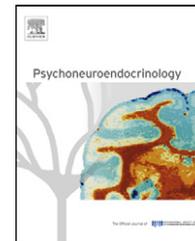


Available online at www.sciencedirect.com

SciVerse ScienceDirect

journal homepage: www.elsevier.com/locate/psyneuen

LETTER TO THE EDITOR

Oxytocin, attachment, betrayal and self-interest: A commentary on “Oxytocin modulates the link between adult attachment and cooperation through reduced betrayal aversion” by Carsten K.W. De Dreu, *Psychoneuroendocrinology*, doi:10.1016/j.psyneuen.2011.10.003

In their seminal study, Kosfeld et al. (2005) increased trusting behavior in male volunteers by administering oxytocin, a neuropeptide involved in regulating attachment and prosocial behavior in animals (Carter, 1998; Ross and Young, 2009). This observation highlighted the potential utility of oxytocin for increasing feelings of trust and prosocial behavior in such disorders as social anxiety and/or borderline personality disorder (Bartz and Hollander, 2006; Kosfeld et al., 2005). Although subsequent studies have linked oxytocin with increased trust perceptions and behavior—albeit with some caveats (Bartz et al., 2011b)—a compelling illustration of the idea that oxytocin could help at risk individuals can be found in Carsten De Dreu’s paper that was recently published in *Psychoneuroendocrinology*. In De Dreu’s study, male participants received intranasal oxytocin or placebo and then played the Prisoner’s Dilemma (PD), a social dilemma game that is widely used to measure cooperative behavior. Individual differences in attachment anxiety and avoidance were measured at baseline via self-report. Results showed that oxytocin selectively increased cooperation/reduced defection in highly avoidant participants—specifically, avoidantly attached individuals who received placebo were more likely than their less avoidant/more secure counterparts to choose the defecting strategy, but this avoidance-generated difference in cooperative behavior was eliminated in the group who received oxytocin. (Oxytocin had no effect on cooperative behavior for more secure or more anxiously attached individuals in this study.) These data are striking because the defensive interpersonal barriers erected by avoidant individuals are generally thought to be difficult to break down (Fraley et al., 1998, 2000).

In fact, other researchers have also found that individual differences in attachment can moderate the social effects of oxytocin. Here, however, the picture is not so optimistic. In contrast to the beneficial effects of oxytocin on cooperation for more avoidantly attached individuals observed by De Dreu, others have found that oxytocin can exacerbate the

chronic interpersonal ambivalence associated with attachment anxiety—for example, oxytocin (versus placebo) negatively biased recollections of maternal care and closeness in more anxiously attached individuals (but positively biased such recollections in less anxious/more securely attached individuals; Bartz et al., 2010); moreover, oxytocin decreased trust and the likelihood of cooperation in those with borderline personality disorder (who have high levels of attachment anxiety; Bartz et al., 2011a). How are we to make sense of the differential effects of oxytocin for avoidant and anxiously attached individuals?

One clue might come from appreciating the profound differences between these two forms of insecurity. According to attachment theory (Bowlby, 1969; Mikulincer and Shaver, 2003), both attachment avoidance and anxiety arise from experiences with caregivers who fail to meet the child’s needs for felt-security; however, they differ in their form. In brief, avoidant attachment is thought to result from experiences with caregivers who have been consistently unavailable; to remedy the pain associated with such experiences the attachment system deactivated and related goals (e.g., for closeness and care) are suppressed. Avoidant individuals, thus, avoid and de-value emotional attachments and intimacy, and strive for independence, autonomy and self-reliance. Attachment anxiety, on the other hand, is thought to arise from experiences with inconsistently responsive caregivers; in an effort to secure attention and care from the elusive caregiver, the attachment system is “hyperactivated”. In contrast to avoidant individuals, anxious individuals have a strong desire for closeness but concomitant concerns about rejection and abandonment; this motivational juxtaposition produces a preoccupation with close relationships, and with the goal of securing love and commitment from significant others (for a more thorough discussion of the differences between attachment avoidance and anxiety see Mikulincer and Shaver, 2003). One hypothesis to explore is that oxytocin is acting on regions of the brain to activate the attachment system. This could explain why oxytocin is helpful for avoidant individuals whose attachment system is essentially turned off, but unhelpful for anxious individuals whose attachment system is operating in overdrive. It could also be that oxytocin is activating specific attachment-related goals (e.g., the desire for closeness and care). Again, this could be helpful for avoidant individuals, who have chronically suppressed such goals as a result of negative early caregiving experiences, but unhelpful for

