mouse, they would say the emotion out loud and the experimenter would use the mouse to click on the answer. Accuracy and reaction time were recorded. Upon completion, the child was debriefed and thanked. For children tested at the Ontario Science Centre, they received a Junior Scientist certificate for their participation. Children tested at the lab received a certificate, a small toy, and a $10 honorarium for the parents.

Results

All statistical analyses were conducted using IBM's *Statistical Package for the Social Sciences* (SPSS) version 20. The first set of analyses examined overall accuracy among the three age groups. To further investigate the differences in emotion recognition, a second set of analyses was conducted to examine if any group differences or culture effects differed by emotion.

The effects of age, race, and culture on overall emotion recognition. A repeated measures ANOVA was conducted on accuracy scores with participant group (South Asian vs. Caucasian) and participant age (younger children vs. older children vs. adults) as the between-subjects factors and face type (South Asian Canadian vs. South Asian immigrant vs. Caucasian Canadian vs. Caucasian immigrant) as the within-subject factor. Mauchley's test indicated that the assumption of sphericity had not been violated, $\chi^2(5) = 4.84$, $p = .436$. There was a significant main effect of age, $F(2, 141) = 42.61$, $p < .001$, $\eta^2 = .38$. Post hoc tests using the Bonferroni correction for multiple comparisons revealed that younger children performed significantly worse than older children and adults ($ps < .001$) and older children performed

significantly worse than adults ($p < .001$). There was also a significant main effect of face type, $F(3, 423) = 182.43$, $p < .001$, $\eta^2 = .56$. Post hoc tests using the Bonferroni correction for multiple comparisons revealed that participants performed most accurately on the Caucasian immigrant faces compared South Asian Canadian faces ($p = .031$), South Asian immigrant and Caucasian Canadian faces (*ps* < .001). Participants performed least accurately on the South Asian immigrant faces (all *ps* < .001) compared to all the other groups (replicating the findings from Study 2). Participants performed similarly on Caucasian Canadian faces and South Asian Canadian faces ($p = .370$). There was no main effect of participant group, $F(1, 141) = 2.02$, $p = .158$, $\eta^2 = .01$, or interactions among the variables. See Figure 4 for accuracy by all three age groups on each face type.

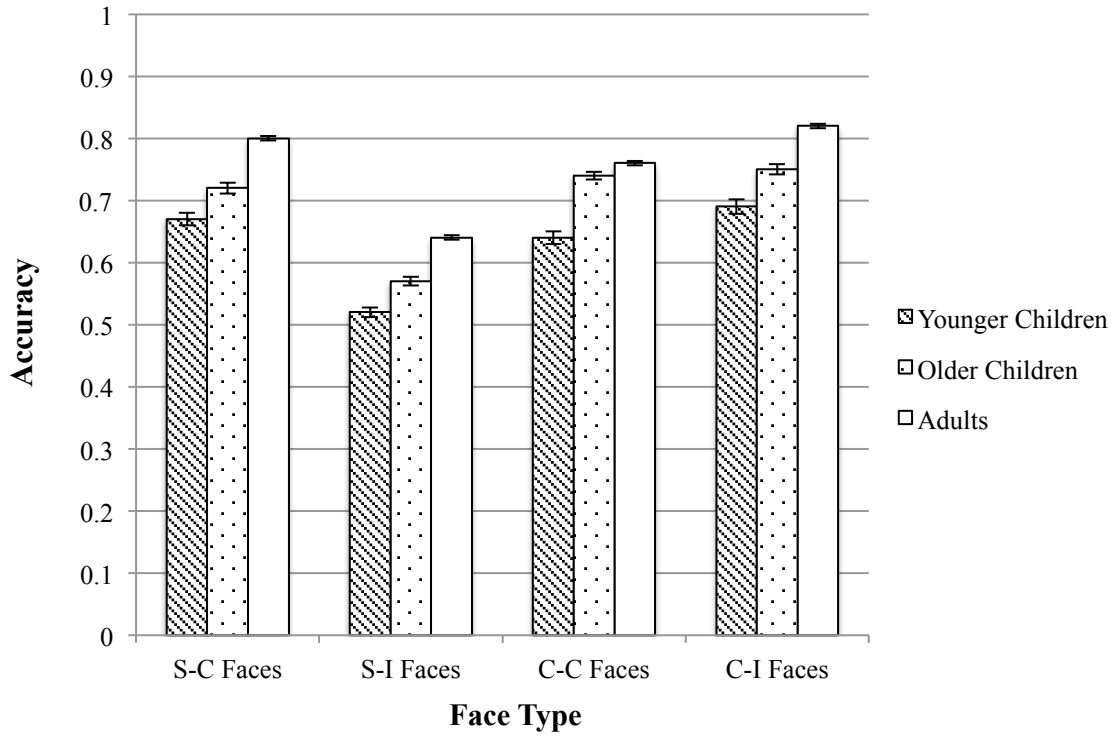


Figure 4. Mean values of overall accuracy on each type of stimulus for all three age groups. Error bars represent standard errors. S-C = South Asian Canadian; S-I = South Asian Immigrant; C-C = Caucasian Canadian; C-I = Caucasian Immigrant.

Reaction time scores from children who needed help completing the task (e.g., if a child

could not read the labels) were excluded. To investigate age and cultural differences in reaction time, a repeated measures ANOVA was conducted with participant group (South Asian vs. Caucasian) and age (younger children vs. older children vs. adults) as the between-subjects factors and face type (South Asian Canadian vs. South Asian immigrant vs. Caucasian Canadian vs. Caucasian immigrant) as the within-subject factor. Mauchley's test indicated that the assumption of sphericity had not been violated, $\chi^2(5) = 9.01$, $p = .109$. There were no main effects, but there was a significant interaction between age and face type, $F(6, 133) = 2.15$, $p = .047$, $\eta^2 = .03$. Follow-up analyses using one-way ANOVAs revealed that the age groups differed significantly only on South Asian Canadian faces, $F(2, 136) = 5.17$, $p = .007$, $r = .08$. Post hoc tests using the Bonferroni correction for multiple comparisons revealed that younger children responded significantly slower compared to older children ($p = .005$) and adults ($p = .033$) on South Asian Canadian faces (see Figure 5). There were no other significant interactions.

