The influence of emotion recognition and emotion regulation on intercultural adjustment

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Abstract

Previous studies have consistently shown emotion regulation to be an important predictor of intercultural adjustment. Emotional intelligence theory suggests that before people can regulate emotions they need to recognize them; thus emotion recognition ability should also predict intercultural adjustment. The present study tested this hypothesis in international students at three times during the school year. Recognition of anger and emotion regulation predicted positive adjustment; recognition of contempt, fear and sadness predicted negative adjustment. Emotion regulation did not mediate the relationship between emotion recognition and adjustment, and recognition and regulation jointly predicted adjustment. These results suggest recognition of specific emotions may have special functions in intercultural adjustment, and that emotion recognition and emotion regulation play independent roles in adjustment.
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1. Introduction

In 2003–2004, 4.3% of the students in higher education institutions in the US were international students (Institute of International Education, 2004). International students usually experienced more problems than average American students (Kaczmarek, Matlock, Merta, Ames, & Ross, 1994; Pedersen, 1991), such as unfamiliar culture and

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school systems, language difficulties, communication problems, financial worries, discrimination, trouble making American friends, uncertainty and change in socio-economic status (Chataway & Berry, 1989; Lewthwaite, 1996; Oropeza, Fitzgibbon, & Baron, 1991; Sam, 2001; Stafford, Marion, & Salter, 1980; Surdam & Collins, 1984). Experiencing such problems can lead to poor academic performance or premature return to one's own country (Matsumoto & LeRoux, 2003; Mori 2000). These problems could be a result of international students having to face the challenges of adjusting to a new culture and simultaneously dealing with the academic stress of being a student all while being far away from their family and friends. Therefore it is important to identify the factors that are associated with the positive intercultural adjustment of international students. The purpose of the present study was to examine whether emotion recognition ability was such a factor. Below we define intercultural adjustment and review the factors that influence it, with a focus on emotion regulation. We use the concept of emotional intelligence to highlight the potential importance of emotion recognition, suggesting that it is primary to emotion regulation in predicting adjustment.

1.1. Intercultural adjustment

The term intercultural adjustment has been defined in many different ways (e.g. Black & Gregersen, 1991; Grove & Torbiorn, 1985). Furthermore the terms intercultural adjustment, adaptation and acculturation have all been used interchangeably in many previous studies on cross-cultural contact (Searle & Ward, 1990). It therefore is important to first explain how we define intercultural adjustment in the present study.

We define adaptation as the process of altering one's behaviors or cognitions in relation to a different environment, in order to better interact with the environment to achieve desired end goals. Contrastingly, we define adjustment as the psychological outcomes that are associated with adaptation (Matsumoto, Yoo, & LeRoux, in press). Adjustment involves both objective and subjective outcomes. Our definition is similar to Ward and colleagues' definition of psychological adjustment (Searle & Ward, 1990; Ward, 2001; Ward & Kennedy, 1994). Subjective aspects would include emotions such as anger, frustration, anxiety or sadness. Objective aspects of adjustment include outcomes that are independent of the mind of the individual; these would include salary, job performance ratings, or grades. Successful intercultural adjustment would entail having positive psychological consequences during and after the adaptation process.

1.2. Importance of emotion regulation in intercultural adjustment

Matsumoto and colleagues proposed that how an individual deals with the emotions aroused during adaptation is a major determinant of successful intercultural adjustment (Matsumoto et al., in press). They found support for this in their studies using the Intercultural Adjustment Potential Scale (ICAPS; Matsumoto et al., 2001), consistently finding that high emotion regulation is the most important predictor of positive intercultural adjustment (Matsumoto et al., 2001, 2003). Emotion regulation refers to the "the processes by which individuals influence which emotions they have, when they have them, and how they experience and express these emotions" (Gross, 1998, p. 275). It is important for positive adjustment because controlling one's negative emotions evoked during conflict and stress, which are inevitable in intercultural (and intracultural) life,

allows one to not be overly influenced by negative emotions and instead think clearly and rationally, which then paves the way for using the other psychological skills important for intercultural adjustment, such as openness, flexibility and critical thinking (Matsumoto et al., 2001, 2003). The importance of emotion regulation in intercultural adjustment has also been supported in other studies, such as Van Oudenhoven and Van der Zee's (2002) using the Multicultural Personality Questionnaire (MPQ; Mol, Van Oudenhoven, & Van der Zee, 2001; Van Oudenhoven, Mol, & Van der Zee, 2003; Van Oudenhoven & Van der Zee, 2002).

1.3. Emotion recognition ability as a necessary precursor to emotion regulation

Because emotion regulation has been found to be an important predictor of intercultural adjustment, a deeper understanding of the concept might be useful to better understand its relationship to adjustment. One approach is from the emotional intelligence framework, because emotion regulation is considered to be one of the components of emotional intelligence. Emotional intelligence refers to the "ability to recognize the meanings of emotions and their relationships and to use them as a basis in reasoning, problem solving and enhancing cognitive activities" (Mayer, Salovey, Caruso, & Sitarenios, 2001, p. 234). Emotional intelligence is comprised of four skills: emotion regulation, emotion recognition in self and others, understanding of emotion, and utilization of emotion to facilitate thinking (Ciarrochi, Chan, & Bajgar, 2001; Mayer et al., 2001). In this framework emotion recognition is conceptually more primary than emotion regulation because regulation is only possible after recognition has occurred (Izard, 2001; Lane, 2000; Mayer et al., 2001). Thus recognition must be a precursor to regulation; conversely, if emotion is not recognized, there is nothing to regulate.

