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Oxytocin increases willingness to socially share one's emotions

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Oxytocin (OT) is a neuropeptide that is attracting growing attention from researchers interested in human emotional and social behavior. There is indeed increasing evidence that OT has a calming effect and that it facilitates pair-bonding and social interactions. Some of OT's effects are thought to be direct, but it has been suggested that OT also may have indirect effects, mediated by changes in behavior. One potentially relevant behavioral change is an increased propensity for "emotional sharing" as this behavior, like OT, is known to have both calming and bonding effects. In this study, 60 healthy young adult men were randomly assigned to receive either intranasal placebo (PL; $n = 30$) or oxytocin (OT; $n = 30$). Participants were then instructed to retrieve a painful memory. Subsequently, OT and placebo participants' willingness to disclose to another person event-related facts (factual sharing) vs. event-related emotions (emotional sharing) was evaluated. Whereas the two groups were equally willing to disclose event-related *facts*, oxytocin was found to specifically increase the willingness to share event-related *emotions*. This study provides the first evidence that OT increases people's willingness to share their emotions. Importantly, OT did not make people more talkative (word counts were comparable across the two groups) but instead increased the willingness to share the specific component that is responsible for the calming and bonding effects of social sharing: emotions. Findings suggest that OT may shape the form of social sharing so as to maximize its benefits. This might help explain the calming and bonding effects of OT.

Keywords: Oxytocin; Emotion; Disclosure; Expression; Sharing.

L'ocytocine (OT) est un neuropeptide qui attire l'attention croissante des chercheurs intéressés par le comportement émotionnel et social de l'humain. Il y a de plus en plus de preuves que l'OT a un effet calmant et qu'elle facilite l'attachement et les interactions sociales. Quelques effets de l'OT semblent directs, mais l'OT pourrait aussi avoir des effets indirects médiatisés par des changements comportementaux. Un changement comportemental dont il faut tenir compte est la propension accrue pour « le partage d'émotion », puisque ce comportement, comme l'OT, est reconnu pour ses effets calmants et liants. Soixante jeunes hommes en santé sont répartis au hasard pour recevoir un placebo intranasal (PL; $n = 30$) ou de l'ocytocine (OT; $n = 30$). On demande alors aux participants de se remémorer un souvenir douloureux. On évalue ensuite le désir des participants (OT et PL) de divulguer à autrui des faits reliés à l'événement (partage factuel) versus des émotions reliées à l'événement (partage émotionnel). Bien que les deux groupes veuillent également divulguer des faits reliés à l'événement, l'ocytocine augmente spécifiquement le désir de partager les émotions reliées à l'événement. Cette étude fournit la première preuve que l'OT accroît chez les gens le désir de partager leurs émotions. Il est important de noter que l'OT ne rend pas les gens plus bavards (le nombre de mots est identique dans les deux groupes), mais elle accroît plutôt le désir de partager la composante spécifique responsable des effets calmants et liants du partage social : les

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émotions. Les résultats suggèrent que l'OT peut façonner le style de partage social de manière à maximiser ses bénéfices. Ceci pourrait aider à expliquer les effets calmants et liants de l'OT.

La oxitocina (OT) es un neuropéptido que ha atraído una creciente atención de los investigadores interesados en la conducta emocional y social humana. En realidad, cada vez hay más evidencia de que la OT tiene un efecto calmante y que facilita el vínculo de pareja y la interacción social. Se piensa que algunos de los efectos de la OT son directos, pero se ha sugerido que la OT también podría tener efectos indirectos, mediados por cambios en la conducta. Un cambio conductual potencialmente relevante es la mayor propensión a “compartir emociones” siendo que se sabe que esta conducta, como la OT, tiene efectos tanto calmantes como de vinculación. Se asignó aleatoriamente sesenta hombres adultos jóvenes saludables a recibir un placebo intranasal (PL; $n = 30$) u oxitocina (OT; $n = 30$). Luego se solicitó a los participantes que recordaran un evento doloroso. A continuación se evaluó la disposición de los participantes OT y placebo para revelar a otra persona hechos relacionados con el evento (compartir factual) versus emociones relacionadas con el evento (“compartir emocional”). Mientras que ambos grupos estuvieron igualmente dispuestos a revelar hechos relacionados con el evento, se encontró que la oxitocina incrementó específicamente la disposición a compartir emociones relacionadas con el evento. Este estudio brinda la primera evidencia de que la OT incrementa la disposición de la gente a compartir sus emociones. Cabe resaltar que la OT no hizo que la gente hablara más (la cantidad de palabras fue similar entre los dos grupos), sino que incrementó la disposición a compartir el componente específico responsable de los efectos calmantes y de vinculación del compartir social: las emociones. Los hallazgos sugieren que la OT puede dar forma al compartir social de tal modo que maximice sus beneficios. Esto podría ayudar a explicar los efectos calmantes y de vinculación de la OT.