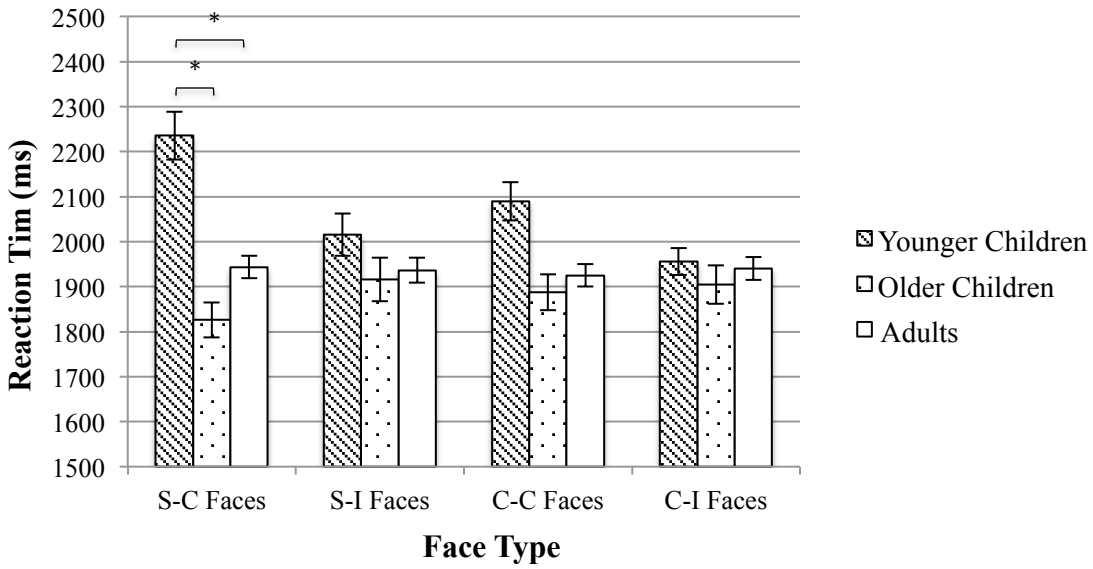


Figure 5. Mean reaction times on each face type for all three age groups. Error bars represent standard errors. S-C = South Asian Canadian; S-I = South Asian Immigrant; C-C = Caucasian Canadian; C-I = Caucasian Immigrant.
*$p < .05$.

Minority status and cross-race differences in emotion recognition. To test our third hypothesis regarding minority status, scores on South Asian Canadian faces and South Asian immigrant faces were combined and scores on Caucasian Canadian and Caucasian immigrant faces were combined (see Tables 11 and 12). Paired samples t-tests were conducted separately for adults and children (this analysis collapsed across younger and older children due to the small sample sizes within the South Asian Canadian group). In the adult group, results replicated those in Study 2: Caucasian participants were significantly better at recognizing their own-race faces compared to other-race faces, $t(44) = 12.97$, $p < .001$, $r = .89$, whereas South Asian participants performed significantly better on other-race faces compared to own-race faces, $t(38) = 8.60$, $p < .001$, $r = .81$. In the child group, results indicated that Caucasian children were significantly better at recognizing their own-race faces compared to other-race faces, $t(46) = 8.43$, $p < .001$, $r = .78$, whereas South Asian children performed significantly better on other-race faces compared to own-race faces, $t(15) = 4.21$, $p = .001$, $r = .74$. When looking at reaction time, there were no significant differences among South Asian children and adults (*ps* = .603, .504 respectively) and Caucasian children and adults (*ps* = .760, .430 respectively). Therefore, as expected, both Caucasian children adults (majority group members) showed poorer performance on other-race compared to own-race faces, whereas South Asian children and adults (minority group members) did not perform worse on other-race faces—in fact, they performed significantly better on other-race than own-race faces.

Table 11.

Mean accuracy on each face type for South Asian and Caucasian children.

	Face Type			
	South Asian Faces		Caucasian Faces	
Participant Group	*M*	*SD*	*M*	*SD*
South Asian Participants	0.60	.10	0.69	.10
Caucasian Participants	0.63	.08	0.72	.09

Table 12.

Mean accuracy on each face type for South Asian and Caucasian adults.

	Face Type			
	South Asian Faces		Caucasian Faces	
Participant Group	*M*	*SD*	*M*	*SD*
South Asian Participants	0.71	.06	0.78	.07
Caucasian Participants	0.72	.05	0.81	.05

However, as in Study 2, this effect may be driven by the low accuracy on South Asian immigrant faces. Paired-samples t-tests were conducted excluding the immigrant faces. In the adult group, Caucasian participants performed significantly better on South Asian Canadian faces compared to Caucasian Canadian faces, thereby showing an other-race advantage, $t(44) = -2.17$, $p = .036$. South Asian participant showed an own-race advantage as they performed significantly better on South Asian faces compared to Caucasian faces, $t(38) = -4.46$, $p < .001$. For the child group, there were no differences in accuracy for South Asian children, $t(15) = -.055$, $p = .589$, or Caucasian children, $t(46) = .643$, $p = .524$.

The effects of age, race and culture on the recognition of each emotion. As the previous analyses indicated no significant effects of participant race, data were collapsed across this variable in the following analyses. To investigate further the differences in emotion recognition among the three age groups, a repeated measures ANOVA was conducted with participant age (younger children vs. older children vs. adults) as the between-subjects factor and

face type (South Asian Canadian vs. South Asian immigrant vs. Caucasian Canadian vs. Caucasian immigrant) and emotion (angry vs. fear vs. happiness vs. neutral vs. sadness) as the within-subject factors. Mauchley's test indicated that the assumption of sphericity had been violated for the main effect of emotion, $\chi^2(9) = 107.29$, $p < .001$, and for the interaction between face type and emotion $\chi^2(77) = 427.60$, $p < .001$. Therefore, degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity ($\varepsilon = .78$ for the main effect of emotion and $\varepsilon = .73$ for the face type by emotion interaction). Replicating our first set of analyses, there was a significant main effect of age, $F(2, 144) = 47.01$, $p < .001$, $\eta^2 = .40$. Post hoc tests using the Bonferroni correction for multiple comparisons indicated that younger children performed significantly worse compared to older children ($p = .016$) and adults ($p = .014$). Furthermore, older children performed significantly worse than adults ($p = .013$).

There was also a significant main effect of emotion, $F(3.12, 449.63) = 298.80$, $p < .001$, $\eta^2 = .68$. Post hoc tests using the Bonferroni correction for multiple comparisons indicated that participants were best at recognizing happiness, then neutral, then fear, then angry, and finally sadness. The differences between the emotions were all significant (all *ps* < .01) except between angry and sad. Refer to Table 13 for the means for each emotion broken down by age group.

Table 13.

Mean accuracy on each emotion for younger children, older children and adults.

	Emotion									
	Happiness		Neutral		Fear		Angry		Sadness	
Age group	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Younger Children	.95	.07	.85	.23	.54	.18	.43	.22	.39	.17
Older Children	.98	.03	.87	.13	.61	.17	.55	.19	.51	.17
Adults	.99	.01	.88	.11	.69	.10	.64	.13	.62	.12

