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Giving peace a chance: Oxytocin increases empathy to pain in the context of the Israeli—Palestinian conflict

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Summary Studies have argued that empathy to the pain of out-group members is largely diminished by "in-group empathy bias". Investigating the mechanism underlying the emotional reactions of Jewish Israeli participants toward the pain experienced by Palestinians in the context of the Israeli—Palestinian conflict affords a natural experiment that allows us to examine the role of neurohormones in emotion sensitivity across conflicting social groups. In a double-blind placebo-controlled within-subject crossover design, Israeli Jewish participants were asked to report their empathy to the pain of in-group (Jewish), neutral out-group (European), and adversary out-group (Palestinian) members. Oxytocin remarkably increased empathy to the pain of Palestinians, attenuating the effect of in-group empathy bias observed under the placebo condition. This effect, we argue, is driven by the general role of oxytocin in increasing the salience of social agents which, in turn, may interfere with processes pertaining to derogation of out-group members during intractable conflicts.

1. Introduction

A major societal challenge is bringing about the resolution of intractable conflicts and facilitating reconciliation between rival groups. This has its roots in the evolutionary trajectory of humans, whereby, like other mammals, sociality is beneficial for individuals because it provides greater protection from predators and enhances success in locating or maintaining access to resources. At the same time, sociality can be costly for individuals because it increases competition over access to resources. The Israeli—Palestinian conflict is regarded as one of the most intractable existing inter-group conflicts (Bar-Tal, 1998), combining ethnic, national, political, and religious elements, as well as economics pertaining to sharing and competing over limited resources (Lesch and Lustick, 2005). Thus, investigating the mechanism underlying

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the emotional reactions of individuals from one group toward another in the context of the Israeli–Palestinian provides a natural experiment that allows us to examine the role of neurohormones in emotion sensitivity across social groups.

While empathy toward out-group members improves inter-group relations (Stephan and Finlay, 1999), people consistently exhibit a stronger empathic response toward those who they perceive as similar to themselves (Brown et al., 2006). The mechanism underlying this in-group bias, however, remains to be elucidated as it is unclear whether diminished empathy toward out-group members results from in-group favoritism or out-group dehumanization and derogation (Harris and Fiske, 2006). In this regard, social endocrinology research, investigating the influence of oxytocin (OT)—a peptide hormone—on empathy within the context of inter-group relations, suggests that the effect of OT on empathy is limited to within in-group members (Declerck et al., 2010; De Dreu et al., 2011; Sheng et al., 2013). This interpretation has been questioned as it is not considered within the context of the general role of OT in increasing the salience of socially relevant information (Heinrichs et al., 2009; Chen et al., 2011). Within this context, it can be hypothesized that the influence of OT on empathy can extend beyond the in-group circle via its role in increasing the salience of social agents. By increasing the cognitive availability of such information, OT can increase the empathic response to the distress of others. This hypothesis is in accord with evidence showing that OT enhances mentalizing and recognition of emotions in others (Domes et al., 2007; Guastella et al., 2010), increases trust toward unrelated others (Kosfeld et al., 2005) and negative emotions such as envy in competitive situations (Shamay-Tsoory et al., 2009; Hirosawa et al., 2012), modulates the social relevance of emotional stimuli (Kirsch et al., 2005), interacts with dopamine to regulate socio-affiliative behaviors (Liu and Wang, 2003; Zeki, 2007) and the appropriate assignment of salience to social stimuli (Skuse and Gallagher, 2009).