Oxytocin (OT) is a neuropeptide that is attracting growing attention from researchers interested in human emotional and social behavior. There is increasing evidence that OT has a calming effect (Heinrichs, Baumgartner, Kirschbaum, & Ehler, 2003; Uvnas-Moberg & Petersson, 2005) and that it facilitates pair-bonding and social interactions. For instance, OT moderates cortisol secretion amid stress (Heinrichs et al., 2003), facilitates the processing of positive social cues (e.g., Unkelbach, Guastella, & Forgas, 2008), and increases trust (Kosfeld, Heinrichs, Zak, Fischbacher, & Fehr, 2005; Mikolajczak et al., 2010), generosity (Zak, Stanton, & Ahmadi, 2007), eye-gaze (Guastella, Mitchell, & Dadds, 2008), and mind-reading (Domes, Heinrichs, Michel, Berger, & Herpertz, 2007).

It has recently been suggested that OT exerts its calming and bonding effects in humans via both direct and indirect pathways. Direct effects appear to include action on other neurotransmitter systems such as glucocorticoids, opioids, and dopamine (Heinrichs et al., 2003; Uvnas-Moberg & Petersson, 2005). Indirect effects are thought to include behaviors that in turn facilitate relaxation and bonding (see Taylor, 2006). In this study, we focus on indirect effects, and examine whether oxytocin increases the social sharing of emotions.

Clinicians have long noted that people who have gone through a traumatic experience later evidence a need to talk about it. Empirical studies of bereavement, life-threatening diagnoses, disasters, and everyday misfortunes have confirmed the

pervasiveness of this inclination: 80% or more of people exposed to these situations report a need to share them (Rimé, 2009). This phenomenon, referred to as “social sharing,” involves a description of the emotional event by the person who experienced this event to another person in a socially shared language. “The social sharing of emotion” is a process that takes place in the minutes, hours, days, even weeks and months—and sometimes years, or even an entire life—following an emotional episode. In its full form, the social sharing of emotion occurs in discourse when individuals communicate openly with one or more persons about the circumstances of the emotion-eliciting event and about their own feelings and emotional reactions. In attenuated forms, it consists of latent or indirect communications in which the addressee is present only at a symbolic level, as is the case with letters or diaries (Rimé, 2009, p. 65).

Social sharing typically entails a description of the facts; the experienced emotions are shared to a much lesser extent (Kauhanen, Kaplan, Julkunen, Wilson, & Salonen, 1993). However, sharing only facts appears not to help the person who experienced the event to feel better (Pennebaker & Beall, 1986); what is really useful is sharing emotions (Kennedy-Moore & Watson, 1999). Such “social sharing of emotion” (SSE), like OT, has both a calming and a bonding function. SSE alleviates emotional distress through the elicitation of consolation, care, advice, and solutions (see Rimé, 2009 for a review). It also reinforces the discloser–listener relationship (e.g., Laurenceau,

Barrett, & Pietromonaco, 1998), and strengthens social cohesion via the secondary and tertiary sharing that follows the primary social sharing of emotion (Harber & Cohen, 2005).

The goal of the present study is for the first time to link OT and the social sharing of emotion. Because sharing event-related *facts* does not convey any calming or bonding benefits, we did not expect a main effect of OT on social sharing, but rather an interaction effect whereby OT would specifically increase the readiness to share event-related *emotions*.