There were significant two-way interactions between face type and age, $F(6, 144) = 2.21$, $p = .041$, $\eta^2 = .03$, and between emotion and age, $F(8, 144) = 5.96$, $p < .001$, $\eta^2 = .08$. These interactions were qualified by a significant three-way interaction between emotion, age, and face type, $F(24, 144) = 1.88$, $p = .006$, $\eta^2 = .03$. To explore this interaction, I conducted two-way ANOVAs with age as the between-subjects factor and face type as within-subject factor, separately for each emotion. There were significant main effects of age for happiness, $F(2, 144) = 12.14$, $p < .001$, $\eta^2 = .14$, fear, $F(2, 144) = 13.23$, $p < .001$, $\eta^2 = .16$, angry, $F(2, 144) = 17.86$, $p < .001$, $\eta^2 = .20$, and sadness, $F(2, 144) = 28.43$, $p < .001$, $\eta^2 = .28$. Bonferroni correction for multiple comparisons revealed that on happiness, younger children performed significantly worse than older children ($p = .007$) and adults ($p < .001$). On fear, adults performed significantly better than younger ($p < .001$) and older children ($p = .007$). On anger, adults performed significantly better than younger ($p < .001$) and older children ($p = .013$), and older children performed significantly better than younger children (all $p = .018$). Finally, on sadness, adults performed significantly better than younger and older children ($ps < .001$), and older children performed significantly better than younger children (all $p = .006$). There was a significant interaction between age and face type for neutral expressions, $F(6, 144) = 3.50$, $p = .002$, $\eta^2 = .05$, and for sad expressions, $F(6, 144) = 2.69$, $p = .014$, $\eta^2 = .04$. Follow-up analyses revealed that for neutral expressions, younger and older children performed similarly across all four face types; however, adults performed significantly worse on Caucasian immigrant faces compared South Asian Canadian faces ($p < .001$), South Asian immigrant faces ($p = .001$), and Caucasian Canadian faces ($p < .001$) (see Figure 6). For sad expressions, younger children performed significantly better on Caucasian Canadian faces ($p = .024$) and Caucasian immigrant

faces (p = .011) compared to South Asian immigrant faces. Older children performed significantly better on Caucasian Canadian faces compared to South Asian Canadian faces (p = .012) and South Asian immigrant faces (p = .016). Finally, adults performed best on Caucasian immigrant faces compared to all other face types *(ps* < .001*)*, worse on South Asian immigrant faces compared to South Asian Canadian faces (p = .004) and Caucasian Canadian and immigrant faces (*ps* < .001). Moreover, they performed better on Caucasian Canadian faces compared to South Asian Canadian faces (p < .001) (see Figure 7).

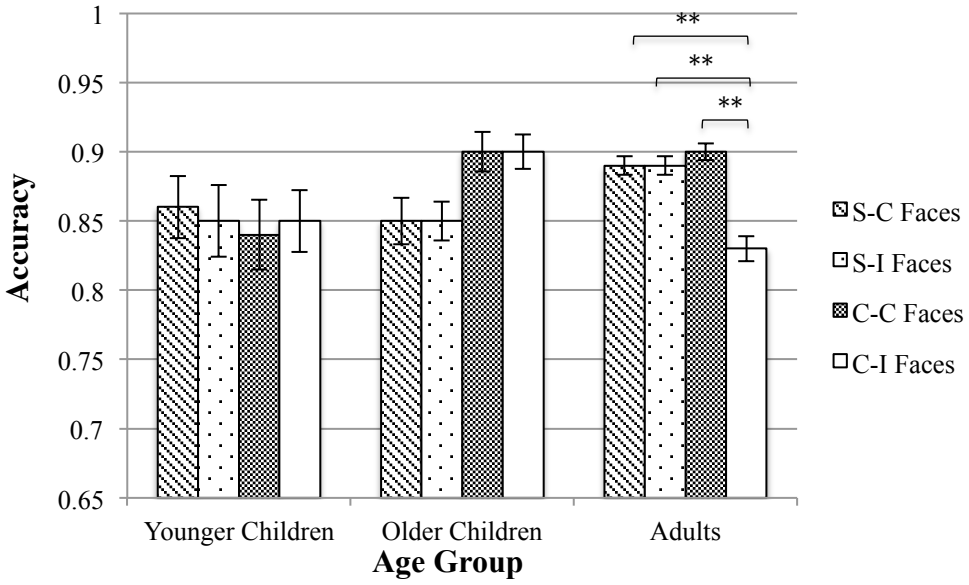


Figure 6. Mean accuracy on neutral expressions only on each face type for all three age groups. Error bars represent standard errors. S-C = South Asian Canadian; S-I = South Asian Immigrant; C-C = Caucasian Canadian; C-I = Caucasian Immigrant.
**p < .01

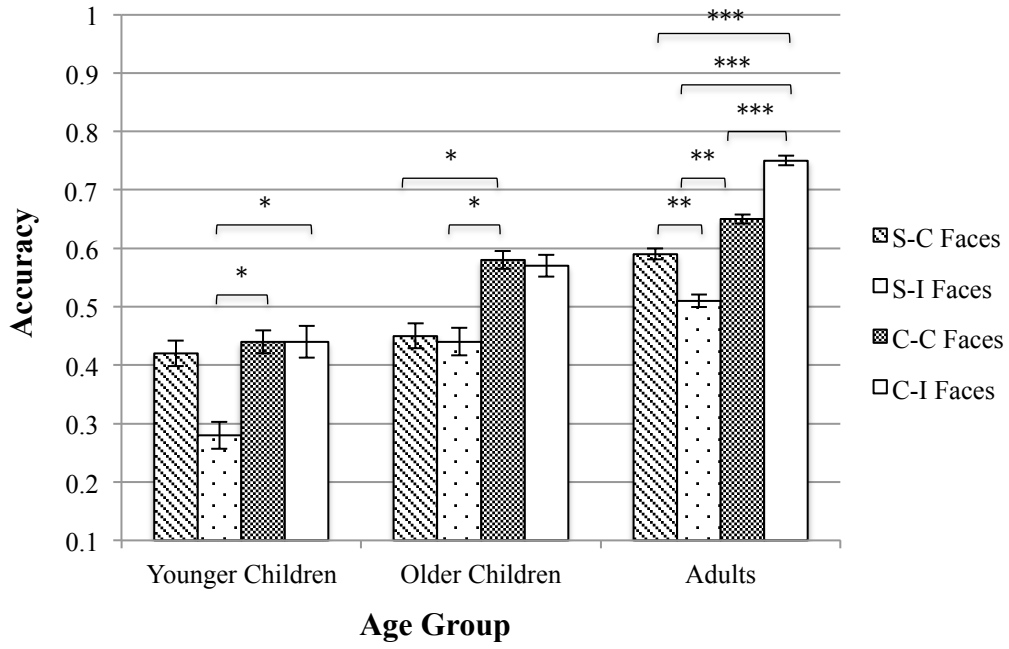


Figure 7. Mean accuracy on sad expressions only on each face type for all three age groups. Error bars represent standard errors. S-C = South Asian Canadian; S-I = South Asian Immigrant; C-C = Caucasian Canadian; C-I = Caucasian Immigrant.
*$p < .05$. **$p < .01$. ***$p < .001$.

Summary

Consistent with our first hypothesis, emotion recognition improves with age. Overall, adults performed better than younger and older children. Furthermore, older children performed better than younger children. Contrary to our second hypothesis - in which we expected that participants would be most accurate and fastest at recognizing emotion in faces similar to them in both race and culture, and least accurate and slowest at recognizing emotion in faces dissimilar to them in both race and culture - there were no significant effects of participant race or interactions involving race. These results suggest that the participants' race did not affect their emotion recognition accuracy or their speed in responding to faces. However, regarding the minority hypothesis, similar results to Study 2 were found. Caucasian children and adults showed an other-race deficit in emotion recognition, whereas South Asian children and adults

did not. These results suggest that children as young as 6 who belong to a minority group are better at judging emotions by majority group members, which may be due to frequent exposure to majority group members. However, results differed when only looking at Canadian faces and excluding the immigrant faces. In particular, Caucasian adults demonstrated an other-race advantage while South Asian adults showed an own-race advantage.