If emotion recognition is a necessary precursor to emotion regulation, and if emotion regulation predicts intercultural adjustment, then emotion recognition should also predict adjustment. Previous studies have, in fact, provided support for this notion. Emotion recognition has been correlated with such adjustment-related constructs as emotional disturbance, conduct disorder, incompetence, depression, social anxiety, academic achievement, popularity, competence, high function in social settings on several populations such as psychologically treated children, non-clinical children, juvenile delinquents, adults, schizophrenics, and those with learning disabilities (Hobson 1986 as cited in Turk & Cornish, 1998; Izard, 2001; McKenzie, Matheson, McKaskie, Hamilton, & Murray, 2000; McClure & Nowicki, 2001; McCown, Johnson, & Austin, 1986; Monfries & Kafer, 1987; Nowicki & Carton, 1997; Nowicki & Duke, 1994).

1.4. Limitations of previous research

Despite the fact that a number of studies have demonstrated that emotion recognition is related to adjustment, no study has examined this relationship in sojourners. Such a relationship could have important implications for improving intercultural adjustment because emotion recognition is a skill that can be taught (i.e. Micro Expression Training Tools, Ekman & Matsumoto, 2004, http://www.paulekman.com/training_cds.php; McKenzie et al., 2000). And it would provide important theoretical insights into the role of emotion-related processes, aside from emotion regulation, that influence adjustment. The present study tested this notion by first examining the relationship

between emotion recognition and regulation and then their relationship with intercultural adjustment.

This study also addressed limitations of previous studies on emotion regulation and intercultural adjustment. Previous studies (Matsumoto et al., 2001, 2003) have provided convincing evidence that emotion regulation can predict positive intercultural adjustment concurrently. Few, however, have demonstrated future predictive ability (but not all; see Matsumoto et al., 2003, Study 4). The present study extends that literature by examining how emotion recognition and regulation predict positive, long-term adjustment. We measured emotion recognition and emotion regulation of international students in the US at three different times during the school year, along with their intercultural adjustment. By examining future predictive ability of emotion recognition and regulation, further insight into the effectiveness and importance of these emotion processes on intercultural adjustment can be gained.

Finally another limitation of previous studies on emotion regulation and adjustment is their reliance on self-report. While there is nothing wrong with self-report measures per se, the *sole* reliance on them in assessing adjustment may be problematic. In particular, adjustment outcomes can be measured not only by self-report but also by behaviors in laboratory tasks, and not only by self-ratings but also by peers. We addressed this limitation by having international students participate in a group task in the laboratory, where self- and peer-ratings of social behaviors related to adjustment and interaction process were made.

1.5. Present study

In the present study, international students' emotion recognition and regulation were measured at the beginning of the school year. We also measured the subjective indices of their adjustment by measuring different emotional outcomes at the beginning and end of the school year, such as anxiety, depression, contentment, culture shock, hopelessness, homesickness and satisfaction with life. These have been found in previous research to be adjustment outcomes of intercultural adjustment (Jacob & Greggo, 2001; Matsumoto et al., 2001; Matsumoto & LeRoux, 2003; reviewed in Matsumoto et al., 2003; Mori 2000; reviewed in Oropeza et al., 1991; Surdam & Collins, 1984). In addition, self and peer ratings of social behaviors that are related to adjustment were obtained from a laboratory task at the middle of the first semester. Ratings of adjustment by friends were also obtained at the end of the school year. The peer and friends' ratings along with the Grade Point Averages (GPA) from both semesters were measured as objective indices of adjustment.

We predicted that emotion recognition and regulation would be positively related (Hypothesis 1), and that emotion regulation would positively predict intercultural adjustment as it has been shown in the past (Hypothesis 2). Furthermore, we predicted that emotion recognition would also positively predict adjustment (Hypothesis 3). Finally, we predicted that emotion regulation would mediate the relationship between emotion recognition and adjustment (Hypothesis 4). Examining this possible mediation will provide a better theoretical understanding of the relationship between emotion regulation and recognition, and the joint role both may play in predicting adjustment. The theoretical framework discussed above affords us with the ability to link these two important concepts together in understanding intercultural adjustment.

2. Method

2.1. Time 1

Participants: At the beginning of the fall semester, international student volunteers were recruited from San Francisco State University's New International Students Orientation and the International Students Office's weekly email newsletter. At Time 1, 63 international students participated (28.57% males and 71.43% females; mean age = 25.29 years, SD = 4.97). The country they were primarily raised was as follows: 17.46% in Europe (France, Germany, UK), 73.02% in Asia (China, India, Indonesia, Japan, Korea, Philippines, Malaysia, Taiwan, Turkey), and 9.52% in Central or South America (Brazil, Mexico). Many of these countries were listed as the top 20 countries of origin of current US international students (Institute of International Education, 2004). They had currently been in the US for an average of 8.22 months, and some had prior experience living in the US for an average of 4.41 months. Their self-rated proficiency in speaking, writing and reading English were all above fair (M = 4.65, SD = 1.73; M = 4.55 SD = 1.65; and M = 5.06, SD = 1.62, respectively on a 1–7 scale, 1 *poor* and 7 *fluent*), and their mean Test of English as a Foreign Language (TOEFL) score was 257.93 (SD = 110.72) out of 300.

