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Emotion expression and intergroup bias reduction between Muslims and Christians: Long-term Internet contact

Fiona A. White [a,*], Hisham M. Abu-Rayya [b,c], Ana-Maria Bliuc [d], Nicholas Faulkner [d]

[a] School of Psychology, The University of Sydney, Australia
[b] Faculty of Social Welfare and Health Sciences, University of Haifa, Israel
[c] School of Psychological Science, La Trobe University, Australia
[d] School of Social Sciences, Monash University, Australia

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ABSTRACT

The Internet can play a critical role in improving intergroup relations. The current field experiment investigated how emotions expressed by participants in intergroup contact sessions—in the form of a synchronous online chat program—predicted a reduction in intergroup bias. Here 102 Muslim and 103 Christian high-school students spent eight Internet sessions in either a Dual Identity Electronic(E)-Contact (DIEC) program integrating interfaith information and intergroup contact, or a Control program involving within-faith information and ingroup contact. Participants also completed pre- and post-program measures of intergroup bias. Using Linguistic Inquiry and Word Count (LIWC), a computerised text analysis program, we objectively analysed data from across the eight Internet sessions, and found that groups in the two conditions expressed emotions differently. That is, the DIEC chat groups used more affect and positive emotion words, and less anger and sadness words than the Control chat groups. Mediation analyses showed that anger and sadness mediated the intervention effect on T2, T3 and T4 intergroup bias. In other words, DIEC chat groups' reduced expressions of anger and sadness were related to reduced short- and long-term intergroup bias. These findings highlight the significant role that structured Internet interactions can play in creating positive and long-lasting intergroup relations.

1. Introduction

Prejudice reduction research, with an emphasis on cooperative intergroup contact (Allport, 1954) and the development of intergroup friendship (Pettigrew, 1998), has a long and rich history. To date, however, the majority of prejudice reduction research has relied on participant self-reports of cooperation and friendship, rather than on objective validation of their actual experience in contact interventions. In addition, previous prejudice reduction research has mainly tested short-term contact interventions (i.e., one or a few sessions, see Cameron, Rutland, & Brown, 2007; Cameron, Rutland, Hossain, & Petley, 2011; Houlette et al., 2004). These short programs may not provide sufficient time for the conditions of cooperation and friendship to develop, and for effective intergroup contact to take place (Pettigrew, 1998; Pettigrew, 2008). Thus, there is a need for researchers to investigate the dynamic processes that mediate the success of the contact situation on reducing intergroup bias in the short- and long-term (Dovidio, Gaertner, & Saguy, 2009).

The Internet provides researchers with a valuable opportunity to directly examine these intergroup processes objectively—especially in instances where there are growing tensions between physically segregated groups. One such example is the current global disharmony between Muslims and non-Muslim groups. Nowadays, graphic and sustained media coverage of global events such as the terrorist attacks of September 11 (2001), the Bali bombings (2002), the Sydney Siege (2014), and the Paris terrorist attacks (2015) saturate people's living rooms and consciousness, aggravating pre-existing biases and anxiety towards religious outgroups. This growing international animosity towards Muslims prevails even in multicultural societies that see themselves as open and welcoming to culturally diverse groups. For example, in Australia, there is a perception that Islam is a threat to the Australian way of life, and as a consequence, prejudice towards Muslims is deep-rooted (Abu-Rayya & White, 2010; Pedersen, Aly, Hartley, & McGarty, 2009). Australian Muslims are perceived as culturally inferior, devalued or the 'dangerous other', and incompatible with or radically different from the non-Muslim

* Corresponding author at: School of Psychology (A18), The University of Sydney, New South Wales 2006, Australia.
E-mail address: fiona.white@sydney.edu.au (F.A. White).

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Australian culture (Dunn, Klocker, & Salabay, 2007), with over 50% of non-Muslim Australians reporting never having contact with Muslims (Ryan & McKinney, 2007). Thus, effective intergroup bias reduction strategies need to be developed to promote cooperative intergroup contact as a first step to resolving these tensions, particularly in the form of early interventions within school settings to teach children communication strategies needed to be cooperative adults.

Importantly, new technological developments in virtual communication provide researchers with the opportunity to develop contact strategies that 'bridge the gap' of physical segregation (Alvídrez, Piñeiro-Naval, Marcos-Ramos, & Rojas-Solís, 2014). Carefully designed and theory-driven Internet contact strategies are one way to promote intergroup harmony for younger populations such as within classroom settings. In addition to their role in promoting healthy intergroup relations, Internet contact strategies can also be used as a valuable source of data for research. For example, the language exchanged in Internet chat discussions between ingroup and outgroup members can provide researchers with rich data about how individuals feel towards one another in an intergroup contact situation. Analysis of the emotions reflected in the language exchange may teach us about the underlying mechanisms of how an intergroup contact strategy aiming at bias reduction works.