anxious individuals, since activating such goals could further fuel their chronic yearnings for closeness.

In addition to showing that oxytocin decreases defection/increases cooperation for avoidant individuals, De Dreu found that the prosocial effects of oxytocin for avoidant individuals were mediated by reduced betrayal aversion. This finding is intriguing given the work described above showing that oxytocin makes rejection-sensitive/anxiously attached individuals less trusting and less likely to cooperate (Bartz et al., 2011a), as well as other work showing that oxytocin decreases cooperation when participants interact with an anonymous player versus someone whom they have met before (Declerck et al., 2010). It would seem that if oxytocin were primarily alleviating concerns about betrayal, then we might have expected oxytocin to also help those who are chronically rejection-sensitive, or those who are interacting with strangers, overcome their uncertainty and risk cooperation. Perhaps it is not so much that oxytocin is modulating betrayal aversion per se as it is modulating something more specific about the way avoidant individuals cope with betrayal aversion.

As noted, both attachment avoidance and anxiety are thought to be rooted in concerns about the availability of close others, but avoidant and anxious individuals differ in the ways they manage such insecurities. Avoidant individuals cope by devaluing closeness and emotional intimacy, and asserting their independence, autonomy, and self-reliance. Indeed, empirical evidence shows that avoidant individuals tend to be self-focused, indifferent to others, aloof and cold (e.g., Bartholomew and Horowitz, 1991), as well as on occasion selfish (Schachner and Shaver, 2004) and manipulative (Davis et al., 2004). Moreover, prior work shows that avoidant individuals (and especially avoidant-dismissive males) tend to use exchange (versus communal) norms when working on a group task with a potential close other (Bartz and Lydon, 2006; Study 1), and dislike others when they use communal norms in such situations (Bartz and Lydon, 2006; Study 2).

Thus an alternative, or additional, hypothesis for De Dreu's findings is that oxytocin may reduce defection/increase cooperation in avoidant individuals by attenuating their chronic self-interest. This hypothesis is difficult to rule out since defecting in the PD can be due to self-protective or self-interested motives (Coombs, 1973; Komorita and Parks, 1995) and, by the same token, cooperating (i.e., not defecting) in the PD can be due to reduced fear of betrayal or reduced self-interest. Although the betrayal aversion hypothesis was supported, it is hard to discount the self-interest hypothesis since this motive was not measured. Future work should address the self-interest hypothesis about oxytocin; here, however, measuring motives via self-report may not be ideal given what we know about peoples' insights into their own behavior (Nisbett and Wilson, 1977), and their willingness to disclose less socially desirable motives. An alternative possibility would be to create a situation that takes self-interest out of the equation. For example, participants could play the Assurance Game (AG), which eliminates self-interest motives because the payoff matrix is structured so that participants make the most money (i.e., the self-interested solution) when they chose the cooperative strategy (for discussion see Boone et al., 2010). Critically, however, self-protective motives remain in

play in the AG since cooperating when one's partner defects results in the lowest payoff.¹

In conclusion, identifying ways to increase prosocial behavior—especially in people who use distance, detachment and barriers as a mechanism to cope with the pain of prior unsatisfying close relationships—is an important endeavor. However, understanding the mechanism(s) by which oxytocin modulates (pro)sociality in humans is critical as such knowledge can help gauge when and for whom oxytocin will improve, leave unaltered, or worsen interpersonal cognition and behavior (Bartz et al., 2011b).