Instruments. Emotion recognition ability: Japanese and Caucasian Brief Affect Recognition Test (JACBART; Matsumoto, LeRoux, Wilson-Cohn et al., 2000): The JACBART consists of 56 pictures of the seven universal emotions (anger, contempt, disgust, fear, happiness, sadness, surprise) presented for 1/5 of a second embedded within the same person's 1 s presentation of a neutral expression. Previous studies using JACBART have shown it to have generally high internal and temporal reliability and concurrent and convergent validity (Matsumoto et al., 2000). Expressions were presented randomly with a 3 s interstimulus interval. Participants judged the target emotion expression using a fixed choice response format; the alternatives were 'Anger', 'Contempt', 'Disgust', 'Fear', 'Happy', 'Sad', and 'Surprise'. The data were recoded into hit/miss accuracy scores, with hits recoded into '1' and misses into '0'. Emotion recognition scores were computed by summing the number of correct responses for each of the seven emotions and across all emotions (α = .83 for the total score). We used JACBART to measure emotion recognition in others' faces as a proxy of emotion recognition in general because there were no reliable methods in which to measure emotion recognition in self.

Emotion regulation: The ICAPS (Matsumoto, LeRoux, Ratzlaff et al., 2001): The 55-item ICAPS measures four constructs related to intercultural adjustment: Emotion Regulation, Openness, Flexibility and Critical Thinking (e.g. "I do not worry very much"). The ICAPS has good psychometric properties such as high internal, temporal, and parallel forms of reliability and predictive, convergent, construct, and external validity in predicting intercultural adjustment success (Matsumoto et al., 2001). The participants rated the items using a seven-point scale, 1 (*strongly disagree*) and 7 (*strongly agree*). A total score and factor scores for the four constructs were computed based on a pancultural factor analyses (Leung & Bond, 1989) involving over 2000 individuals' data (Matsumoto et al., 2001). Based on the norm, data all five ICAPS scores were then transformed to a mean of 50 and SD of 10. In this study, only the Emotion Regulation score (ICAPS ER) was used (α = .75).

Beck Anxiety Inventory (BAI; Beck & Steer, 1988): The 21-item BAI measures the frequency of physical and cognitive symptoms associated with anxiety (e.g. "nervousness",

"difficulty breathing"). It has high internal consistency and convergent and discriminant validity and temporal reliability in both clinical and non-clinical populations (Beck, Epstein, Brown, & Steer, 1988; Creamer, Foran, & Bell, 1995). The four answer choices range from *not at all* (0 points) to *severely* (3 points). A total score is calculated by summing all the items; scores ranging 0–7 indicate *minimal anxiety*, 8–15 *mild anxiety*, 16–25 *moderate anxiety* and 26–63 *severe* (Beck & Steer, 1993). The α for this sample was .93.

Beck Depression Inventory II (*BDI-II*; Beck, Steer, & Brown, 1996): The 21-item BDI-II measures the frequency of cognitive, somatic, and behavioral symptoms of depression in the last two weeks (e.g. "sadness", "loss of interest"). It has high internal reliability in both clinical and non-clinical populations as well as concurrent, convergent and discriminant validity (Beck, Steer, & Brown, 1996; Steer, Kumar, Ranieri, & Beck, 1998). Participants rated the items on a scale ranging from 0 to 3. To calculate the total score, the items are summed. The general guideline for interpreting scores is 0–9 *no depression*, 10–18 *mild-moderate depression*, 19–29 *moderate-severe depression* and 30–63 *extremely severe depression* (Beck et al., 1996). The α for this study was .86.

Beck Hopelessness Scale (*BHS*; Beck, Weissman, Lester, & Trexler, 1974): The 20-item BHS measures negative expectations and pessimism in clinical and non-clinical populations (Beck & Steer, 1988; e.g. "The future seems vague and uncertain to me"). Participants indicated *true* or *false* on whether the items matched their attitude the past week. Responses corresponding to hopelessness are recoded into '1' and those corresponding to non-hopelessness are recoded into '0'. Summing these scores yields the total score, which are interpreted as follows: 0–3 as *minimal*, 4–8 as *mild*, 9–14 as *moderate* and 14 and greater as *severe* (Beck & Steer, 1988). The α for this study was .77.

Culture Shock Questionnaire (*CSQ*; Mumford, 1998): The 12-item CSQ measures culture shock (e.g. "Do you feel strain from the effort to adapt to a new culture?") Participants rated the items on three levels (which are converted from 0 to 2 based on the severity of the answer). A total score was calculated by summing the converted numbers with higher scores indicating higher levels of culture shock. The α for this study was .76.

Homesickness and Contentment Scale (*HC*; Shin & Abell, 1999): The 20-item HC is a measure of emotional and psychological adjustment to a new culture and is divided into two subscales: homesickness and contentment (e.g. "I want to go back to my home country", "I am unhappy with myself"). Participants used a 5-point scale, 1 (*very often*), and 5 (*never*) and items were summed to calculate scores for the two subscales. The α for the homesickness subscale was .75; higher scores indicate lower levels of homesickness. The α for the contentment subscale was .89; higher scores indicate higher contentment.

Satisfaction with Life (*SWLS*; Diener, Emmons, Larsen, & Griffin, 1985): The 5-item SWLS measures general life satisfaction (e.g. "In most ways my life is close to my ideal"). Participants rated the items on a 7-point scale, 1 (*strongly disagree*) and 7 (*strongly agree*). The total score was calculated by summing the five items; higher scores indicate higher satisfaction with life. For this study, α = .77.