Examining performance separately by emotion, results were generally consistent with previous literature. Both child and adult participants were more accurate at recognizing happy faces than faces conveying negative emotions, with the worst performance on angry and sad faces. While the performances on happy and neutral faces were similar across the three age groups, for the negative emotions – angry, fear and sadness – the differences increase (refer to Table 15). These results replicate previous findings suggesting that children have more difficulty recognizing negative emotions (Camras & Allison, 1985; Markham and Adams, 1992). For neutral and sad expressions, children and adults differed in their performance depending on the race/culture of the face. For neutral expressions, adults performed worst on Caucasian immigrant faces. When looking at sad expressions alone, younger children performed better on Caucasian faces compared to South Asian immigrant faces. Older children performed better on Caucasian Canadian faces compared to South Asian faces. Lastly, adults performed best on Caucasian faces and worst on South Asian faces. These results suggest that perhaps the stimuli captured more cultural/racial variations in expression for the neutral and sad emotions as evidenced by the varying performances on each face type by the age groups.

Study 4: Cultural Identification Task

Dialect theory suggests that emotion is similar to a universal language, with different cultures having different dialects that account for cross-cultural differences in emotion expression and recognition; thus, people tend to appraise emotions based on their own cultural style (Elfenbein, 2013; Elfenbein et al., 2007). Dialect theory predicts that individuals will be more accurate at recognizing emotions when expressed by members of their own cultural group, a hypothesis that was investigated in Studies 2 and 3 of this thesis. A related hypothesis is that individuals will be able to determine whether someone belongs to their own or a different culture simply based on their emotional expressions, because emotional expressions contain clues that signify an individual's culture. Marsh and colleagues (2003) investigated whether participants were able to determine the nationality of individuals expressing emotion. American participants viewed photos of Japanese Americans and Japanese nationals posing either a neutral expression or standardized expressions of emotion (anger, disgust, fear, sadness, surprise) and were told that half of the faces were Japanese Americans and the other half were Japanese nationals. Participants were able to identify the nationality of the face at above-chance levels for both neutral and emotional expressions but performance was significantly better when participants viewed the faces expressing emotions compared to the neutral faces. These results suggest that the facial expressions of emotions contained cues that identified the nationality or culture of the expresser (Elfenbein, 2013; Marsh, Elfenbein, & Ambady 2003; 2007). However, Matsumoto (2007) found that participants were not able to identify an individual's nationality based on their facial expression. The current study aimed to replicate the findings of Marsh and colleagues and to extend them by investigating whether participants could accurately determine the cultural background of faces when viewing faces of more than one ethnicity.

Hypotheses

Hypothesis 1: Overall, participants would be able to identify the culture of both neutral and expressive faces at greater than chance levels.

Hypothesis 2: Participants would be more accurate at identifying the expresser's country of origin when the face was expressing an emotion rather than a neutral pose.

Hypothesis 3: Participants would be more accurate at identifying the expresser's country of origin when the face was own-race vs. other-race.

Hypothesis 4: Individuals with greater cross-cultural exposure would be more accurate at determining the country of origin of people who are racially and/or culturally dissimilar, compared to people with lower cross-cultural exposure.

Method

Participants. Participants who completed either Study 2 or Study 3 were included in this study. A total of 161 participants were included in the final sample. The first group included 83 Caucasian females and 5 Caucasian males (M = 19.53, SD = 2.58, Range: 18-34), all of whom were born and raised in Canada. The second group included 64 South Asian females and 14 South Asian males (M = 19.55, SD = 2.51, Range: 18-35), all of whom were born and raised in Canada.

Procedure. The Ryerson Research Ethics Board approved all procedures. All participants read through and signed a consent form before participating. The cultural identification task was presented to adult participants after they had completed the emotion recognition task in either Study 2 or Study 3. The task was created in E-Prime (Psychology Software Tools, Inc.) and presented on a desktop computer with a 23" Samsung widescreen LCD monitor and a screen resolution of 1920 x 1080. All participants saw 80 faces from the stimulus set created in Study 1.

They saw one neutral expression and one negative emotional expression (i.e., angry, fearful, or sad) from all 40 individuals in the stimulus set. Participants viewed each face one at a time and had to determine whether the face was an individual who was born and raised in Canada or an individual born and raised abroad. The stimulus set was split into two blocks, one block containing all Caucasian faces and one block containing all South Asian faces. Half of the participants saw the Caucasian faces first, while the other half saw South Asian faces first. Each face was presented in the middle of the screen against a white background and appeared on the screen until participants made their decision using a mouse. Accuracy and reaction time were recorded. After completing the task, participants completed the contact exposure questionnaire and were debriefed as described in Studies 2 and 3.

Results

Cultural identification. All statistical analyses were conducted using IBM's *Statistical Package for the Social Sciences* (SPSS) version 20. To test the first hypothesis, one–sample t-tests were conducted for each expression against chance, collapsing across participant race and race of face. Participants were able to identify the culture of face at above chance levels for both neutral expressions ($M = .56$, $SD = .07$), $t(160) = 11.60$, $p < .001$ and emotional expressions ($M = .57$, $SD = .08$), $t(160) = 11.00$, $p < .001$. Thus, these faces contained observable cues to cultural background.

To determine whether participants were more accurate when the face was emotional vs. neutral (Hypothesis 2) and whether participants were more accurate for own-race vs. other-race faces (Hypothesis 3), a repeated measures ANOVA was conducted with participant group (South Asian vs. Caucasian) as the between-subjects factor and face type (South Asian vs. Caucasian) and expression (neutral vs. emotional) as the within-subject factors. Refer to Table 14 for

accuracy on each expression by face type and participant group.

Table 14.

Mean accuracy for each expression for South Asian and Caucasian participants.

	Expression							
Participant Group	South Asian Neutral		South Asian Emotion		Caucasian Neutral		Caucasian Emotion	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
South Asian	.62	.10	.65	.11	.54	.08	.52	.11
Caucasian	.58	.11	.58	.10	.52	.09	.50	.09

There was a significant main effect of face type, $F(1, 159) = 83.23$, $p < .001$, $\eta^2 = .34$, and a significant main effect of participant group, $F(1, 159) = 23.82$, $p < .001$, $\eta^2 = .13$. Participants were more accurate on South Asian faces compared to Caucasian faces, and South Asian participants were more accurate than Caucasian participants. Surprisingly, the results indicated no main effect of expression, $F(1, 159) = .163$, $p = .687$, suggesting that participants were no better at identifying the expresser's country of origin when they viewed an emotional expression compared to a neutral face. However, these main effects were qualified by a significant interaction between face type and expression, $F(1, 159) = 6.01$, $p = .015$, $\eta^2 = .04$, and a marginally significant interaction between face type and participant group, $F(1, 159) = 3.51$, $p = .063$, $\eta^2 = .02$. To investigate the face type by expression interaction, I ran paired samples t-tests separately for each face type, collapsing across participant group. For South Asian faces, participants were significantly more accurate at identifying the country of origin when viewing an emotional expression rather than a neutral expression, $t(160) = -2.03$, $p = .044$. For Caucasian faces, there was no significant difference in accuracy when viewing emotional vs. neutral expressions, $t(160) = 1.40$, $p = .163$ (Figure 8).