Taking this into account, the aim of the current study is to investigate the extent to which the type of emotion, as expressed in online text-language between Muslim and Christian high-school students, is associated with reductions in intergroup bias in the short- and long-terms. Specifically, the valence and the extent of Muslim and Christian participants' emotion disclosure across an 8-week prejudice-reduction program—the Dual Identity E-Contact (DIEC) program, developed and validated by White and Abu-Rayya (2012)—will be examined. In doing so, this will be the first experiment to: (i) examine the types of emotion expressed across a long-term (8-week) internet contact intervention aimed at fostering cooperation and friendliness, and reducing intergroup bias, and (ii) identify the extent to which positive and negative emotions mediate the effect of the Internet contact intervention on intergroup bias reduction in the short- and long-terms.

1.1. Computer-mediated communication (CMC) and intergroup bias reduction

With the expansion of the Internet and computer mediated communication (CMC), especially amongst young populations of 'digital natives', research is needed to fully understand how CMC can be integrated into interventions to maximally improve the quality of social interactions and reduce intergroup bias (for a critical review, see White, Harvey, & Abu-Rayya, 2015). In fact, there is a growing number of research studies testing Allport's (1954) contact hypothesis via online communication to reduce outgroup prejudice since one of the initial proposals by Amichai-Hamburger and McKenna (2006). For example, Mollov and Schwartz (2010) reported a preliminary case study during which Israeli and Palestinian University students participated in a number of email exchanges together over a 2-month period. They implemented Allport's (1954) contact conditions into their program which required students to discuss and educate the outgroup member in regards to their religious practices. Mollov and Schwartz noted that most of the exchanges were friendly, with both groups collaborating in a cooperative way to learn and teach the other about their respective religious holidays.

Likewise, an analysis of the Soliva Connect program, one of the longest lasting online videoconferencing education programs, revealed that quantitative and qualitative feedback from participating students and teachers was generally positive. The program, first established in 2003, today globally connects students from over 100 universities and 27 countries to a "....community of peers who engage in facilitated, sustained and substantive dialogue, and build respectful relationships across national, cultural, religious and ideological boundaries" (Soliya Connect Program, 2013). In a similar vein, Walther, Hoter, Ganayem, and Shonfeld (2014) tested a sample of college students who identified as either religious Jews, secular Jews or Arab Muslims, who worked together in a mixed religious group of six on an online collaborative project for one year. The course design integrated three out of four of Allport's contact conditions: equal status, support from an institutional authority and cooperative pedagogies. The findings revealed that both Arab Muslims and Jews disliked each other less after the online contact program compared to pre-contact. Also, virtual groups who identified as religious were less prejudiced towards outgroups than were control participants.

Importantly, Walther et al. (2014), argue that more research is needed to discern the communication mechanism or mediator by which intergroup contact operates to reduce prejudice, suggesting a greater focus on the messages used within CMC. Emotion expression in the messages communicated online potentially holds the key.

1.2. Emotion, cooperation and improved intergroup relations

Researchers still know relatively little about what happens during the actual intergroup contact experience to explain the subsequent reduction in prejudice. It is possible that emotions, or emotions disclosure, more specifically, play a key role. Research on emotion disclosure shows that sharing positive emotions increases the quality of social interactions (Augustine, Mehl, & Larsen, 2011), and that of interpersonal relationships (Gable, Reis, Impett, & Asher, 2004). Sharing negative emotions was found to also have positive effects such as decreasing stress produced by suppressing negative feelings and allowing a reappraisal of negative experiences (Pennebaker, 1997).

In the context of intergroup contact research, Miller, Smith, and Mackie (2004) found that self-reported negative and positive emotions experienced during intergroup contact mediated the association between contact and prejudice (however, this study did not directly manipulate contact, but instead relied on participants' memories of how they felt during past contact situations). Also, research by Esses and Dovidio (2002) showed that positive emotions towards an outgroup predicted willingness to engage in intergroup contact with that group.