Demographics: Participants were asked standard demographic questions such as age, ethnicity, place primarily raised, fluent languages, most recent TOEFL score, self-report of fluency in English and length of stay in the US

Procedures: Due to concerns that it might be difficult for international students to complete all of the questionnaires in one session, the questionnaires were divided into two packets and one was given to students to complete before the experiment; one packet

contained the ICAPS, BHS, CSQ, and SWLS and the other contained the HC, BDI, BAI with all of the questionnaires counterbalanced. The second packet was completed during the experiment, either before or after viewing the JACBART. The experiment consisted of the administration of the JACBART and the remaining measures, either in individual or group sessions. Before viewing the JACBART on a large screen, participants were given both written and verbal instructions for it. They were also provided with definitions of the seven universal emotions. There were no problems during the experiment. At the end of the experiment, they completed a raffle ticket and given snacks to take home.

2.2. Time 2

Participants and procedures: Approximately 2 months after Time 1, the same participants were recruited to participate in Time 2; 50 did so (28% males and 72% females; mean age = 25.42, SD = 4.97) with several others expressing interest in participating but were not able to due to scheduling conflicts. From this and the fact that the ratio of males and females and the age of the participants who came at Time 2 were similar from Time 1, we concluded that there was no selective loss of participants. They participated in a discussion in same-sex groups of 3–7 people. The groups were a mixture of high and low JACBART scorers from Time 1 and when possible, of Asian and non-Asian students. The students first were given 5 minutes to get to know each other while the experimenter left the room. Afterwards, they were given 15 minutes to discuss and generate the "top five adjustment issues international students face when coming to the US" while the experimenter once again left the room. After the discussion, the participants rated themselves and then each other on a 27-item questionnaire (described below). Throughout the study, the participants were videotaped with their consent. They were provided snacks during the experiment and at the end again completed a raffle ticket. For this study, only the questionnaire data were analyzed.

Instruments. Questionnaire: The 27-item questionnaire was divided into two parts, the group participation section assessing methods of interaction in a group setting, and the intercultural adjustment section assessing problems students face when adapting to the US. The items in the latter section were derived from a previous focus group of international students conducted during the development stages of ICAPS (Matsumoto et al., 2001). Participants first rated how much each characteristic described themselves on a 1–5 scale, 1 (*not characteristic at all*) and 5 (*very characteristic*). They then rated each of the group members using the same scales with the condition that they give one member the highest rating on each characteristic and one the lowest, with the rest of the group members being compared with these two people.

To determine the scoring procedure for this instrument, a principal components factor analysis with varimax rotation was performed separately for the two parts of the questionnaire using data collected from a separate sample of 250 university students. For Part 1, the four factors that had an eigenvalue of one or higher were rotated and items with a factor loading of |.3| or higher on only one factor were interpreted, resulting in an interpretation of the first two factors. The first factor accounted for 29.18% of the total variance. Items loading on it were "Tell others when they do something good" and "Am considerate of others." This factor was labeled *Consideration*. The second factor accounted for 11.94% of the total variance; items loading on it were "Talk a lot," "Start things going," and "Have lots of energy." This factor was labeled *Friendliness*.

The same analysis on Part 2 resulted in two factors. Factor 1 accounted for 40.50% of the total variance; sample items loading on this factor were "Worried about getting sick in another country," and "Worried about how hard it is to go places in another country." We labeled this factor *Anxiety*. Factor 2 accounted for 15.12% of the variance; sample items loading on it were "Believe the culture of your original country is better than most," and "Have bad feelings about different languages." This factor was labeled *Ethnocentrism*.

The self and peer-ratings of consideration, friendliness, anxiety and ethnocentrism were calculated by taking the mean of the items that loaded on each of these factors; higher scores indicated higher levels of these four factors. The peer-ratings were then averaged across the raters in the group for each participant. The αs for the self-rating of consideration, friendliness, anxiety and ethnocentrism were .67, .79, .86 and .57, respectively; the αs for peer-ratings were .46, .71, .45, and .15, respectively. Because of the low αs for three of the peer-ratings, only peer rating of friendliness along with the four self-ratings were used in the analyses. The self-ratings were used as subjective indices of adjustment for Time 2 because they were self-perceptions of social behaviors during an intercultural interaction. Even though most participants did not know each other until this session, we believe that their direct interaction with one another for 20 minutes was enough to form a good perception of that person's behavior during the interaction and therefore we used the peer-rating averaged across all raters as the objective index of adjustment.

2.3. Time 3

Procedure: At the end of the school year (approximately 9 months after initial data collection), the same participants were recruited to participate in Time 3. Thirty-one did so (22.58% male, 77.42% female, mean age = 26.81, SD = 4.69). The ratio of males and females and the age of the participants as well as the adjustment levels of the participants were similar to those in Time 1. We thus concluded that there was no selective loss of participants. Like Time 1, the participants completed the BAI, BDI, BHS, CSQ, HC, and the SWLS. The αs for these scales for Time 3 were .95, .92, .68, .74, .83 (homesickness subscale), .94 (contentment subscale), and .82, respectively. They also completed the ICAPS and the JACBART. The procedure for JACBART was the same as Time 1 with the exception that the options of 'no emotion' and 'other' were given as response alternatives. The procedures for all other measures listed above were exactly the same as those in Time 1. The ICAPS and JACBART scores in Time 3 were not used in this study.