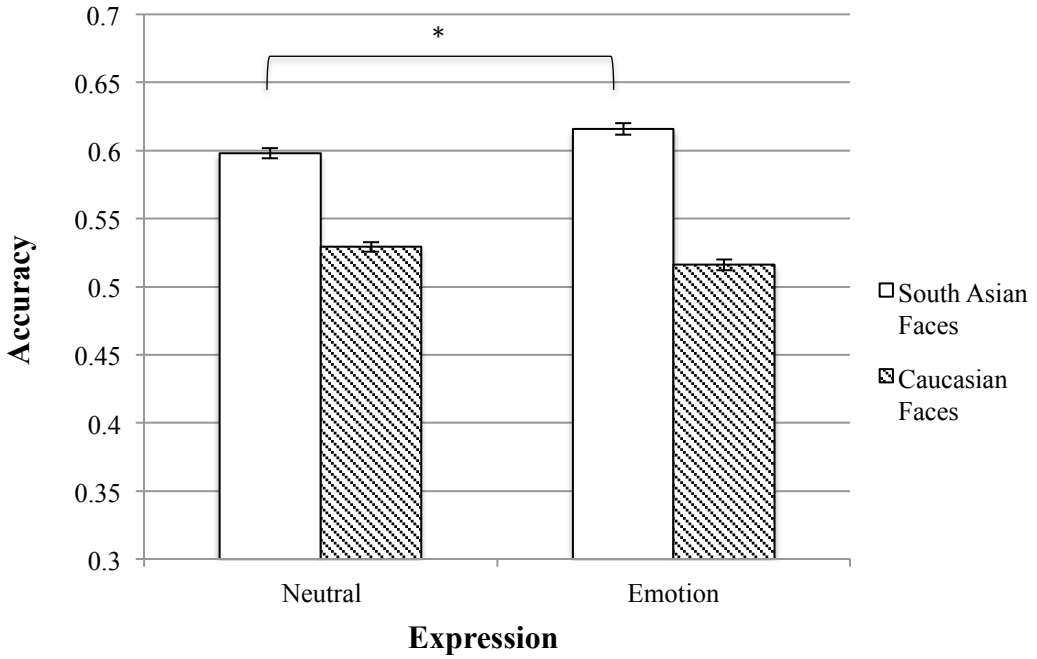


Figure 8. Mean accuracy scores on neutral and emotion expressions for each face type. Error bars represent standard errors.
*$p < .05$

To investigate the face type by participant group interaction, I ran independent samples t-tests to compare performance separately on each face type, collapsing across expression. South Asian participants were more accurate than Caucasian participants on both South Asian faces, $t(159) = 4.35$, $p < .001$, and Caucasian faces, $t(159) = 2.24$, $p = .026$, although the difference between the groups was larger for South Asian faces.

Cross-cultural exposure. Prior to running correlational analyses, tests of normality revealed that scores on Caucasian immigrant faces, $D(78) = .10$, $p = .035$, and on average contact with Caucasian individuals, $D(78) = .11$, $p = .021$, were significantly non-normal. In analyses involving variables with non-normal data, Kendall's tau (τ) was used. For South Asian participants, bivariate correlations were run between exposure to Caucasians (separately for average contact and close contact) and accuracy on Caucasian Canadian faces and Caucasian

immigrant faces. All correlations were non-significant (see Table 15). For Caucasian participants, bivariate correlations were run between exposure to South Asians (separately for average contact and close contact) and accuracy on South Asian Canadian faces and South Asian immigrant faces. There was a significant relationship between close contact with South Asians and accuracy on South Asian Canadian faces $r = .18$, p (one-tailed) = .048. There was also a significant relationship between average contact with South Asians and accuracy on South Asian Canadian faces, $r = .24$, p (one-tailed) = .010 (see Table 16). Thus, Caucasian participants with more contact with South Asian individuals show better performance on this cultural identification task.

Table 15.

Bivariate correlations for South Asian participants (exposure and culture identification)

Exposure	Caucasian Canadian Accuracy	Caucasian Immigrant Accuracy
Caucasian Close Contact	-.16	.03
Caucasian Average Contact	-.06	-.04

Table 16.

Bivariate correlations for Caucasian participants (exposure and culture identification)

Exposure	South Asian Canadian Accuracy	South Asian Immigrant Accuracy
South Asian Close Contact	.18*	-.01
South Asian Average Contact	.23*	-.05

*p (one-tailed) < .05

Summary

Overall, participants were able to identify the culture of the faces in this task at above-chance levels. Participants scored similarly when viewing a face expressing neutral compared to

a face expressing an emotion. However, when examining accuracy on expressions within each race of face, the results partially supported our hypothesis. For South Asian faces (but not Caucasian faces), participants were more accurate at identifying the country of origin when viewing expressions of emotion rather than neutral expressions, indicating that the emotional expressions contained more clues to the person's cultural background. Interestingly, participants were more accurate overall on South Asian faces than on Caucasian faces, perhaps because the cues that distinguish South Asian Canadians and South Asian immigrants are more distinct than the cues that distinguish Caucasian Canadians and Caucasian immigrants from Western Europe. Additionally, South Asian participants performed significantly better than Caucasian participants. Consistent with our hypothesis regarding cross-cultural exposure, Caucasian participants with greater close contact and greater average contact with South Asians were better at identifying the country of origin for South Asian Canadian faces.

General Discussion

The goals of this thesis were to investigate cross-cultural differences in emotion recognition by (1) disentangling the effects of race and culture and (2) charting the development of these differences. In Study 1, we created a stimulus set to be used in the subsequent studies with four different racial/cultural groups (South Asian Canadians, South Asian immigrants, Caucasian Canadians, and Caucasian immigrants) "free-posing" seven emotions (happiness, surprise, angry, fear, disgust, sadness and neutral). We then used the stimulus set to test cross-cultural differences in emotion recognition with participants – both adults (Studies 2 and 3) and children (Study 3) – who were culturally similar (Canadian) but racially different (South Asian vs. Caucasian). Furthermore, we investigated whether an individual's emotional expression contained clues to their cultural background (Study 4).

Cross-Cultural Differences in Emotion Recognition in Adults

We hypothesized that participants would be fastest and most accurate at recognizing emotions when expressed by people similar to them in both race and culture and slowest and least accurate on faces that were dissimilar on both dimensions. In addition, participants would show intermediate performance on faces that matched them on one of the two dimensions (i.e., match on race but not culture; match on culture but not race). For adults, this hypothesis was only partially supported. Caucasian adults were more accurate at recognizing emotion on faces that were similar to them on only race, only culture, or both race and culture, while performing least accurately on their out-group – South Asian immigrants – which differed from them on both race and culture. Caucasian adults also performed significantly better than South Asian participants on Caucasian Canadian faces (the faces that matched them on both race and culture). This finding is consistent with findings from Wickline et al. (2009), in which Caucasian

Americans performed better than African Americans on Caucasian American faces.