Conflict of interest

Jennifer Bartz has received funding from the Beatrice and Samuel A. Seaver Foundation and from the National Institutes of Health (1R21HD065276-01) to investigate the effects of oxytocin on social cognition in healthy individuals and individuals with autism spectrum disorders. The author declared that there is no conflict of interest.

Acknowledgements

I thank M. Joy McClure and John E. Lydon for their comments to an earlier version of this manuscript.

References

- Bartholomew, K., Horowitz, L.M., 1991. Attachment styles among young adults: a test of a four-category model. *J. Pers. Soc. Psychol.* 61, 226–244.
- Bartz, J., Simeon, D., Hamilton, H., Kim, S., Crystal, S., Braun, A., Vicens, V., Hollander, E., 2011a. Oxytocin can hinder trust and cooperation in borderline personality disorder. *Soc. Cogn. Affect. Neurosci.* 6, 556–563.
- Bartz, J.A., Hollander, E., 2006. The neuroscience of affiliation: forging links between basic and clinical research on neuropeptides and social behavior. *Horm. Behav.* 50, 518–528.
- Bartz, J.A., Lydon, J.E., 2006. Navigating the interdependence dilemma: attachment goals and the use of communal norms with potential close others. *J. Pers. Soc. Psychol.* 91, 77–96.
- Bartz, J.A., Zaki, J., Bolger, N., Ochsner, K.N., 2011b. Social effects of oxytocin in humans: context and person matter. *Trends Cogn. Sci.* 15, 301–309.
- Bartz, J.A., Zaki, J., Ochsner, K.N., Bolger, N., Kolevzon, A., Ludwig, N., Lydon, J.E., 2010. Effects of oxytocin on recollections of maternal care and closeness. *Proc. Natl. Acad. Sci. U. S. A.* 107, 21371–21375.
- Boone, C., Declerck, C., Kiyonari, T., 2010. Inducing cooperative behavior among proselves versus prosocials: the moderating role of incentives and trust. *J. Confl. Resolut.* 54, 799–824.
- Bowlby, J., 1969. Attachment and loss: vol. 1. Attachment. Basic Books, New York.

¹ Interestingly, the studies showing that oxytocin can decrease the likelihood of cooperation in anxiously-attached/BPD participants (Bartz et al., 2011a), and in participants interacting with strangers (Declerck et al., 2010), used the AG to measure cooperative behavior. That defection in the AG is attributable to self-protective motives also suggests that oxytocin does not reduce betrayal aversion for all people, or in all situations.

- Carter, C.S., 1998. Neuroendocrine perspectives on social attachment and love. *Psychoneuroendocrinology* 23, 779–818.
- Coombs, C.H., 1973. Reparameterization of prisoners dilemma game. *Behav. Sci.* 18, 424–428.
- Davis, D., Shaver, P.R., Vernon, W.L., 2004. Attachment style and subjective motivations for sex. *Pers. Soc. Psychol. Bull.* 30, 1076–1090.
- Declerck, C.H., Boone, C., Kiyonari, T., 2010. Oxytocin and cooperation under conditions of uncertainty: the modulating role of incentives and social information. *Horm. Behav.* 57, 368–374.
- Fraley, R.C., Davis, K.E., Shaver, P.R., 1998. Dismissing-avoidance and the defensive organization of emotion, cognition, and behavior. In: Simpson, J.A., Rholes, W.S. (Eds.), *Attachment Theory and Close Relationships*. The Guilford Press, New York, pp. 249–279.
- Fraley, R.C., Garner, J.P., Shaver, P.R., 2000. Adult attachment and the defensive regulation of attention and memory: examining the role of preemptive and postemptive defensive processes. *J. Pers. Soc. Psychol.* 79, 816–826.
- Komorita, S.S., Parks, C.D., 1995. Interpersonal-relations – mixed-motive interaction. *Annu. Rev. Psychol.* 46, 183–207.
- Kosfeld, M., Heinrichs, M., Zak, P.J., Fischbacher, U., Fehr, E., 2005. Oxytocin increases trust in humans. *Nature* 435, 673–676.
- Mikulincer, M., Shaver, P.R., 2003. The attachment behavioral system in adulthood: Activation, psychodynamics, and interpersonal processes. In: Zanna, M.P. (Ed.), *Advances in experimental social psychology*. Academic Press, New York, pp. 53–152.
- Nisbett, R.E., Wilson, T.D., 1977. Telling more than we can know – verbal reports on mental processes. *Psychol. Rev.* 84, 231–259.
- Ross, H.E., Young, L.J., 2009. Oxytocin and the neural mechanisms regulating social cognition and affiliative behavior. *Front. Neuroendocrinol.* 30, 534–547.
- Schachner, D.A., Shaver, P.R., 2004. Attachment dimensions and sexual motives. *Pers. Relat.* 11, 179–195.