In addition, participants completed two additional measures new to Time 3; the subjective adjustment scale and questions about their Fall and Spring GPA. The self-rating of the subjective adjustment scale was used as a subjective index of adjustment while friends-ratings and GPAs were used as objective indices of adjustment.

Subjective Adjustment Scale (SAS): Each participant and two of their friends completed this 10-item SAS, which consisted of items describing various issues an individual faces when living in the US (e.g. "It has been hard to get used to living in the US"). Participants rated the items on a 1–7 scale, 1 (*strong disagree*) and 7 (*strongly agree*). After reverse coding the negatively worded items, a mean score was computed; higher scores indicated higher subjective adjustment. The friends were asked to make the ratings about the participant and indicate how long they have known the participant; αs for self and friends ratings were both .79.

Fall and Spring GPA: Participants were asked to list the courses taken and grades received during fall semester and provide their overall Fall GPA. They were also asked to provide the same information regarding their Spring GPA by email.

3. Results

3.1. Preliminary analyses

The rate of correct answers for Time 1 JACBART was 59%, which is about the norm. The overall mean ICAPS ER score was 45.74 (SD = 9.55). The mean of Time 1 contentment, culture shock, homesickness and satisfaction indicated that the participants in this study had relatively high levels of contentment, fairly low levels of culture shock, moderate levels of homesickness and moderate levels of satisfaction with life. Based on these tests' manuals, the participants had mild to moderate depression, a moderate level of anxiety and mild hopelessness at Time 1, suggesting low to moderate adjustment problems. The adjustment levels at Time 3 were similar to and not significantly different from those at Time 1 (Table 1).

Hypothesis 1. Are emotion regulation and emotion recognition ability correlated?

Correlations were computed between ICAPS ER and the seven emotion and total recognition scores from Time 1. ICAPS ER was correlated with emotion recognition of disgust, happiness and total score ($r = .315$, $p < .01$; $r = .221$, $p < .05$; $r = .221$, $p < .05$, respectively). Higher recognition of disgust, happiness and all emotions combined were associated with higher emotion regulation. These findings provide partial support for Hypothesis 1.

Hypothesis 2. Does emotion regulation predict intercultural adjustment concurrently and in the future?

Time 1: ICAPS ER from Time 1 was separately regressed on all Time 1 adjustment variables in the second step of a hierarchical regression, after controlling for demographic variables that were significantly correlated with the same adjustment variable on the first step. ICAPS ER predicted anxiety, contentment, culture shock, depression, hopelessness,

Table 1
Mean and standard deviation for emotion recognition, emotion regulation and adjustment

	Time 1		Time 3	
	Mean	Standard deviation	Mean	Standard deviation
JACBART total	33.02	7.91	36.39	8.48
ICAPS ER	45.74	9.55	45.97	10.23
Anxiety	19.60	12.77	20.48	13.87
Contentment	36.43	7.23	36.33	8.88
Culture shock	8.89	3.87	8.41	3.57
Depression	11.52	7.63	11.63	9.49
Homesickness	27.40	6.25	26.38	7.09
Hopelessness	4.35	3.34	4.13	3.64
Satisfaction with life	22.16	5.83	21.97	6.03

and satisfaction with life; it also marginally predicted homesickness. In all cases higher emotion regulation was associated with better adjustment.

Time 2: The same analyses were computed on the data from the group laboratory task. ICAPS ER predicted self-rating of anxiety and peer rating of friendliness. Individuals with higher emotion regulation scores reported less anxiety and were rated by others as more friendly.

Time 3: The same analyses were computed on all Time 3 adjustment variables. ICAPS ER predicted contentment, culture shock, homesickness, hopelessness, and satisfaction with life, and marginally predicted anxiety, and depression. ICAPS ER also predicted self-rating of subjective adjustment. These analyses indicated that emotion regulation measured at Time 1 could predict adjustment in the international students nine months later at Time 3; in all of these analyses, higher emotion regulation was associated with better adjustment (see Table 2 for R^2 change and standardized beta coefficients for all regressions reported in this section).

Thus emotion regulation predicted adjustment not only concurrently (Time 1) but also in the future (Times 2 and 3). These findings are notable because the adjustment variables

Table 2
Summary of hierarchical regression analysis for emotion regulation and adjustment

Adjustment	ΔR^2	β
Time 1		
Anxiety	.12**	−.35**
Contentment	.11**	.33**
Culture shock	.29***	−.59***
Depression	.13**	−.40**
Homesickness	.04 +	.19[+]
Hopelessness	.12**	−.35**
Satisfaction with life	.15**	.39**
Time 2		
Self-rating of consideration		.03
Self-rating of friendliness		.17
Self-rating of anxiety	.16**	−.40**
Self-rating of ethnocentrism		−.05
Peer-rating of friendliness	.09*	.31*
Time 3		
Anxiety	.08 +	−.27[+]
Contentment	.11*	.34*
Culture Shock	.38***	−.62***
Depression	.08[+]	−.28[+]
Homesickness	.18**	.43**
Hopelessness	.19**	−.44**
Satisfaction with life	.10*	.31*
Fall GPA		−.14
Spring GPA		.08
Subjective adjustment rated by self	.20**	.45**
Subjective adjustment rated by friends		−.003

Note. Betas for demographic variables available from first author.
$^{+}p < .10$, $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$.

in Time 2 were derived from a laboratory exercise, and involved ratings made by others. The findings for Time 3 are also notable because they occurred 9 months after Time 1.