1.3. Long-term intergroup bias reduction involving Muslim and Christian students: the DIEC program

The theoretical framework underpinning the DIEC program involves an integration of Allport's (1954) and Pettigrew's (1998) contact conditions, and Dovidio et al.'s (2009) dual identity recategorization tenets. Here intergroup contact was implemented through a design using a new electronic contact (or E-contact) paradigm that operationalised all four of Allport's (1954) optimal conditions for successful contact—including equal numbers of Christian and Muslim students, a common goal, the opportunity for friendliness and familiarity between participants, and support for the program by the school authorities (White, Abu-Rayya, & Weitzal, 2014). During E-contact, ingroup and outgroup members never physically meet or see one another during the Internet sessions but interact via online text using a synchronous chat tool. The text-only and online (rather than face-to-face) nature of E-contact ensures that the intergroup contact remains indirect, yet the synchronous nature of the Internet chat maintains the spontaneity of 'live' interactions and creates the advantage of

actual engagement of self in the immediate contact situation (see also White & Abu-Rayya, 2012).

In addition to E-contact, the DIEC program provides information that encourages participants to adopt a *dual identity* recategorization (Dovidio, Gaertner, Pearson, & Riek, 2005). This involves the simultaneous activation of their original subgroup identity (in this case, either a Christian or Muslim religious identity) and a superordinate identity (in this case, a pro-environmental Australian identity). A plethora of research has shown the efficacy of dual identity recategorization in improving intergroup relations (Cameron et al., 2011; Dovidio, Gaertner, Niemann, & Snider, 2001; González & Brown, 2006; Guerra et al., 2010; Rebelo, Guerra, & Monteiro, 2005). A dual identity recategorization is effective because it reduces intergroup biases by extending the benefits of ingroup favouritism to former outgroup members who are now included members of the created common ingroup (White & Abu-Rayya, 2012). Together, dual identity recategorization and E-contact strategies *complement* and *enhance* one another to effectively improve intergroup relations (White & Abu-Rayya, 2012). Dual identity recategorization provides the cognitive mechanism within the contact situation that is needed to successfully achieve the common goal, which is the main driver behind prejudice reduction.

In addition to this integrated theoretical framework, the DIEC program has the added benefit of being long-term by involving eight structured Internet sessions of intergroup contact. The program is also interactive with its engagement of *both* Christian and Muslim students from religiously segregated schools working together in small online groups to achieve the common goal of developing ideas for a sustainable strategy for the Australian environment. During the eight Internet sessions of the DIEC program, two Muslim and two Christian students formed an online group and communicated with each other via a specially-designed internet chat room, discussing an energy-efficiency, water-saving or recycling strategy (the common goal) needed for sustainable Australian environment (the superordinate identity), whilst incorporating their respective religious beliefs and practices (subgroup identity) in working towards the common goal. In a recent review of the intergroup nature of prejudice, White, Harvey, and Verrelli (in press) have argued that in order for long-lasting prejudice reduction to occur and intergroup harmony promoted, two groups must *both* be engaged in a dialogue to develop an effective solution.

1.4. The current study

Previous research has shown that the eight Internet sessions of the DIEC program produced a significant reduction in intergroup bias and intergroup anxiety and an increase in outgroup knowledge at two weeks post-program compared to the Control program (White & Abu-Rayya, 2012), and intergroup bias reduction amongst the DIEC participants was maintained twelve months post-program (White et al., 2014).

The current study extends these findings by providing an in depth analysis of the quality and quantity of emotion expression that is captured by the online text exchanges between the Muslim and Christian students who took part in the DIEC program. In doing so, this is the first field experiment to evaluate the role of emotion expression as captured by the language used in determining the success of intergroup bias reduction programs. In advancing previous DIEC research that has shown intergroup anxiety and outgroup knowledge to mediate the contact-bias reduction relationship (White & Abu-Rayya, 2012; White et al., 2014), the current study focuses on understanding the role of language in intergroup interaction. The Internet text chat sessions between students in the DIEC program provided linguistic data that formed the basis of our analysis of the online communication between the groups.

To learn *how* contact reduces prejudice, researchers must continue to uncover the principal mediators of contact effects. As noted above, the current study examines the role of positive and negative emotions expressed by the participants in the DIEC Internet sessions. To objectively measure the quantity and quality of emotion expression during the text-chat of DIEC Internet sessions we used the Linguistic Inquiry and Word Count (LIWC) software developed by Pennebaker, Chung, Ireland, Gonzales, and Booth (2007). LIWC groups words or word-stems into over 70 different linguistic categories, including standard function words (e.g., personal pronouns, articles, verbs, conjunctions), emotion words (e.g., positive emotions, anger, sadness), and cognitive words (e.g., cause, know). LIWC categories have been validated (e.g., Pennebaker et al., 2007) and widely used in social and personality psychology research to measure a variety of constructs (Tausczik & Pennebaker, 2010). It is proposed here that the optimal conditions for successful contact created through the DIEC program should be conducive to positive emotion expression and restrictive of negative emotion expression, which in turn should mediate the intergroup contact effects (Pettigrew, 1998). Moreover, based on research on diverse teams from organisational psychology, ethnically heterogeneous groups are more likely to cooperate more (Cox, Lobel, & McLeod, 1991) and show increased satisfaction (Stahl, Maznevski, Voigt, & Jonsen, 2010) compared to ethnically homogenous groups. Therefore, we expect that participants in the intergroup E-contact condition will express higher levels of positive emotions and fewer negative emotions than participants in the control condition.