One of the most rudimentary empathy mechanisms is that of empathy to pain, a concept that describes our tendency to automatically experience distress when facing someone else's pain. Previous human imaging studies focusing on empathy to others' pain have consistently shown activations in regions also involved in the direct pain experience (Singer et al., 2004; Decety and Lamm, 2006). Specifically, a network including the anterior cingulate cortex (ACC) and the anterior insula (AI) was reported to respond to both felt and observed pain (Decety et al., 2010). The same sets of regions have been reliably observed across a wide range of individuals and circumstances, suggesting that empathy to pain is, at least in part, an automatic, bottom-up process and perhaps an evolved adaptation. Yet, research also strongly suggests that empathy is also mediated by top-down processing. In fact, recent neuroimaging studies have demonstrated that the empathic response to pain is either strengthened or weakened when contextual and interpersonal variables are manipulated, including the intent of the inflictor of pain to harm the target of pain (Akitsuki and Decety, 2009), and whether the person in pain belongs to a stigmatized group (Tarrant et al., 2009; Decety et al., 2010). This suggests that empathy to pain is also modulated by top down processes such as group membership.

Given that empathy to pain can be modulated by top down processes such as group membership (e.g., Tarrant et al., 2009), and that oxytocin plays a general role in modulating empathy (Bartz et al., 2010; Hurlemann et al., 2010) and enhancing the saliency of relevant social stimuli (Heinrichs et al., 2009; Bartz et al., 2011), we hypothesize that the influence of OT on empathy to pain can extend beyond the in-group circle, rather being confined to increasing in-group favoritism. We test our hypothesis by investigating the influence of OT on the empathic responses toward pain experienced by adversary out-group members within the context of the Israeli–Palestinian conflict, and examine (i) if Israeli participants exhibit an 'in-group empathy bias', and (ii) whether intranasal administration of OT diminishes this bias. This context, characterized by an ongoing inter-group violent conflict, provides an ecologically valid environment where the effect of OT on the empathic responses of Israelis toward the pain of Palestinians can be evaluated. In confirming the ecological validity of our study, it is important to note that the experiments were carried out between 2010 and 2012 when no actual negotiations between the parties took place, and that during this period, per data from B'tselem and Israel's Ministry of Foreign Affairs, 331 Palestinians and 20 Israelis died.

2. Materials and methods

2.1. Participants and protocol

A total of 55 healthy male and female Israeli Jewish adults (18 females, 37 males; age range 19–46) participated in a double-blind placebo-controlled within-subject crossover design experiments. Participants were recruited by ads and were compensated for their participation. All participants gave their written informed consent prior to their participation. Exclusion criteria included medical or psychiatric illness and use of any substantial medication or other substance (including heavy smoking). All participants were instructed to avoid psychotropic substances, such as caffeine and nicotine, for at least 12 h prior to the experiment. Due to the significant hormonal interactions between OT and estrogen, information regarding menstrual cycle and contraceptive pills was collected among the women. The study protocol was approved by Shalvata Hospital's ethics committee.

Participants were randomly assigned into groups before the experiment for the first administration of either OT or placebo. Oxytocin is a neurohypophyseal peptide that primarily acts as a neuromodulator in the brain and can cross the blood–brain-barrier when administered intranasally (Born et al., 2002). A single dose of 24 IU OT or placebo was intranasally administered (three puffs per nostril, each puff containing 4 IU) 45 min before the task performance. The placebo contained all inactive ingredients without the neuropeptide. At the second session of the experiment, seven days later, participants underwent the same procedure with the other substance (i.e., placebo or OT). Dosage and waiting time corresponded to those previously used in experiments designed to investigate the effect of the intranasal administration of OT on behavior in humans (Kirsch et al., 2005; Kosfeld et al., 2005; Domes et al., 2010; Guastella et al., 2010).

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2.2. Pain evaluation task

The Pain Evaluation Task (Jackson et al., 2005) consists of a series of digital color photographs showing right hands and right feet in painful and non-painful situations. All situations depict familiar events that can happen in everyday life. Various types of pain (mechanical, thermal, and pressure) are represented. For each painful situation, there is a corresponding neutral picture, which involved the same setting without any painful component. A selected series of 40 stimuli were presented randomly, following a 750 ms presentation of different common names of Jews, Palestinian-Arabs or Europeans. The selection of the targets' names was based on a preliminary study in which 120 students from the University of Haifa (60 Palestinian-Arabs and 60 Jews), all Israeli citizens, were asked to report what they believe are the five most common names of Palestinian Arabs, Jews and Europeans. From a total list of 96 names, 5 names with the highest frequency rates were selected for each group. The selected Jewish names were Moshe, Avi, Yits'hak, Yesrael, and Shimon, the Arab names were Ahmad, Mohamed, Abed, Saleem and Ali and the European (neutral outgroup) names were Chris, John, Mark, Martin and Paul.