METHOD

Sixty healthy young adult men were randomly assigned to receive either intranasal placebo (PL; $n = 30$) or oxytocin (OT; $n = 30$; 32 IU Syntocinon spray, Novartis, Basle, Switzerland). The study was conducted in accordance with the Declaration of Helsinki, and the protocol was approved by the Biomedical Ethics Committee (Commission d'Ethique Biomédicale Hospitalo-Facultaire, Université Catholique de Louvain, Belgium). Before providing written consent, participants were informed of the requirements and risks of the study and told that they could stop it if (and whenever) they wanted, without having to justify their decision. Exclusion criteria included a medical or psychiatric condition, substance dependence, and female gender (in order to avoid sex differences in OT response). One participant (PL) said he had not gone through any difficult event, leaving 59 participants ($M = 21.2$, $SD = 2.4$) for analyses.

After providing written informed consent, participants were invited to complete measures of demographics, risk taking, self-esteem, agreeableness, sociability, emotional intelligence, and mental health in order to ensure that groups were equal regarding demographics and individual differences relevant to the study. The substance (OT or placebo) was then administered. Owing to the crucial role of social thoughts or experiences in triggering the effects of oxytocin (Uvnas-Mober et al., 2005), subjects were then invited to wait 45 min in front of an excerpt of a movie featuring friendship and camaraderie.

Then, as is usually done in social sharing research, participants were asked to recall a past negative experience that *still currently affects them* and rate its emotional intensity at the time on a 10-point Likert scale (see Table 2) (Rimé, Finkenauer, Luminet, Zech, & Philippot, 1998;

Rimé, Mesquita, Philippot, & Boca, 1991; Rimé, Philippot, Boca, & Mesquita 1992). Previous studies indeed showed that unextinguished emotional experiences elicit an ongoing need to be shared. Participants were asked to describe the event on a sheet of paper. They were told that their anonymous description might be subjected to computerized content analysis. Participants were then required to rate their current negative emotional intensity on a 10-point Likert scale. Finally, participants had to indicate on four five-point Likert scales whether they would agree to share the related facts and related emotions with either a same-sex or an opposite-sex person. As responses did not differ across targets, we aggregated them into a single index for each type of content ($\alpha = .90$ for facts and $.87$ for emotions).

Two judges (one student in psychology and one person with no experience in psychology) manually analyzed the narratives. The interrater agreement was nearly perfect after the first round. All narratives taken into account; there were approximately eight discrepancies. These were mostly attributable to the fact that the “nonpsychologist” did not count words from sentences such as “I could not speak anymore” (because the emotion was so intense) as emotion-related words. After discussion, there was 100% interrater agreement.

RESULTS

Preliminary analyses (independent t -tests) indicated that PL and OT groups did not differ on demographics and individual differences under study (all p values $> .25$; see Table 1). Anonymous descriptions of the events were comparable across conditions. Most concerned romantic break-ups, loss of a close friend or relation, and abuse. Neither event type nor words used to describe the event differed by group (Table 2). Finally, groups were comparable regarding the emotional intensity of the event retrieved, both at the time of the event and at the time of the study (see Table 2).

To test whether OT affects inclination to engage in social sharing, we performed a repeated-measures ANOVA, with content (facts versus emotions) as a within-subject factor and condition (PL versus OT) as a between-subjects factor. As expected, there was no main effect of group, $F(1, 57) = 0.51$, $p = ns$, and a significant main effect of the type of content, $F(1, 57) = 23.82$, $p \leq .001$, partial $\eta^2 = .30$, suggesting that participants were

TABLE 1

Means and standard deviations of demographic variables and individual differences measured before substance administration

<i>Variables</i>	<i>Placebo means (and SDs)</i>	<i>Oxytocin means (and SDs)</i>	<i>Independent samples t-test (and p-value)</i>
Age	21.47 (2.73)	20.93 (2.07)	−0.85 (.40)
Body mass index	24.00 (3.13)	23.43 (5.21)	−0.52 (.61)
Risk taking	2.51 (0.45)	2.65 (0.47)	1.14 (.26)
Kindness	2.98 (0.22)	2.98 (0.37)	0.00 (1.00)
Self-esteem	3.11 (0.44)	3.21 (0.55)	0.79 (.43)
Agreeableness	2.84 (0.39)	2.82 (0.41)	−0.13 (.90)
Sociability	4.70 (0.47)	4.68 (0.53)	−0.15 (.89)
Emotional Intelligence	4.84 (0.60)	4.85 (0.58)	0.02 (.98)
Mental disorders	1.56 (0.51)	1.55 (0.47)	−0.07 (.94)