The DIEC and Control chat groups involved synchronous text-chat across eight Internet sessions, and thus provided a rich set of data capturing these emotion-based categories. High levels of positive emotions and low levels of negative emotions are an excellent foundation for cooperation and friendship to develop. In addition to creating optimal conditions for intergroup contact, the length of the DIEC program provides the necessary time needed for the realistic and effective development of positive emotion expression and a reduction in negative emotion expression required for cooperative contact (Allport, 1954; Pettigrew, 1998; Sherif, Harvey, White, Hood, & Sherif, 1961) and dual identity recategorization strategies (Brown, 2010; Dovidio et al., 2005), and sustained intergroup bias reduction. It is hypothesised that:

H1. *The DIEC chat groups will report more positive emotions and less negative emotions than the Control chat groups throughout their synchronous text-chat across the eight Internet sessions.*

H2. *Positive and negative emotion expression among the chat groups will mediate the intervention–intergroup bias reduction relationship.*

2. Method

2.1. Participants

Of the original 220 participating students at pre-intervention (Time 1), 205 (93%) remained in the study at Time 2 (two weeks post-program), 201 (91%) remained at Time 3 (six-months post-program), and 188 (85%) remained at Time 4 (twelve months post-intervention). Participants completed pre-program measures, the eight-week DIEC or Control programs, and post-program

measures. Participants were students at four single-sex high schools in Sydney, Australia: two Christian (one male-only and one female-only) and two Muslim (one male-only and one female-only) schools. For those matched participants at Time 2, 102 were Muslim students (55 females) and 103 were Christian students (50 females). Mean ages at pre-intervention were 12.50 years ($SD = 0.39$) for Muslim males, 12.44 years ($SD = 0.33$) for Muslim females, 12.81 years ($SD = 0.32$) for Christian males, and 12.76 years ($SD = 0.37$) for Christian females. Participants were allocated to DIEC or Control chat groups composed of 2 members, resulting in an overall $N = 102$ chat groups which served as the unit of analysis in the present study.[1] All participants took part on a voluntary basis, with consent provided by the schools, parents and themselves.

2.2. Pre- and post-program measures

2.2.1. Intergroup bias

White and Abu-Rayya (2012) created an Image Affect Scale (IAS) that consists of 20 images, 10 related to the religious ingroup (Muslim or Christian) and 10 images related to the religious outgroup (Christian or Muslim) to measure intergroup bias. Participants were asked to rate as fast as possible how they feel about each image on a Likert-scale from 1 (Extremely unpleasant) to 8 (Extremely pleasant). For example, participants were asked to rate an image of a Mosque and a Church. Images were presented in a random order to participants. Intergroup bias scores for each participant were calculated, after reversing negative items, through the subtraction of their total score on the ingroup part from their total score on the outgroup part of the measure. Cronbach's α reliability was .83 for Muslims and .93 for Christians at Time 1.

2.2.2. Emotion expression

Online text exchanges between chat groups were analysed using LIWC software (for examples of exchanges in the two conditions refer to Table 1). In the current study, six categories measuring emotion expression were used. These categories included affect (e.g., happy, cried, abandon), positive emotion (e.g., love, nice, sweet), negative emotion (e.g., hurt, ugly, nasty), anxiety (e.g., worried, fearful, nervous), anger (e.g., hate, kill, annoyed), and sadness (e.g., crying, grief, sad). A measure of each type of emotion expression was computed by averaging scores across the eight Internet sessions. The emotion categories included have been used in past research on affective processes (Golder & Macy, 2011; Kahn, Tobin, Massey, & Anderson, 2007; Pennebaker, Mayne, & Francis 1997), and found to correlate with human ratings of emotional content (Bantum & Owen, 2009; Pennebaker & Francis, 1996).

2.3. Procedure

2.3.1. Pre-intervention testing (Time 1)

Six months prior to the intervention phase, participants completed the intergroup bias measure as well as demographic information and other measures online in school computer labs.

Table 1
Examples of online exchanges in DIEC and control conditions.