Despite evidence of a cross-cultural emotion recognition deficit in Caucasian participants, South Asian participants did not show a similar deficit. In fact, South Asian adults showed a very similar pattern of results to Caucasian adults, with both groups of adults displaying the worst performance on faces of South Asian immigrants and the best performance on faces of Caucasian immigrants. This finding suggests that performance on both immigrant groups of faces might be driven, at least in part, by the stimuli themselves—i.e., South Asian immigrant emotions were objectively the hardest to recognize and the Caucasian immigrant emotions were objectively the easiest. Although it is difficult to objectively compare the stimuli, it is possible to gain some insight from the validation data collected in Study 1. In Study 1, the emotional faces were rated by members of their own racial/cultural group. If South Asian immigrant faces are recognized less accurately than the faces in the other cultural groups, even by members of their own group, it would suggest that emotions are simply not expressed as clearly by members of this group, at least in this stimulus set. Indeed, it seems as if that might be the case. In Study 1, South Asian immigrant faces (rated by South Asian immigrants) expressing angry, fear, disgust, or neutral (4 of the 7 emotions) were recognized with the least accuracy, and South Asian immigrant faces expressing sadness or surprise were recognized with the second least accuracy (compared to faces from other cultural groups). In contrast, Caucasian immigrant faces (rated by Caucasian immigrants) expressing anger, sadness, fear, or disgust were recognized with the most accuracy, and these emotions were also rated as much more intense in the Caucasian immigrant faces compared to the other cultural groups. Thus, it seems as if emotions might simply be most readily expressed by the Caucasian immigrants in our stimulus set and least readily expressed by

the South Asian immigrants in our stimulus set, and this leads to overall differences in emotion recognition accuracy.

However, it should be noted that accuracy on the emotions of sad, fear, and surprise was higher when viewed by South Asian immigrants (Study 1) compared to South Asian and Caucasian Canadians (Study 2). This lends some support to dialect theory, as the poorer recognition by the Canadian participants may be due to the different cultural "accents" for those emotions. In a study conducted by Beaupre and Hess (2005), they did not find cross-cultural differences in emotion recognition when African, Chinese, and French-Canadian participants judged photos of Caucasian and African faces in which the emotions were standardized and expressed in the same fashion. Because we did not instruct expressers on how to pose the emotions, our findings demonstrate that our stimuli were able to capture non-verbal accents of the expresser. Since the South Asian immigrant group was the most culturally dissimilar (compared to the Canadian and Western European groups), their emotional expressions elicited the lowest accuracy in recognition. Similarly, North American and Western European cultures are quite similar; thus, our Canadian participants (both Caucasian and South Asian) may have found that the emotions of the Caucasian immigrants were expressed in a style familiar to them and the emotions did not contain the distinct cultural accents in their expressions that would lead to errors in recognition.

Another possible reason for the overall similarity among Caucasian and South Asian participants' performance is related to majority and minority status. Consistent with our hypothesis and previous literature (Elfenbein & Ambady, 2002a; Nowicki, Glanville & Demertzis, 1998), when examining performance on own-race vs. other-race faces (collapsing across culture), Caucasian participants showed an in-group advantage. In contrast, South Asian

participants showed an out-group advantage in which they were more accurate at recognizing emotions on other-race faces compared to own-race faces. This may be due to the fact that South Asian individuals are exposed to more Caucasian faces than vice versa and thus are more familiar with Caucasian expressions of emotions. It is also possible that minority members are better at recognizing emotions of majority members than vice versa because minority members are more motivated and experience more pressure to learn non-verbal communication of the majority group (Nowicki et al., 1998).

Overall, the current findings replicated previous studies that also separate race and culture. In the study conducted by Prado et al. (2013), Caucasian Australians and people of Chinese heritage living in Australia had similar accuracy on Caucasian and Asian faces. Moreover, Wickline et al. (2009) found that for African American faces, Caucasian and African Americans performed similarly, however Caucasian Americans outperformed African Americans on Caucasian American faces. These results are very similar to our findings in which Caucasian and South Asian Canadians perform similarly on all face types except for Caucasian Canadian faces, on which the Caucasian participants outperform the South Asian participants. Consistent with research on dialect theory (Elfenbein, 2013; Elfenbein et al., 2007), the findings suggest that for South Asian immigrant faces (most dissimilar in culture), there was discrepancy of expressive style (i.e. cultural dialects) and expectation of style by Canadian participants that may have that led to lowest accuracy for South Asian immigrant faces. Relatedly, the current findings regarding South Asian immigrant faces are consistent with Elfenbein and Ambady's (2002a) meta-analysis in which emotion recognition accuracy is higher for individuals living within the same nation compared to people who are separated by national borders; however, our finding of better emotion recognition for Caucasian immigrant faces is not consistent with these

findings.

Emotion Recognition. When performance on different emotions was analyzed, the findings replicated previous research for the most part. Participants were most accurate on happy expressions across all cultural groups (Beaupre & Hess, 2005; Elfenbein & Ambady, 2002b; Matsumoto, 1992). When all seven expressions were included in the task (Study 2), participants were least accurate on fearful expressions; however, when only five expressions were included in the task (Study 3; disgust and surprise were not included), participants were more accurate on fearful expressions compared to sad and angry expressions. This discrepancy in performance on the two tasks is likely due to participants mistaking fear for surprise in the 7-emotion task, which is consistent with previous research (Ekman & Friesen, 1971; Jack, Blais, Scheepers, Schyns, & Caldara, 2009). As described above, Caucasian adult participants showed an in-group advantage for Caucasian Canadian faces, and this overall effect seemed to be driven by the expressions of fear and anger in the 7-emotion task, and the expression of sadness in the 5-emotion task. This is somewhat consistent with previous research: Elfenbein and Ambady (2002a) reported that the in-group advantage is highest for fear and disgust and lowest on angry and happiness, while Matsumoto (1992) found that Caucasians recognize anger more accurately than Asians. Since we found an in-group advantage for fearful, angry, and sad, this suggests that Caucasian Canadians were best at recognizing the negative emotions in the style that was most familiar to them.

Developmental perspective. As hypothesized, emotion recognition improves as individuals get older which is consistent with previous developmental literature (Camras & Allison, 1985; Thomas, Bellis, Graham, & LaBar, 2007). More specifically, the recognition for sadness, anger and fear improves. Contrary to our hypothesis regarding cross-cultural differences, children did not have the highest recognition on faces that were similar to them in

both culture and race. South Asian and Caucasian children in both age groups (younger and older) performed similarly across all face types (highest accuracy on Caucasian immigrant faces, lowest accuracy on South Asian immigrant faces, similar accuracy on Caucasian and South Asian Canadian faces). We did not replicate previous developmental literature that reported ethnic bias, such as the study conducted by Markham and Wang (1996) that tested Australian and Chinese children. Although in that particular study, the two groups of children differed on both race and culture. Our results suggest that since the children were raised in the same culture (i.e., all born in Canada), they decoded emotions similarly, resulting in no differences in performance between the South Asian and Caucasian children. However, it should be noted that our sample size in the South Asian group was small, which could have accounted for the lack of significant findings. When directly comparing children and adults completing the same task (5 emotions) Caucasian adults but not Caucasian children, perform better on Caucasian Canadian faces compared to South Asian adults. These findings suggest that the difference in performance between Caucasian and South Asian participants on Caucasian Canadian faces appears at some point between childhood and adulthood. Interestingly, South Asian children as young as 6 years old performed better on other-race faces compared to their own-race faces, supporting the minority hypothesis. Considering that the Greater Toronto Area is very multicultural and school classrooms are increasingly ethnically diverse, it was surprising to find these results. Thus, these findings emphasize the importance of intergroup relations, both in adulthood and in childhood.