These results show that groups were statistically equivalent regarding all the demographics and individual differences relevant to the study. BMI was computed as weight in kg/(height in m)². Risk-taking, kindness, self-esteem, agreeableness, sociability, emotional intelligence, and mental disorders were respectively measured using the risk-taking subscale of the Jackson Personality Inventory (Jackson, 1994), the kindness subscale of the Value in Action scales (Park, Peterson, & Seligman, 2004), the Rosenberg Self-Esteem Scale (Rosenberg, 1965), the agreeableness dimension of the NEO-PI-R (Costa & McCrae, 1992), the Trait Social Intelligence Questionnaire (Petrides, 2011), the Trait Emotional Intelligence Questionnaire (Petrides, 2009), and the Brief Symptom Inventory (Derogatis, 1993).

TABLE 2

Mean event parameters by group

<i>Variable</i>	<i>Placebo (N = 29): Mean (SDs)</i>	<i>Oxytocin (N = 30): Mean (SDs)</i>
Length of event description (in words)	106.60 (116.21)	111.86 (104.10)
Length of event-related facts description (in words)	52.13 (61.07)	60.83 (69.10)
Length of event-related emotions description (in words)	54.47 (62.93)	51.03 (49.17)
Emotional intensity at the time	7.75 (2.24)	8.00 (1.55)
Current emotional intensity	5.04 (2.58)	5.93 (2.55)
Readiness to disclose the facts	2.05 (0.19)	2.03 (0.20)
Readiness to disclose the emotions	1.41 (0.18)	1.78 (0.17)

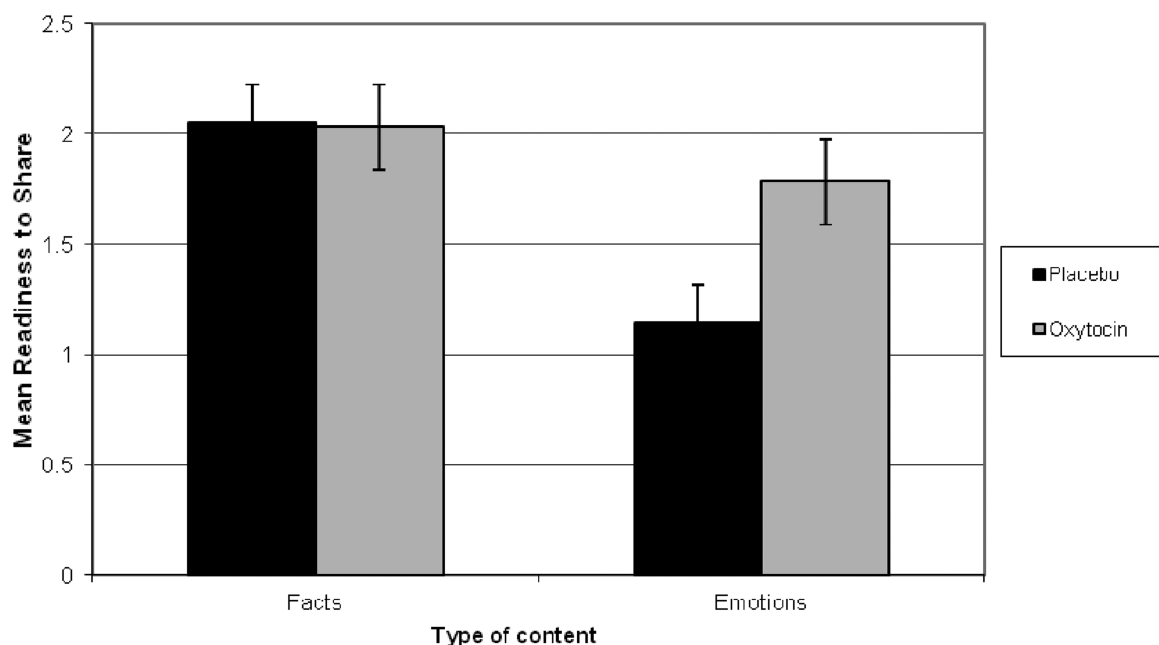


Figure 1. Mean readiness to share emotions and facts across conditions.

generally more inclined to share facts than emotions.