DIEC group		Control group	
Positive exchange	Negative exchange	Positive exchange	Negative exchange
"Well it has been great talking to you and learning about your religion it has been really fun looking at stuff and thinking of ways to improve our environment see ya!!!!!" (Session 8, Christian boy)	"we pray 5 times a day with each prayer taking about 6 min and each one at different times of the day...stereotypically people see it as a bad thing" (Session 1, Muslim boy)	"I really enjoyed talking to you guys and I really learnt a lot about my own religion and Islam. I learnt things i will use for the rest of my life" (Session 8, Muslim boy)	"HEY how are you's today, our last time talking how sad: ([frowning face]" (Session 8, Christian girl)
"...being aussie, i like all the friendliness, everyone's social and that we all come from different backgrounds" (Muslim girl, Session 4)	"yeah sort of...we just pray whenever we feel like we need to talk to god we feel bad now and guilty: ([frowning face]" (Session 1, Christian girl)	"Overall these chat sessions have been alright... but there were distractions on the way (Augustine...) but I reckon we have learnt quite a lot from each other! See YA!!" (Session 8, Christian boy)	"NO U A SAD DOG...U SAD SAD SAD PERSON" (Session 1, Muslim boy)

2.3.2. Intervention phase

Two classes (one male-only and one female-only, $n = 55$) from the Muslim schools and two classes (one male-only and one female-only, $n = 61$) from the Christian schools took part in the nine-week Dual Identity E-Contact (DIEC) program. Equivalent classes ($n = 47$ for Muslims and $n = 42$ for Christians) took part in the Control program.[2] For the eight Internet sessions, a pair of same-sex students took part in a synchronous text chat with another pair of same-sex students from the other school, and the two pairs formed one team of four students. The teams followed a specially developed 40-page workbook, with coloured illustrations, questions and exercises to guide the contact interaction.

2.3.2.1. DIEC program. In the first two E-contact Internet sessions, students' text chat was structured around their workbook, which included getting-to-know-you and friendship-building questions relating to commonalities and differences between Muslim and Christian religious faiths. Participants were reminded in several places throughout the program that the Australian environment

[1] Chat groups were used as the unit of analysis for two reasons: (i) we did not have a full dataset for all individual participants in each dyad; and (ii) to avoid violating the assumption of independent observations that is made in each of the statistical tests used. The choice to use mediation models with a sample of 102 is consistent with common practice in psychological research. For example, Fritz and MacKinnon (2007) found that 40.2% of studies published in two leading psychology journals that reported mediation models had less than 150 participants, and the bootstrap approach we use to assess mediation can be appropriately applied when sample sizes are moderate or small (i.e., sample sizes of 20 to 80) (see Efron & Tibshirani, 1993; Polansky, 1999; Shrout & Bolger, 2002).

[2] School-based field studies are logistically challenging and cannot always involve random allocation. As each program (DIEC versus Control) involved slightly different curricula and different instructions, participants could not be randomly allocated to conditions within one classroom. Rather it was deemed more efficient for teachers/researchers and less confusing for student participants, that separate classes was randomly allocated to either the DIEC program or the Control program. Every effort was made to ensure that the DIEC and Control classrooms were matched in terms of year/grade in high school, academic achievements and gender composition.

is shared by both Muslims and Christians, and the importance of being better guardians of this common land. The remaining Internet sessions consisted of three, two-session blocks on the topics of saving water, saving energy, and recycling. For example, "Water has important uses in Muslim and Christian religious practices. . ..so what can Muslim and Christian students do at home to help save water?" In each of these sessions, a short information and class discussion section was followed by 30–45 min of synchronous text chat between the cross-religious team members. Each Internet session was structured, in that cross-religious teams had to answer set questions from their workbook (approximately 5–8 questions per session), and the discussion was monitored within a specially designed Internet chat room.

2.3.2.2. Control program. The Control program had a similar E-contact structure to the DIEC program but only involved ingroup (rather than cross-religious) dyads, and consequently because there was no outgroup to form a superordinate identity with, this program did not involve any dual identity recategorization. The Control program workbook used similar images and environmental topics as the DIEC program but only contained ingroup Muslim information for Muslim students or ingroup Christian information for Christian students. Here one ingroup dyad participated in synchronous text chat across eight Internet sessions with another ingroup dyad in a specially designed Internet chat room.

2.3.3. Post-intervention testing

Two weeks following the final Internet session of the DIEC and Control programs, all Muslim and Christian students completed the same measures (Time 2) as in the pre-intervention, and they did so again six months later (Time 3), and finally twelve months later (Time 4), when they were in their third year of high school.