In this regards, we note that an earlier version of the task was originally designed to compare between brief (25 ms) and long (750 ms) presentation times of the names interleaved by the 67 ms mask (Suleiman, Yahya, Decety, Shamay-Tsoory, submitted for publication). In the Suleiman et al. study, perceived pain was assessed when Jewish and Arab participants viewed a series of visual stimuli depicting painful and non-painful familiar situations. The stimuli were associated with explicitly (750 ms) or subliminally implicitly (25 ms) primed typical names of in-group, neutral out-group, and adversary out-group members. The results demonstrate that when the target (i.e., name) is primed implicitly, Jews and Palestinian-Arabs alike showed no in-group or out-group bias. In contrast, in-group empathy bias was evident under the explicit priming condition among both the Jewish and Palestinian-Arab participants. Since the in-group bias effect was obtained when names were presented for 750 ms, we opted to use the 750 ms presentation time in this study.

The adapted version of the task was controlled via the software package E-prime 2.1 and involved stimuli which included (1) right hands in painful situations, (2) right hands in neutral situations, (3) right feet in painful situations, and (4) right feet in neutral situations. Participants were asked to rate the degree of pain felt by the target using a visual analog scale (VAS) using the computer mouse (0 — no pain, 10 — most painful). Following each name, they were presented with a picture showing either a painful or a non-painful situation (see Fig. 1). After each presentation of a name and subsequent picture, participants were requested to rate the intensity of the pain experienced by the target presented in the stimuli. They were instructed to report their ratings as quickly as possible on the VAS. The experiment consisted of 40 trials in total (20 painful and 20 non-painful stimuli). In all sessions, the same name was always tagged with the same picture and the combinations of names and pain or no-pain stimuli were randomized between subjects. The task began with 3 practice trials, followed by the test blocks.

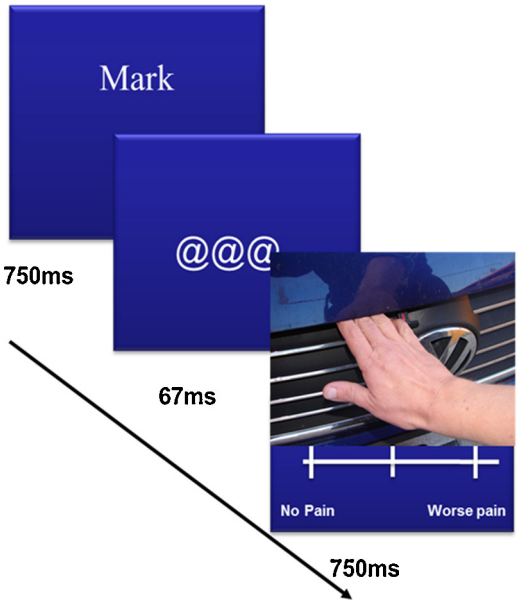

Figure 1 Sample presentation of a right hand in a pain situation.

2.3. Statistical approach and analysis

The double-blind placebo-controlled design adopted in the current study enables us to assess within each participant the effect of OT versus placebo on the empathy rating of perceived pain when viewing in-group, adversary or neutral outgroup members (primed by their respective prototypical names) in painful and non-painful familiar situations, using the Jackson et al.'s (2005) Pain Evaluation Task. In addition, given the ongoing debate regarding the reactivity to exogenous oxytocin in male versus females, we explore if OT has a similar modulatory effect on the empathy to pain ratings of both men and women. In addition, and in order to account for the order in which participants received the treatment (i.e., whether participants received OT or placebo first), the current study thus employs a 2 * 3 * 2 * 2 * 2 design where treatment (placebo versus OT), group membership of the target (Jew versus Palestinian-Arab versus European) and stimuli (painful versus non-painful) are entered as within subject factors and gender (male versus females) and passation order of treatment (OT first versus placebo first) as between subject factors.