Crucially, and as shown in Figure 1, there was a significant content $\times$ group effect, $F(1, 57) = 4.55$, $p \leq .05$, partial $\eta^2 = .07$. Follow-up t -tests revealed that in the PL group, participants' inclination to share facts and emotions differed ($t_{28} = 4.96$, $p \leq .001$). By contrast, in the OT condition, the difference between the readiness to share facts and emotions was not statistically different ($t_{29} = 1.9$, ns). It is of note that this interaction effect held true when all demographics and personality factors were partialled out, $F(1, 49) = 3.99$, $p \leq .05$; partial $\eta^2 = .07$.

DISCUSSION

This study provides the first evidence that OT increases people's willingness to share their emotions. Importantly, OT did not make people more talkative (word counts were comparable across the two groups) but instead increased the willingness to share the specific component that is responsible for the calming and bonding effects of social sharing: emotions. The findings are all the more remarkable because they were obtained among men, who may be less inclined than women to express their emotions. These data contribute to both OT and social sharing literatures.

As far as OT is concerned, our study fits with and complements the results of past studies on OT and behaviors in humans. For instance, it shows that people under OT are trustful not only when money is at stake (Kosfeld et al., 2005) but also when their intimate feelings are in the balance (Mikolajczak, Pinon, Lane, de Timary, & Luminet, 2010). In addition, this study uncovers a possible mediator of the effects of OT. As the social sharing of emotion has been found to induce appeasement in the discloser (Rimé, 2009) and reinforce the bonds with the listener (Laurenceau et al., 1998), it is possible that it indirectly contributes to explain OT's calming and bonding effects. As pointed out by an anonymous reviewer, it is exciting to realize that emotional behaviors can mediate the influence of neurochemicals on wellbeing.

As far as the social sharing literature is concerned, the current study is—to our knowledge—the first to investigate the biological correlates of emotion sharing. It may help to explain a number of findings that have remained mysterious so far, such as the fact that a small touch (even by a nonclose other) precipitates emotional disclosure (e.g., Pattison, 1973). The present findings suggest

the possibility that touch increases OT release and that OT in turn stimulates emotion sharing.

In addition to its theoretical contribution, this study has practical implications and opens up several new exciting research directions. One concerns patients who experience difficulties expressing their emotions. A large body of clinical and scientific literature (Grabe et al., 2008; Leweke, Bausch, Leichsenring, Walter, & Stingl, 2009; Ogrodniczuk, Piper, & Joyce, 2005) has shown that such patients induce boredom and frustration among therapists and are at high risk for dropout. This is unfortunate, since difficulties in verbalizing emotions constitute a vulnerability factor for many psychological and psychosomatic disorders. The current findings suggest that stimulating the release of OT at the beginning of the sessions (e.g., via social or romantic thoughts and associations; see Uvnas-Moberg & Petersson, 2005) might be a way to motivate SSE and improve patient–therapist communication.

A second research direction pertains to the prevention of trauma. As mentioned earlier, most victims of traumatic events manifest a need to talk. Yet one of the few key elements that distinguish people who develop a posttraumatic stress disorder from those who do not is that the former keep a small part of their experience secret (see Rimé, 2009). As this kernel concerns emotions rather than facts, getting these people to talk about the event usually does not help as long as emotions remain undisclosed. Future studies should examine whether oxytocin release helps overcome the barriers to these buried emotions.

Finally, a third direction relates to health. Although the effect of OT on physical health awaits investigation in humans, the current results hint that this peptide might prevent physical illness, not only directly (e.g. through its antagonist effect on cortisol) but also indirectly (e.g., through the elicitation of social sharing, which has positive effects on health).

Despite its contributions, this study suffers from several limitations. The first is that the sample comprised only men. The second is that the study relies on a written social sharing design. The reason is that investigating social sharing with an “oral paradigm” would have required two subjects (the speaker and the listener). As we were afraid of the biases that might be introduced by the reaction of the listener, we opted for a very simple design, the results of which could be easily interpreted. The third limitation is that the key dependent measure was a behavioral intention (i.e., to what extent they would be willing to share their emotions and/or the facts) and not a behavior

per se. There is a vast research literature showing that behavioral intentions do not always translate into actual behaviors. Therefore, future studies will need to replicate these results using a more ecological design and a behavioral measure of social sharing.

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