3. Results

3.1. Attrition analysis

An attrition analysis was conducted to examine whether students who left the study at Times 2, 3, or 4 were different from those who completed the program. The only measure that could be used to compare the groups was intergroup bias measured at Time 1 and a series of analyses of variance confirmed that the two groups were not significantly different.

3.2. Effect of E-contact and dual identity recategorization on intergroup bias

Controlling for Time 1 values of intergroup bias, this measure was significantly lower in the DIEC chat groups than control chat groups at Time 2, $F(1, 99) = 15.23$, $p < .001$, $\eta_p^2 = 0.133$, Time 3, $F(1, 99) = 9.13$, $p = .003$, $\eta_p^2 = 0.084$, and Time 4, $F(1, 99) = 11.24$, $p = .001$, $\eta_p^2 = 0.102$. This is fully consistent with the findings of White and Abu-Rayya (2012) and White et al. (2014).

3.3. Effect of intergroup contact on emotion expression: Hypothesis 1

A series of t-tests showed that the intervention significantly increased affect, $t(100) = 3.72$, $p < .001$, $d = .75$, and positive emotion words, $t(100) = 4.67$, $p < .001$, $d = .94$, and significantly decreased anger, $t(77.12) = -2.69$, $p = .009$, $d = -.56$, and sadness words, $t(56.52) = -3.31$, $p = .002$, $d = -.72$, among the DIEC chat groups compared to Control chat groups. There was also a marginal decrease in negative emotion words, $t(67.03) = -1.93$, $p = .058$, $d = -.41$, among the DIEC chat groups compared to Control chat groups.[3] The intervention did not have any notable effect on anxiety expression. The analysis generally confirmed hypothesis one. Refer to Table 2 for Means and standard deviations.

Table 2
Means and standard deviations of emotions and bias in DIEC and Control conditions.

	DIEC condition		Control condition	
Measure	*M*	*SD*	*M*	*SD*
Affect	8.5	1.7	7.3	1.5
Positive emotion	7.4	1.6	6.0	1.4
Negative emotion	1.1	0.5	1.3	0.8
Anxiety	0.1	0.1	0.1	0.1
Anger	0.3	0.2	0.4	0.4
Sadness	0.1	0.1	0.3	0.3
T1 intergroup bias	26.9	18.3	33.4	22.4
T2 intergroup bias	14.6	11.1	24.6	15.9
T3 intergroup bias	16.2	13.5	25.9	16.5
T4 intergroup bias	15.5	12.6	25.7	15.9

3.4. Mediation analyses: Hypothesis 2

To address the question of whether emotions mediated the intervention effect on intergroup bias reduction, Preacher and Hayes' (2004) bootstrap approach (using 1000 re-samples) to assessing mediation was used. Because the intervention had no significant effect on anxiety expression during contact, mediation via anxiety was not assessed. Models tested are presented in Fig. 1. Results showed that anger and sadness each partially mediated the intervention effect on intergroup bias reduction at Times 2, 3 and 4. Neither positive emotion nor affect significantly mediated the intervention effect on intergroup bias at Times 2, 3 or 4 at the $p < .05$ level. Negative emotion had a mediation effect at $p < .10$. Refer to Table 3 for significant indirect effects. Hypothesis two was thus partially confirmed.

4. Discussion

4.1. Main findings

Different contact strategies have been suggested in the social psychological literature to improve intergroup relations. While these strategies differ in their focus, theoretical basis, and level of experimental strength and evidence, the pressing issue for researchers is to understand how affective factors could uncover the mechanisms underlying how contact strategies work (e.g., Dovidio et al., 2009). The current study addresses this important gap in the literature. It is the first field-experiment to objectively examine the quality of the dynamic intergroup behaviours, via emotions expressed in language, involved in the successful reduction in intergroup bias. In terms of the effect of intergroup contact on intergroup bias reduction, our findings, unsurprisingly, confirm previous results based on the same intervention platform by White and Abu-Rayya (2012) and White et al. (2014); that is, intergroup bias was significantly lower in the DIEC chat groups than control chat groups at Time 2, Time 3, and Time 4 (when controlling for Time 1 values), providing support for the short- and long-term benefits of intergroup relations via participation in the DIEC program (White & Abu-Rayya, 2012; White et al., 2014).

[3] To compute Cohen's *d* effect sizes, we divided the mean difference by the pooled standard deviation. Pooled standard deviation was computed by taking the sum of the sum of squares for the two groups, dividing by the total sample size, and taking the square root of the resulting variance (McGrath & Meyer, 2006).