Cultural Identification

It was hypothesized that participants would be able to identify the culture of a face at greater than chance levels and that participants would be more accurate at identifying the culture of the face when the face was expressive rather than neutral. We replicated Marsh and

colleagues' (2003; 2007) findings in that overall, participants were able to identify the culture of the faces in the stimulus set at greater than chance levels. However, the results were more complex when considering the cultural identification of emotional vs. neutral expressions. For South Asian faces, findings were consistent with the literature (Marsh et al., 2003); participants were more accurate at identifying cultural background when viewing emotional rather than neutral expressions. In contrast, for Caucasian faces, facial expression did not affect participants' ability to identify the cultural background. This contradicts Marsh and colleagues' (2007) study which found that individuals were able to identify the cultural background more accurately for Caucasian faces (American vs. Australian) expressing emotion rather than neutral. It is possible that this discrepancy is due to the fact that the current study used negative expressions, whereas Marsh et al. (2007) used happy expressions.

One possible reason that participants were more accurate on South Asian faces in general, and South Asian emotional expressions in particular could be that Canadian culture and Western European culture are more similar compared to Canadian culture and South Asian culture. Thus, emotional expressions posed by South Asian immigrants may contain distinct cultural "accents" with which participants were unfamiliar, which then provided cues that these individuals were not born and raised in Canada. In contrast, the emotional expressions posed by Caucasian immigrants, most of whom were Irish, may not have contained accents that were distinct from Canadian cultural accents, leading to more difficulty identifying the culture of the Caucasian faces. This notion of Caucasian immigrants expressing emotions in a similar style can also be seen in the emotion recognition task, as participants performed most accurately on Caucasian immigrant faces. These findings have important theoretical implications, especially for dialect theory, as they provide support for the different cultures having different dialects in their facial

expressions of emotion.

Cross-Cultural Exposure

The effects of cross-cultural exposure were assessed in emotion recognition and cultural identification. We hypothesized that individuals with higher levels of cross-cultural exposure would be would be faster and more accurate at recognizing emotions expressed by people who are racially and/or culturally dissimilar to them. Additionally, they would be more accurate at determining the country of origin of people who are racially and/or culturally dissimilar, compared to people with lower cross-cultural exposure. Regarding emotion recognition, Caucasian participants with greater levels of close interaction with South Asians recognized emotions expressed by South Asian immigrant faces better. Moreover, South Asian participants with greater average contact with Caucasians responded faster to Caucasian immigrant faces. This positive relationship between exposure to an out-group and proficiency on a task of emotion recognition in faces of that out-group, is consistent with previous literature (Beaupre & Hess, 2006; Elfenbein & Ambady, 2003; Wickline 2007 as cited in Wickline et al., 2009). Overall, Caucasian participants performed least accurately on South Asian immigrant faces, but with greater close contact, it may be that they are becoming more familiar with the expressive style and this leads to greater accuracy in emotion recognition. This suggests that cultural familiarity is related to improved non-verbal communication. While previous research tends to examine cultural familiarity in terms of the length of time an individual is in the host culture or physical proximity (Beaupre & Hess, 2006; Elfenbein & Ambady, 2003; Wickline, 2007 as cited in Wickline et al., 2009) the current study extends the notion of cultural familiarity by assessing the type of interaction with other cultures (i.e. friendships, personal relationships, living arrangements, etc.). Regarding cultural identification, to my knowledge there have not been any

studies looking at the relationship between higher levels of cross-cultural exposure and greater accuracy in cultural identification. Consistent with our hypothesis, Caucasian participants with greater close and average contact with South Asians were more accurate at identifying the country of origin for South Asian Canadian faces. This suggests that cultural familiarity may be related to a greater sensitivity to non-verbal cues that indicate one's cultural background. Greater cross-cultural exposure was related to higher accuracy for both tasks but surprisingly, only for Caucasian participants. Since all the South Asian participants were born and raised in Canada, it may be that they have constant exposure to Caucasian faces; thus levels of varying exposure do not relate to performance. As seen in Studies 2 and 3, South Asian participants actually perform better on Caucasian faces overall. In contrast, Caucasian participants may have had much more varied exposure to South Asian faces. These findings have important implications with regards to newly arrived immigrants, as they may face barriers in non-verbal communication.

Limitations and Future Directions

It is important to acknowledge several limitations of this thesis. First, the stimulus set was not fully validated before testing began for Studies 2, 3, and 4 due to time constraints and difficulty recruiting immigrant populations. This was especially relevant for South Asian immigrant faces, as they had lower overall agreement and intensity ratings compared to the other three groups. Second, the small sample size of the children, particularly for the South Asian children was also an issue. There were only 16 South Asian child participants (8 younger, 8 older); thus, the null findings regarding any effects of participant race or interactions may have been due to low statistical power. Third, there were considerably more females than males in the adult samples. This had the potential to bias the results, since there is evidence for gender differences in emotion recognition (Hall, 1978; Hoffman, Kessler, Eppel, Rukavina, & Traue,

2010). Hoffman et al. (2010) found that men and women performed similarly on "full-blown" emotions; however, gender differences emerge in lower intensity expressions in which women were more accurate in recognizing subtle expressions of emotions compared to men. Thus, if more males had been included in the sample, there may have been a more fair representation of emotion recognition across Caucasian and South Asian participants since our stimuli contained lower intensity expressions of emotion.

In future research, it would be interesting to examine cross-cultural differences in emotion recognition in two different minority groups in Canada (e.g., East Asian and African individuals). The independent effects of race and culture may be clearer when investigating difference in emotion recognition in two cultures that are considerably more different than North American/Western culture, and that are both minority groups in the country in which they reside. With regards to the developmental framework, testing older children and adolescents would be informative. As evidenced by the current findings, greater cross-cultural differences in emotion recognition were found in adulthood than in childhood; thus, testing older children and adolescents has the potential to pinpoint when this difference begins.

Conclusion

This thesis investigated cross-cultural differences in emotion recognition in children and adults. The findings have important theoretical and practical implications. Regarding dialect theory, results suggest that similarly to language, different cultures have different dialects. Furthermore we found an in-group advantage particularly for culture. From a developmental perspective, we found that children who are different in race but similar in culture do not show cross-cultural differences in emotion recognition; however, these differences appear in adults.