3. Results

The empathy ratings of 55 Jewish participants were analyzed using the 2 * 3 * 2 * 2 * 2 repeated measures ANOVA described above. As shown in Fig. 2A, the treatment effect was not significant ($F(1, 51) = 0.43$, $p = 0.52$), indicating that the administration of OT did not have a general effect on pain ratings. In addition, the target effect was also not significant ($F(2, 102) = 0.51$, $p = 0.60$), indicating that, overall, participants had similar ratings for the targets across the experiment. There was a main effect for pain ($F(1, 51) = 420.31$, $p < 0.001$) which resulted from higher ratings for the pain as compared to the non-pain stimuli (pain: M/S.E. = 6.77/0.25;

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no-pain = 1.10/0.20) and a main effect for gender ($F(1, 51) = 8.16$, $p = 0.006$) which resulted from the higher ratings by women as compared to the men (women: M/S.E. = 4.44/0.29; men = 3.43/0.21). There was no order effect ($F(1, 51) = 2.08$, $p = 0.16$), indicating that overall participants who received OT in the first session had similar pain ratings as compared to participants who received placebo in the second session.

Remarkably, there was a significant treatment by target interaction effect ($F(2, 102) = 4.25$, $p = 0.018$), indicating that OT affected empathy ratings differently depending on the group membership of the target. Furthermore, the interaction of treatment by target by pain was significant ($F(2, 102) = 3.163$, $p = 0.048$), indicating that OT affected empathy ratings differently depending on the group membership of the target and the pain condition (pain vs. no-pain). Follow-up paired t-tests indicated that following the administration of placebo, empathy ratings for pain were significantly higher for Israeli Jew targets as compared to the Arab targets ($t(54) = -2.25$, $p = 0.028$), but not as compared to the European targets ($t(54) = 0.05$, $p = 0.97$). Interestingly, the difference between the ratings of Jewish and Arab targets was not significant following the administration of OT ($t(54) = 0.50$, $p = 0.62$) nor was the difference between the ratings of the Jewish and European targets ($t(54) = 0.97$, $p = 0.34$), indicating that the administration of OT did not increase the empathy bias observed in the placebo condition. With respect to the empathy ratings to the non-pain stimuli in the placebo condition, follow-up paired t-tests revealed no significant differences between the Israeli Jew targets and the Arab targets ($t(54) = -0.82$, $p = 0.42$), or the European targets ($t(54) = -0.88$, $p = 0.39$). Similarly, there were no differences in the ratings of the Israeli Jew targets and the Arab targets ($t(54) = 1.40$, $p = 0.17$), or between the Jewish and the European targets ($t(54) = 1.26$, $p = 0.21$) after the administration of OT (see Fig. 2B).