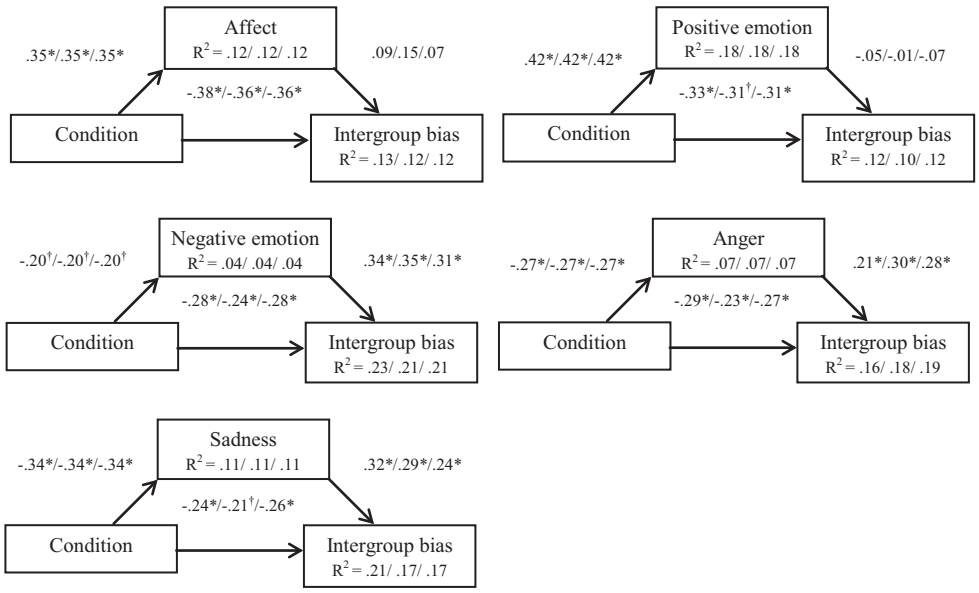

Fig. 1. Models used to test mediation by affect, positive emotion, negative emotion, anger, and sadness on Time 2, Time 3, and Time 4 intergroup bias. Where $^{\dagger}p < .10$. $^{*}p < .05$. Condition was manipulated and coded 1 = control and 2 = DIEC. Values represent standardised direct effects on T2, T3, and T4 intergroup bias, respectively. For example, the standardised direct effect of anger on intergroup bias was .21 at T2, .30 at T3, and .28 at T4. *R*-squared statistics are reported for models using T2, T3, and T4 intergroup bias, in that order.

Table 3
Standardised indirect effects of DIEC on intergroup bias at Times 2, 3 and 4.

	T2 intergroup bias	T3 intergroup bias	T4 intergroup bias
Affect	.030 (−.025; .090)	.053† (.001; .122)	.023 (−.025; .101)
Positive emotion	−.021 (−.103; .056)	−.003 (−.084; .069)	−.031 (−.106; .050)
Negative emotion	−.068* (−.144; −.013)	−.069* (−.136; −.013)	−.063* (−.125; −.009)
Anger	−.058** (−.133; −.019)	−.081** (−.163; −.024)	−.075** (−.152; −.026)
Sadness	−.106** (−.181 −.050)	−.099** (−.171; −.051)	−.080** (−.148; −.030)

Ninety-five per cent confidence intervals are shown in parenthesis.
† $p < .10$.
* $p < .05$.
** $p < .01$.

Results confirmed generally our prediction that the DIEC chat groups would express more positive emotions and less negative emotions than the Control chat groups. Specifically, results showed that participating in the DIEC program increased participants' use of affect words (emotion sharing in general), and positive emotion words, and simultaneously decreased the use of anger and sadness words compared to participating in the control program. In addition, the DIEC chat groups had a marginal decrease in negative emotion words. These findings, based on the objective analysis of the language used by participants in the contact and control conditions, strengthen previous self-report based research findings showing that positive and negative emotions play a critical role in the quality of intergroup relations (e.g., Augustine et al., 2011; Pennebaker, 1997). In other words, alongside bias reduction due to participating in the DIEC program, participants also benefit emotionally through their use of more positive and less negative words in their communication with outgroup members.