These findings have implications regarding social interactions between cultural groups. Living in a multicultural society, many new immigrants face several barriers upon arrival. As the results indicated that Canadian participants had the most difficulty recognizing emotions on South Asian immigrant faces, immigrants may experience non-verbal barriers when interacting with individuals outside their culture, in addition to a language barrier and culture shock. Thus, these findings can help inform services aimed towards newly arrived immigrants to have a better understanding of their new social environment and improve upon their social interaction.

Appendix A

Adult Demographic Questionnaire

What is your age?_____ What is your gender?_____

What is your ethnicity/race?_____ Where were you born? _____

If you were not born in Canada…

Did you live in any other countries (other than your country of birth) before coming to Canada?

☐ Yes

☐ No

If yes, in what other country did you live and from what year to what year?

Country: _____ From _____ to _____
Country:_____ From _____ to _____
Country:_____ From _____ to _____

In what month and year did you come to Canada to live? Month:_____ Year:_____

Appendix B

Contact Questionnaire

Please use the following legends to answer the next questions:

South Asian	White
e.g., East Indian, Pakistani, Bangladeshi, Punjabi, Sri Lankan, etc.	e.g., English, Irish, Dutch, Eastern European, German, etc.

Strongly Disagree	Disagree	Agree	Strongly Agree
1	2	3	4

Please rate the following statements about the people that you encounter and with whom you interact:

		1	2	3	4
1	I used to live in an area where I interacted with South Asian people every day.	1	2	3	4
2	Of my three best friends, one or more is/are White people.	1	2	3	4
3	I have lived in a country where the majority of the population was South Asian people.	1	2	3	4
4	I usually only interact with South Asian people.	1	2	3	4
5	I interact with White people every day.	1	2	3	4
6	In school, I have had one or more teacher who was (were) South Asian people.	1	2	3	4
7	I live in an area where I interact with South Asian people every day.	1	2	3	4
8	I have dated one or more White person.	1	2	3	4
9	I interact with South Asian people every day.	1	2	3	4
10	I socialize a lot with White people.	1	2	3	4
11	I don't usually interact with South Asian people.	1	2	3	4
12	Now, my boss(es) at work or teacher(s) at school is (are) White people.	1	2	3	4
13	I usually only interact with White people.	1	2	3	4
14	At work/school, I rarely interact with South Asian people.	1	2	3	4
15	Of the three people I spend the most time with, one or more is/are South Asian.	1	2	3	4
16	I interact with South Asian people during my leisure time, outside of work/school.	1	2	3	4
17	I have lived in a country where the majority of the population was White people.	1	2	3	4
18	In high school, I interacted with White people.	1	2	3	4
19	Currently, I spend very little time interacting with White people.	1	2	3	4

20	In high school, I interacted with South Asian people.	1	2	3	4
21	I have lived with (at home, in residence, as roommates, etc.) one or more White person.	1	2	3	4
22	In my circle of friends, the majority is South Asian people.	1	2	3	4
23	In public, I find I encounter mostly White people.	1	2	3	4
24	I know a lot of South Asian people.	1	2	3	4
25	In school, I have had one or more teacher who was (were) White people.	1	2	3	4
26	I have lived with (at home, in residence, as roommates, etc.) one or more South Asian person.	1	2	3	4
27	Of the three people I spend the most time with, one or more is/are White people.	1	2	3	4
28	In my circle of friends, the majority is White people.	1	2	3	4
29	I have dated one or more South Asian person.				
30	In my high school, the student majority was South Asian people.	1	2	3	4
31	I don't usually interact with White people.				
32	Now, my boss(es) at work or teacher(s) at school is (are) South Asian people.	1	2	3	4
33	Of my three best friends, one or more is/are South Asian people.	1	2	3	4
34	I used to live in an area where I interacted with White people every day.	1	2	3	4
35	I socialize a lot with South Asian people.	1	2	3	4
36	In my high school, the student majority was White people.	1	2	3	4
37	Currently, I spend very little time interacting with South Asian people.	1	2	3	4
38	I know a lot of White people.	1	2	3	4
39	In public, I find I encounter mostly South Asian people.	1	2	3	4
40	I spend most of my time interacting with White people.	1	2	3	4
41	I spend most of my time interacting with South Asian people.	1	2	3	4
42	I live in an area where I interact with White people every day.	1	2	3	4
43	At work/school, I rarely interact with White people.	1	2	3	4

Appendix C

Accuracy for all Face Types and Emotions

Table 17

Mean accuracy on Caucasian Canadian expressions of emotions.

	Emotions													
Participant	Happiness		Surprise		Angry		Fear		Disgust		Sadness		Neutral	
Group	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
South Asian Canadians	.97	.07	.70	.13	.48	.13	.20	.16	.65	.15	.51	.13	.92	.11
Caucasian Canadians	.99	.05	.72	.16	.57	.15	.30	.14	.62	.13	.56	.17	.92	.11

Table 18

Mean accuracy on South Asian Canadian expressions of emotions.

	Emotions													
Participant	Angry		Disgust		Fear		Happiness		Neutral		Sadness		Surprise	
Group	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
South Asian Canadians	.55	.19	.60	.17	.33	.20	.99	.04	.90	.12	.50	.17	.77	.16
Caucasian Canadians	.58	.17	.61	.15	.37	.20	1.00	.00	.92	.13	.55	.14	.76	.15

Table 19

Mean accuracy on Caucasian immigrant expressions of emotions.

	Emotions													
Race/Culture	Angry		Disgust		Fear		Happiness		Neutral		Sadness		Surprise	
of Participants	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
South Asian Canadians	.71	.16	.67	.16	.30	.18	.98	.05	.88	.11	.65	.15	.66	.11
Caucasian Canadians	.77	.12	.65	.14	.34	.16	.96	.05	.84	.17	.71	.14	.65	.15

Table 20

Mean accuracy on South Asian immigrant expressions of emotions.

	Emotions													
Race/Culture of Participants	Angry		Disgust		Fear		Happiness		Neutral		Sadness		Surprise	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
South Asian Canadians	.39	.15	.63	.17	.14	.14	.98	.06	.90	.10	.41	.18	.38	.16
Caucasian Canadians	.44	.17	.67	.16	.09	.11	.99	.04	.92	.12	.39	.19	.37	.17

Appendix D

Optional Child Demographic Questionnaire

The following questions are optional. You may choose to skip any or all of the questions listed below.

1. What is your child's birthday? _____
2. What is your child's gender? _____
3. What is your child's country of birth? _____
4. What is your child's ethnic background (please check all that apply)?

☐ White/Caucasian (e.g. England, Ireland, France, Germany)

☐ Black (e.g., Nigeria, Ghana, Ethiopia, Caribbean and of Black/African descent)

☐ East Asian (e.g., Hong Kong, China, Japan, Korea)

☐ South East Asian (e.g., Singapore, Malaysia, Thailand, Cambodia, Philippines)

☐ South Asian (e.g., India, Pakistan, Bangladesh, Sri Lanka)

☐ Middle Eastern or North African (e.g., Iran, Israel, Egypt, Morocco)

☐ Indo-Caribbean (from the Caribbean AND of South Asian descent)

☐ Aboriginal/Metis/Inuit

☐ Latin American (e.g. Colombia, Argentina, Peru)

☐ Other: _____

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