In addition, there was a significant pain by gender interaction ($F(1, 51) = 5.363$, $p = 0.025$), where the women rated the pain (women: M/S.E. = 7.59/0.40; men = 5.94/0.29), but not the no-pain condition (women: M/S.E. = 1.29/0.32; men = 0.92/0.23), significantly higher than the men ($t(1, 53) = 3.08$; $p = .003$). The rest of the interactions were not significant including treatment by gender ($F(1, 51) = 0.93$, $p = 0.34$), treatment by order ($F(1, 51) = 3.20$, $p = 0.08$), treatment by gender by order ($F(1, 51) = 2.08$, $p = 0.16$), target by gender ($F(2, 102) = 1.04$, $p = 0.34$), target by order ($F(2, 102) = 0.48$, $p = 0.62$), target by gender by order ($F(2, 102) = 0.09$, $p = 0.90$), pain by order ($F(1, 51) = 1.07$, $p = 0.31$), pain by gender by order ($F(1, 51) = 0.54$, $p = 0.46$), treatment by target by gender ($F(2, 102) = 0.006$, $p = 0.99$), treatment by target by order ($F(2, 102) = 0.08$, $p = 0.92$), treatment by target by gender by order ($F(1, 51) = 1.59$, $p = 0.21$), treatment by pain ($F(1, 51) = 1.83$, $p = 0.18$), treatment by pain by gender ($F(1, 51) = 1.09$, $p = 0.30$), treatment by pain by order ($F(1, 51) = 0.02$, $p = 0.90$), treatment by pain by gender by order ($F(1, 51) = 2.42$, $p = 0.13$), target by pain ($F(2, 102) = 1.55$, $p = 0.22$), target by pain by gender ($F(2, 102) = 1.35$, $p = 0.26$), target by pain by order ($F(2, 102) = 2.90$, $p = 0.06$), target by pain by gender by order ($F(2, 102) = 1.73$, $p = 0.18$), treatment by target by pain by gender ($F(2, 102) = 0.84$, $p = 0.43$), treatment by target by pain by order ($F(2, 102) = 0.68$, $p = 0.51$), or treatment by target by pain by gender by order ($F(2, 102) = 0.03$, $p = 0.97$).

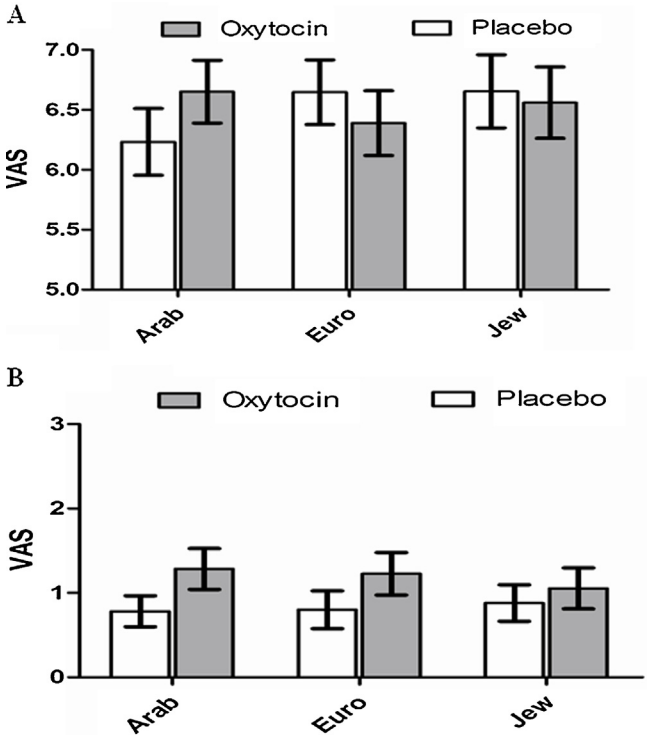

Figure 2 Treatment effect (mean ± S.E.) on the empathic rating to painful and non-painful stimuli as a function of group membership. Figure A depicts the treatment effect on the empathic rating to painful stimuli, and figure B depicts the treatment effect on the empathic rating to non-painful stimuli.

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4. Discussion

Our results show that the administration of OT to Jewish Israelis, in the context of Israeli–Palestinian conflict, significantly increased their empathic responses to pain experienced by Palestinian Arabs, an effect that was absent for both the in-group and the European neutral out-group. As expected, female participants responded more empathically than their male counterparts, albeit this gender effect was only evident when rating the painful stimuli. However, as suggested by our analysis, gender does not seem to have affected the modulatory effect of OT on empathy. In considering previous research, the results of the current study concord with reports showing that, when compared to the placebo condition, OT enhances positive attitudes toward other-owned but not self-owned objects (Wu et al., 2012), and increases trust toward unrelated others (Kosfeld et al., 2005). Moreover, these results are also in line with the role of OT in enhancing perspective-taking abilities (Domes et al., 2007; Pedersen et al., 2011), mentalizing and the recognition of emotion in others (Domes et al., 2007; Guastella et al., 2010), all of which are considered important ingredients that facilitates empathic responses toward others (Shamay-Tsoory, 2011; Baston, 2012). Given the role of OT in perspective-taking and mentalizing abilities, it is possible to conjecture that the effect of OT on the empathic responses toward the out-group members might be mediated by restoring the belief that out-groups members can have complex human emotions and share in-group beliefs and values (Leyens et al., 2001).