Our findings also support the prediction that emotion expressions among the chat groups would mediate the intervention–intergroup bias reduction relationship. Precisely, among the significant differences in emotion expressions between the DIEC and Control chat groups noted above, mediation analyses revealed that the reductions in anger and sadness among DIEC chat groups, compared to Controls, were positively associated with intergroup bias reduction in the short- and long-terms. This conclusion was partly true for negative emotion expression. Here negative language (i.e., anger, sadness, and negative emotion expressions) were the main mediators between contact and bias reduction. This finding indicates that structured cooperative program such as the DIEC seems to work through the actual reduction of negative emotions which in turn assists intergroup bias reduction. This conclusion is different from previous research employing self-report measures of emotions that showed that both positive and negative emotions experienced during intergroup contact mediate the association between contact and prejudice (e.g., Miller et al., 2004). One possible explanation of this empirical divergence is that the current study objectively assessed the expression of negative emotions during the *actual* contact experience, whereas previous research used self-report measures of emotions relating to *anticipatory* intergroup contact (see Stephan & Stephan, 1985). Related to this, the current study did not reveal any difference between the DIEC and Control conditions in the language expression of anxiety words during *actual* computer-mediated contact, and thus, anxiety was excluded as a potential mediator from further analysis. Again this differs from a plethora of previous findings that identifies self-reported *anticipatory* anxiety as a mediator of the contact–prejudice reduction relationship (Pettigrew & Tropp, 2006). Clearly further research is needed to investigate the differentiation

between anticipatory self-reported anxiety and the objective emotional expression of anxiety during actual contact, which is much reduced, as a result of computer mediated contact being cooperative in nature.

4.2. Research implications

The key implication of our findings is that the effects of the DIEC intervention program are reflected in the quality of the actual interaction as captured by the language used in the online exchange. Specifically, in the DIEC program, participants are more like to share emotions in general (i.e., increased use of affect words), and importantly, to express more positive and less negative emotions. Although, the underpinning motivations and mechanisms of this particular pattern of language use in this context warrants further investigation, these initial findings point out to the importance of extending the range of variables used to capture the quality of intergroup interactions as well as the context in which these interactions take place. The current study also extends previous research (e.g., Molina & Wettig, 2006) that relied solely on self-reports, by focusing on an objective measurement of emotions as captured by the language used by participants.

The variation in emotion expressed by the two groups of high-school students highlights the engaging nature of the content of the eight Internet sessions of the DIEC program. Here the synchronous Internet discussion between the Muslim and Christian students was carefully structured around a social issue that was equally important to both groups: developing strategies to create an environmentally sustainable Australia. Future Internet contact research may benefit from continuing to incorporate topics that engage student discussion and require them to use critical thinking to work towards finding a common solution to a real-world problem that all cultural and/or religious groups would benefit from. In doing so, we could evaluate the extent to which current positive intergroup findings amongst Muslim and Christian students generalise to different cultural and/or religious groups.

It should be noted that compared to other computer-mediated, text-based, asynchronous contact, the DIEC program evaluated here has the added advantage of being conducted in *real-time*. This synchronous, real-time text chat potentially frees DIEC participants to use a wide array of emotion expressions throughout their online intergroup communication. This additional strength of the DIEC program increases its generalisability to real world intergroup contact situations where contact also occurs in real time. Considering that computer-mediated social-networking platforms such as Facebook, Twitter and the like, are becoming widely used among adolescents and young adults, researchers should continue to develop and refine real-time Internet tools to encourage cooperative intergroup contact.

4.3. Research limitations and future research

Two caveats of this study must be noted. First, the current study tested a design that compared the DIEC program to a Control program that did not include intergroup E-contact or dual identity recategorization. However, since the dual identity tenet is central to the DIEC program, a stronger test of its effectiveness in reducing bias would be to also compare the DIEC program to a third program that includes intergroup E-contact without dual identity recategorization. Should future research include a three-program design, then the relative effectiveness of E-contact and dual identity recategorization on intergroup relations could be further explored and clarified. Second, participants in the dual identity condition might have formed an interpretation of the intervention purposes and thus changed their behaviour accordingly, a phenomenon widely known as demand characteristics. While demand characteristics do not seem a plausible alternative explanation for the effects of the DIEC intervention on emotion expressions, demand characteristics might potentially have influenced the participants' self-report intergroup bias. Future research could address this limitation by including additional implicit measures of intergroup bias.

4.4. Conclusion

This current study provides important objective evidence to support the success of previous research that identifies long-term cooperative contact between two groups as critical for achieving improved intergroup relations. Additionally, this study significantly extends previous contact research by uncovering evidence regarding the specific types of emotions expressed during actual intergroup contact and distinguishes what types of emotion expression mediate the effects of this contact on intergroup bias reduction in the short- and long-term. Notably, this evidence is derived from the DIEC program that adopts a synchronous Internet text chat tool between two religiously different groups of students, and in doing so, this study opens the way for new research avenues to integrate traditional intergroup contact paradigms with contemporary online platforms to improve long-term intergroup relations.

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