Hypothesis 3. Does emotion recognition predict intercultural adjustment concurrently and in the future?

Time 1: Recognition scores for the seven emotions from Time 1 were regressed on Time 1 adjustment variables using a hierarchical regression with forward method of entry after controlling for the significant demographic variables in the first step. Recognition of anger and contempt predicted anxiety; the final R was .425, $p < .05$. Students who were better at recognizing anger had less anxiety, while those who were better at recognizing contempt had more. Recognition of contempt also predicted homesickness, with higher contempt scores associated with more homesickness. Recognition of sadness predicted contentment; students with higher recognition of sadness were less content. Recognition of sadness also predicted culture shock along with recognition of disgust; the final R was .578, $p < .05$. Those with higher recognition scores of sadness felt more culture shock while those with higher recognition scores of disgust felt less culture shock. These findings indicated that recognition of anger and disgust was associated with better adjustment while recognition of contempt and sadness was associated with worse adjustment at Time 1.

Time 2: The same analyses were conducted on Time 2 adjustment variables. Recognition of sadness predicted self-rating of consideration; students who were better at recognizing sadness rated themselves as less considerate. Recognition of surprise predicted self-rating of anxiety; students better at recognizing surprise rated themselves as less anxious. Like Time 1, recognition of sadness was associated with worse adjustment at Time 2, while recognition of surprise was associated with better adjustment.

Time 3: The same analyses were computed on Time 3 adjustment variables. Recognition of anger, sadness and fear predicted anxiety; the final R was .624, $p < .05$. Those with higher recognition scores of anger were less anxious while those with higher scores of sadness and fear were more anxious. Recognition of surprise and anger predicted contentment; the final R was .636, $p < .05$, with better recognition of surprise corresponding to less contentment and better recognition of anger corresponding to more contentment. Recognition of fear predicted Fall GPA, with higher recognition score associated with lower Fall GPA. In Time 3, recognition of anger was associated with better adjustment and recognition of sadness, fear, surprise was associated with worse adjustment.

These findings showed that emotion recognition ability is also a good predictor of concurrent and future intercultural adjustment. Across all three times, recognition of anger was associated with better intercultural adjustment whereas recognition of contempt and sadness was associated with worse adjustment. Recognition of surprise was associated with both positive and negative adjustment. Recognition of fear was associated with worse adjustment (for R^2 change and β for each variable see Table 3).

Hypothesis 4. Does emotion regulation mediate the relationship between emotion recognition and intercultural adjustment?

We selected emotion recognition scores that were correlated with emotion regulation and predicted adjustment, which is a necessary condition to conduct the Sobel test for mediation (1982, 1986). Out of 14 findings where emotion recognition predicted adjustment, only one met the criterion of the predictor (emotion recognition) correlating with the mediator (emotion regulation): the relationship between recognition of disgust

Table 3
Summary of hierarchical regression analysis for emotion recognition and adjustment

Emotion recognition	Adjustment	ΔR^2	β
Time 1			
Anger	Anxiety	.04*	−.21*
Contempt	Anxiety	.05*	.25*
	Homesickness	.09*	−.30*
Disgust	Culture shock	.05*	−.26*
Sadness	Contentment	.05*	−.23*
	Culture shock	.04*	.25*
Time 2			
Sadness	Consideration	.13**	−.39**
Surprise	Anxiety	.06*	−.25*
Time 3			
Anger	Anxiety	.18**	−.60***
	Contentment	.12*	.38*
Fear	Anxiety	.08*	.30*
	GPA	.08*	−.29*
Sadness	Anxiety	.14*	.31*
Surprise	Contentment	.11*	−.48**

Note. Betas for demographic variables available from first author.
$^+p<.10$, $^*p<.05$, $^{**}p<.01$, $^{***}p<.001$ (one tailed).

and culture shock at Time 1. We tested whether emotion regulation mediated this relationship. Although the Sobel test was significant, $z = -2.36$, $p < .01$, the recognition of disgust still predicted culture shock when controlling for emotion regulation, $\beta = .173$, $p < .05$. Thus emotion regulation only partially mediated this relationship. Given the partial mediation effects here, and the fact that emotion regulation did not mediate 13 other effects between emotion recognition and adjustment, we conclude that regulation did not mediate the relationship between recognition and adjustment.

3.2. What is the joint effect of emotion regulation and emotion recognition ability to predict intercultural adjustment?

Time 1: Because emotion regulation did not mediate the relationship between emotion recognition and adjustment, we examined their joint effect in predicting adjustment, by computing a series of regressions in which we entered demographic variables on the first step, and then ICAPS ER and emotion recognition scores from Time 1 together in the second step using forward entry criteria. ICAPS ER still positively predicted all of the seven adjustment variables. In addition, recognition of disgust was associated with anxiety ($\beta = .37$), recognition of sadness with contentment, ($\beta = -.23$), and recognition contempt homesickness ($\beta = -.34$).

Time 2: We computed the same analyses on the Time 2 adjustment variables. ICAPS ER positively predicted self-rating of anxiety and ($\beta = -.40$) and peer-rating friendliness ($\beta = .31$). Higher recognition of sadness was associated with lower rating of self-rating of consideration ($\beta = -.41$).