Moreover, previous research has strongly advocated that the modulatory role of OT of social stimuli in the context of inter-group conflict is confined to within in-group members, and that this in-group bias is sufficient to explain the behavior of in-group members toward out-group members. This view is based on research documenting its role in regulating parochial altruism (De Dreu et al., 2010) and promoting ethnocentrism (De Dreu et al., 2011). However, this stance has been questioned for the lack of concrete evidence that OT promotes out-group derogation (see Chen et al. (2011) for critique, and Van IJzendoorn and Bakermans-Kranenberg (2012) for meta-analytic evidence), and that it ignores the general role of OT in increasing the salience of socially relevant information (Heinrichs et al., 2009), which, in certain contexts (Bartz et al., 2011), can also make viable social information that transcends the in-group circle. The present findings thus indicate that couching the effect of OT within the context of its role in enhancing social salience provides a broader framework to understanding the modulatory effect it has on social behavior such as sensitivity to the pain of others. This is particularly appealing given the strong interaction OT has with other neuromodulators, such as dopamine, which are involved in socio-affiliative behavior (Liu and Wang, 2003; Rosenfeld et al., 2011). Accordingly, it is possible to suggest that the increase in the empathic responses of Israeli Jews to the pain received by Palestinians may be attributed to the effect of OT on increasing the saliency of socially relevant information in the context of the Israeli–Palestinian conflict.

Interestingly, in our study, OT did not enhance the empathic responses toward the in-group members. This finding supports recent propositions suggesting that OT is not an automatic enhancer of empathy to all individuals in all contexts (Shamay-Tsoory et al., 2009; Bartz et al., 2010). Specifically, it has been suggested that OT can be constrained by the context in which it is administered and that exogenous OT may not necessarily have an additive value to what is already salient to the individual (see discussion by Bartz et al., 2011). This suggests that OT may have a saturation point in that it may not make available information that previously (i.e., under the placebo condition) is already salient (Bartz et al., 2010), and as such the administration of OT may not enhance empathic responses to the pain of in-group members. A prediction of this position is that OT would have an enhancing effect in individuals with diminished sensitivity to the emotion of others. To this point, recent studies show that OT benefited only individuals with greater difficulty in identifying and describing emotions (Luminet et al., 2011), and only those present with greater socio-cognitive deficiencies (Bartz et al., 2010), when performing tasks that tap socio-emotional abilities.

Overall, we report a modulatory effect of intranasal OT on the empathic responses to the pain experienced by conflictual out-group members rather than enhancing in-group favoritism. In this regard, it is important to note that the in-group bias observed under the placebo condition was attenuated by increased empathy toward the out-group, and not by a decrease in in-group favoritism itself. This suggests that OT has a broader range of prosocial influences which, as discussed above, is likely driven by enhancing perspective taking abilities and the salience of relevant social stimuli. As such, our results may have important implications for reconciliation and conflict resolution. While speculative, training Israeli and Palestinian members of the negotiating parties to consciously contemplate the perspective of the other, could render efficacious in cultivating positive intergroup relations, and thus creating an environment where peace is given a chance in the context of the Israeli–Palestinian conflict. Indeed, attenuating negative inter-group emotions through cognitive reappraisal training methods has been demonstrated to enhance reconciliatory attitudes among Israelis with respect to the Israeli–Palestinian conflict (Halperin et al., 2013). We suspect that such attitudinal changes would be associated with changes in oxytocinergic functioning.

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Conflict of interest statement

The authors declare no conflict of interest.

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