Jennifer A. Bartz

McGill University, Department of Psychology, Montreal,
Quebec, Canada H3A 1B1

E-mail address: jennifer.bartz@mcgill.ca

2 February 2012

doi:10.1016/j.psyneuen.2012.03.003

LETTER TO THE EDITOR

Oxytocin, attachment, and self-regarding preferences in humans: Rejoinder to Bartz

KEYWORDS

Attachment styles;
Oxytocin;
Cooperation;
Self-interest

Growing evidence points to a mutually reinforcing influence between human attachment and attachment-related behavior on the one hand and the hypothalamic release of the neuropeptide oxytocin on the other. Circulating oxytocin negatively relates to self-reports of attachment anxiety and avoidance (Tops et al., 2007), positively associates with pro-social care in general (Zak et al., 2005) and towards one's children in particular (Feldman, in press). Administering oxytocin makes fathers more stimulating of their child's exploration (Naber et al., 2010), and activates neural circuitries related to empathy in women exposed to infant crying (Riem et al., 2011). And when interacting with strangers, intranasal oxytocin reduces fear of being exploited and betrayed (Baumgartner et al., 2008), increases trust (Kosfeld et al., 2005), and increases cooperative tendencies especially among individuals with high rather than low attachment avoidance (De Dreu, in press-a).

In her commentary, Bartz raises a number of issues on the relationship between oxytocin and attachment in general, and about the possible effects of oxytocin on cooperation

among individuals with varying degrees of attachment avoidance and attachment anxiety. These are excellent comments because they highlight that sometimes seemingly contradictory findings have been reported, which has important implications for the use of oxytocin in the treatment of psychosocial disorders and pathologies (Bartz and Hollander, 2006; Meyer-Lindenberg et al., 2011). Furthermore, Bartz provides some solid starting points for solving the puzzle at the conceptual (and eventually empirical) level. Here I build on, and critically reflect on some of the suggestions and issues raised.

1. Cooperation as a function of oxytocin and attachment revisited

An intriguing finding in the recent literature is that intranasal oxytocin sometimes alleviates and sometimes aggravates the problems associated with insecure attachment. In the study reported by De Dreu (in press-a), intranasal oxytocin *reduced* the tendency among individuals with high attachment avoidance to fear betrayal and to withhold cooperation. No effects for attachment anxiety were found. But in several studies, Bartz et al. (2010a,b, 2011); also see Rockliff et al., 2011) found that intranasal oxytocin *increased* the tendency among individuals with high attachment anxiety to have negative recollections about maternal care, and to approach others in a rather hostile manner. No effects for attachment avoidance were found.

To account for these findings, Bartz proposes that individuals with high attachment avoidance may have a relatively de-activated attachment system that comes to life when oxytocin is administered. Individuals with high attachment anxiety, in contrast, have a relatively activated attachment