Time 3: We conducted the same analyses on Time 3 adjustment variables. ICAPS ER positively predicted adjustment, more contentment and satisfaction with life and less culture shock, homesickness, hopelessness (β = .30, .31, −.62, .43, −.44, respectively). It also positively predicted self-rating of subjective adjustment (β = .52). Higher recognition of anger predicted less anxiety and more contentment (β = −.53, .37, respectively). In contrast, higher recognition of fear predicted more anxiety and higher recognition of surprise predicted less contentment (β = .41, −.52). Higher recognition of fear also negatively predicted Fall GPA (β = −.31). Lastly, recognition of contempt was also associated with worse adjustment, negatively predicting self-rating of subjective adjustment (β = −.34).[1]

Thus when we examined the joint effects of emotion recognition and regulation on adjustment, we found that they both strongly predicted different types of adjustment concurrently and in the future. Emotion regulation predicted better adjustment across the three times. Emotion recognition of anger, contempt, disgust, fear, sadness, and surprise predicted several adjustments across the three times. Better recognition of anger was associated with less anxiety and more contentment at Time 3. Better recognition of contempt was associated with more homesickness at Time 1 and lower subjective self-rating of adjustment at Time 3. Better recognition of disgust was associated with higher anxiety at Time 1. Better recognition of fear was associated with higher Time 3 anxiety and lower Fall GPA. Better recognition of sadness was associated with lower contentment at Time 1 and lower self-rating of consideration at Time 2. Better recognition of surprise was associated with lower contentment at Time 3.

4. Discussion

The first hypothesis was partially supported; emotion regulation was positively correlated with recognition of disgust, happiness and total recognition score. The second hypothesis was supported; high emotion regulation at Time 1 was associated with better adjustment across all three times. The third hypothesis was partially supported; better recognition of anger and disgust at Time 1 was associated with better adjustment at Times 1 and 3 whereas better recognition of contempt, fear and sadness was associated with worse adjustment across all three times. Also better recognition of surprise was associated with both positive and negative adjustment in Times 2 and 3. Finally, the fourth hypothesis was not supported; emotion regulation did not mediate the relationship between emotion recognition and intercultural adjustment; post hoc tests indicated that recognition and regulation both independently predicted adjustment.

This study was not conducted without limitations. First, the sample size was small, which affects the generalizability of the results. Second, despite great efforts to only recruit new international students that were both new to the school and the US, many were in fact not new to the US, either because they had transferred from another US school or they had studied in the US before. This suggests a possibility of a self-selection of participants who had prior experience of adjusting fairly well to the US and thus came back. Third, we measured recognition of emotions in others rather than in one self. This limitation will be addressed more in detail when discussing the results.

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[1]A detailed table of results available upon request to first author.

The findings on emotion regulation and adjustment provide further support for the importance of emotion regulation in positive intercultural adjustment. These findings extend those of previous studies (Matsumoto et al., 2001, 2003) because this study examined adjustment nine months after the initial assessment of emotion regulation. This study also used different methods of assessing adjustment by incorporating both paper and pencil and behavioral measures, and ratings by self and peers.

Emotion regulation was correlated with only some of the emotion recognition scores. A possible explanation of the relatively weak relationship between emotion recognition and regulation may be our measurement of these two constructs. As previously mentioned, we measured recognition of emotion in others' faces as a proxy of emotion recognition in general, and measured regulation of one's own emotion and the experience that follows these emotions. However, emotion recognition of others may not be as relevant to emotion regulation of one's own emotion as recognizing emotion in self may be. Or perhaps regulation of the experiential aspect of emotion may not be very relevant to emotion recognition. When an emotion is aroused, it triggers cognitions, experience, expression and physiology; emotion regulation, therefore, may involve the regulation of these various components of emotion (Matsumoto, Yoo, Hirayama, & Petrova, 2005). By using ICAPS, we measured the experiential component of emotion regulation and not the expressive component. However, because emotion recognition involves the task of recognizing emotional expressions, it may be more strongly related to regulations of expressions. Another possibility is that regulation of specific emotions, rather than regulation of generally negatively arousing emotions, may be more strongly related with recognition of specific emotions.

Another unexpected finding was that higher emotion recognition was not always associated with better adjustment. Again, this may have to do with our measurement of emotion recognition. Because high regulation of one's own emotion is associated with positive intercultural adjustment, it is possible that recognition of one's own emotion would also be associated with positive adjustment, whereas recognition of others' emotion is associated with both positive and negative adjustment as it did in this study. It is entirely possible that recognition of emotions in oneself has more dramatic consequences for adjustment or predicts different aspects of adjustment than recognition of emotion in others. The results may also be due to the adjustment variables we studied, which may have been more related to emotion regulation than they were to emotion recognition. Some other adjustment variables, such as quality of social integration with students from the host culture (Lewthwaite, 1996; Van Oudenhoven & Van der Zee, 2002), may be better predicted by emotion recognition.

Regardless, the results suggest the special role recognition of emotion in others plays in intercultural adjustment that is independent with the effect of emotion regulation. Moreover, these findings suggest that the relationship between emotion recognition and intercultural adjustment is complex, with emotion recognition for some emotions associated with positive intercultural adjustment. Such emotion-specific results suggest that recognition of different emotions may each have special functions in adjustment.

Recognition of anger was consistently associated with better adjustment. This finding may be due to the role recognition of anger plays in interpersonal communication and relationships. Correct recognition of emotion may provide the perceiver guidelines for good social communication and interpersonal relationships and acceptable social behavior (Izard et al., 2001; Lazarus, 1991). This is supported by many studies that have found high

emotion recognition to be associated with higher social competence, higher social adjustment, more positive social behavior, higher functioning in social settings, higher ratings of popularity by fellow students, higher ratings of social behavior by teachers and lower social anxiety (Engelberg & Sjoberg, 2004; Izard, 2001; McClure & Nowicki, 2001; McKenzie et al., 2000; Monfries & Kafer, 1987; Nowicki & Carton, 1997; Nowicki & Duke, 1994). Similarly, anger is often thought to have important social communication functions. Anger is aroused in situations when one is insulted, treated unfairly, frustrated, goal obstructed or when the object of anger is considered offensive and blameworthy (Berkowitz, 1999; Haidt, 2003). Expression of anger therefore may be an indicator of a negative person–environment relationship that is a threat to social interactions or relationships (Burrowes & Halberstadt, 1987; Lazarus, 1991; Sternglanz and DePaulo, 2004).

Thus recognizing anger in others may play a role in social interaction. International students (or anyone new to a culture) may face interpersonal situations that lead to uncertainty, misunderstanding and conflict because of cultural differences in communication, values, and norms (Matsumoto & Takeuchi, 1998; Wiseman, Hammer, & Nishida, 1989). This may result in angering the other person. If the international student correctly recognizes such anger in the other person, one may respond to it by figuring out what one did wrong to cause it and consequently modify one's behavior so that the other person's anger is lessened. This process may result in a better intercultural communication outcome and subsequently a better relationship with others. Therefore by correctly recognizing anger in others, international students may learn the effective ways to communicate and deal with people in the new culture, affecting the quality of their social relationships and thus leading to better adjustment.

Another explanation of why recognition of anger was associated with better adjustment may be related to studies on the family socialization model (Burrowes & Halberstadt, 1987; Halberstadt, 1983, 1986). Studies show that individuals raised in more emotionally expressive families were worse at perceiving emotions than those raised in less expressive families because they were not required to be very sensitive to emotional expressions in order to understand their family's emotions compared to those raised in less expressive families (Halberstadt, 1983, 1986). It has also been shown that individuals raised in families that were more expressive of their negative emotions reported more intense and longer lasting anger causing incidents than those raised in less negative expressive families (Burrowes & Halberstadt, 1987). These results taken together implies that students in this study who were good at recognizing anger may have been raised in families that were not very expressive of their anger, which resulted in them generally experiencing less anger incidents, which may have affected how they are emotionally adjusting in a new country.

Conversely, better recognition of contempt, fear and sadness were consistently associated with worse adjustment. These results are consistent with previous studies that found individuals who were good in objective recognition of emotion were more affected by stress (Ciarrochi, Deane, & Anderson, 2002; Simpson, Ickes, & Blackstone, 1995). Ciarrochi et al. (2002) proposed that individuals who are good at emotion perception may not be able to ignore the stress in their lives whereas those who are less good may either repress or ignore it, or just not realize the impact of it altogether. Therefore, in this study, those who were good at recognizing contempt, fear and sadness may have been more susceptible to the effects of stress of being an international student in a new country. Given that these emotions are harder to recognize than anger and happiness, it is possible that

those who were good at recognizing these harder-to-recognize emotions were very perceptive to emotional signals and thus more affected by stress.

It may be that those who are sensitive to these emotion in faces of others may be negatively biased in their outlook in life in general, thus leading them to rate everything more negatively. Or the inverse may be true because emotional disorders like depression and anxiety are associated with cognitive bias toward the negative (Power, 1999). Finally, characteristics and interpersonal consequences of contempt could have implications for its recognition and its effect on intercultural adjustment. Contempt has serious implications for interpersonal functioning, as it involves evaluating the other person and feeling morally superior over another (Matsumoto & Ekman, 2004). It has been associated with bad outcomes of marriage, which is similar to intercultural adjustment (Gottman & Levenson, 2000, 2002). Therefore, recognizing contempt in others may lead one to have a negative self-evaluation, which may in turn affect one's adjustment.

Emotion regulation did not mediate the relationship between emotion recognition and intercultural adjustment, and both contributed independently to the prediction of adjustment. These findings bolster our earlier suggestion that emotion recognition and regulation may affect intercultural adjustment independently of each other. It then is possible that both emotion recognition ability *and* emotion regulation may be important predictors of intercultural adjustment, and both may be associated with different aspects of adjustment. For example, higher emotion recognition and regulation were both associated with less culture shock. Perhaps the interpersonal aspect of culture shock is associated with emotion recognition while the new environment aspect of culture shock is associated with emotion regulation. So although they both positively influence culture shock, emotion recognition and regulation may influence different aspects of culture shock.

There may have been a stronger mediating relationship between emotion recognition and regulation had we measured the regulation of specific emotions. Given our findings on the importance of recognizing anger on intercultural adjustment, it may be possible that emotion regulation of anger mediated the relationship between recognition of anger and adjustment. Similar emotion-specific processes may be at work for other emotions as well. Therefore future studies should examine regulation of specific emotions and its relationship with both emotion recognition and adjustment.

The results of this study have valuable implications for improving intercultural adjustment, especially because of the possibility that both emotion regulation and recognition can be learned. For example, McKenzie et al. (2000) showed that individuals with learning disabilities, who went through a 10 week training process on how to identify specific facial features corresponding to specific emotions and use that skill to identify pictures and videotapes of expressions, significantly improved their skill in identifying emotion expression in others. This implies that if international students are trained in identifying emotions, particularly anger, in others they could become better adjusted in the new environment.

Acknowledgments

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