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Oxytocin infusion increases charitable donations regardless of monetary resources

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ABSTRACT

This study examined if the prosocial effects of oxytocin (OT) extend from individuals to a generalized other who is in need. Participants played a series of economic games to earn money and were presented with an opportunity to donate a portion of their earnings to charity. OT did not significantly increase the decision to donate, but among the 36% of participants who did donate, people infused with OT were found to donate 48% more to charity than those given a placebo. The amount of money earned in the experiment had no effect on whether or not a donation was made or the size of a donation. This is the first study showing that OT increases generosity in unilateral exchanges directed toward philanthropic social institutions, as opposed to immediate benefits directed at individuals or groups.

Introduction

Charitable donations are a uniquely human form of indirect helping, often without any direct exposure to the beneficiary or direct knowledge of how the money will be used. Donations to charity are common, even in challenging economic times. For instance, Giving USA reports that in 2008 during "the worst economic climate since the Great Depression" US charitable donations exceeded $300 billion (Giving USA, 2009). In January 2010, a magnitude 7.0 earthquake hit Haiti, affecting the lives of three million people and killing nearly a quarter million people. In 3 weeks after the earthquake, $611 million was donated to US charities for Haiti relief (The Center on Philanthropy, 2010).

Social scientists have struggled to explain the frequency and extent of charitable giving. Both ultimate and proximate mechanisms for prosocial behaviors like charitable giving have been proposed. Evolutionary explanations for giving include status signaling (Glazer and Conrad, 1996) and establishing a reputation for giving to sustain indirect reciprocity (Nowak and Sigmund, 2005); for review see McCullough and Tabak, (2010). A prominent proximal explanation for charitable giving is the "warm-glow" utility flow (i.e., feeling good from doing good) from the act of giving (Andreoni, 2007). The warm-glow model posits that individuals receive a direct benefit from the act of giving itself, independent of the benefit that others receive. An implication of warm-glow utility is that individuals will give more when their incomes are higher (Andreoni, 2007).

There is some neurologic evidence supporting the warm-glow rationale for charity. Functional MRI studies have shown that giving to a charity whose cause one cares about is associated with activation in dopaminergic mid-brain regions (relative to not donating), the same brain regions that activate for the acquisition of primary rewards (Harbaugh et al., 2007; Moll et al., 2006). Charitable donations have also been associated with differential activity in the subgenual cortex (Moll et al., 2006), a region dense with oxytocin receptors that modulate ventromedial dopamine release (Barberis and Tribollet, 1996; Tribollet et al., 1992).

Oxytocin and prosocial behavior

An alternative biological explanation for charitable behavior may come from the hormone oxytocin (OT). OT is synthesized in the hypothalamus that acts as a neuromodulator in the brain (Evans, 1997; Insel, 1997) and is also released into peripheral circulation. In nonhuman mammals, OT has been shown to promote maternal care for offspring and sustains bonds between socially monogamous females and males (Insel and Young, 2001; Carter, 1998; Insel, 1997). In humans, endogenous OT release measured in blood rises when receiving positive

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social signals and is associated with subsequent prosocial behaviors, including trustworthiness (Zak et al., 2004, 2005) and monetary sacrifice (Morhenn et al., 2008). Intranasal OT infusion induces tangible prosocial behaviors toward strangers, including trust (e.g., Kosfeld et al., 2005; Mikolajczak et al., 2010) and generosity (Zak et al., 2007). Recent evidence has also established that peripheral OT release correlates with the subjective experience of empathy (Barraza and Zak, 2009).

The effect of OT on dyadic prosociality in humans is now well-established (Zak, 2011), but it is not known whether OT impacts helping done indirectly through institutions, as is common with charitable giving. Moreover, existing studies have used prosocial tasks that can be labeled as cooperative, where participants may benefit tangibly and directly from acting in an other-regarding manner. Charitable giving, on the other hand, does not result in an immediate tangible reward for the giver. The only known study to investigate the role of manipulated OT on unilateral prosocial transfers has found no OT effect (Zak et al., 2007). Participants played the "dictator game" in which each participant was matched with a specific, though anonymous, participant in the lab. They were given the choice to anonymously send some, none, or all of their allocated funds (ten dollars) to their matched participant. This is considered an example of altruism (e.g., Camerer, 2003), as there is no tangible reward (e.g., reciprocation, reputation building) possible from a transfer of money. There is some evidence that allelic variants for OT receptors are related to transfer in the dictator game (Israel et al., 2009). Charitable giving in natural settings is a unilateral transfer of money to strangers, but with one important difference: the eventual recipient has a perceived need.

The present study

Based on the existing research, we hypothesized that manipulating OT would increase both the likelihood and size of charitable donations relative to those on placebo. Charity outside the laboratory is typically based on earned income, not on unexpected profits. We sought to replicate this effect so that charitable donation decisions in the laboratory would be meaningful. To do this, participants were given an opportunity to earn varying amounts of money based on their performance in economic decision tasks. This allowed us to test a prediction of the warm glow model that higher earnings would increase charitable contributions.

We also examined whether an OT effect on donations may be contextually dependent by presenting participants with either one of the two different charitable organizations. One of these organizations is well-known to those in the United States (American Red Cross), while the other is less well-known by Americans (Palestinian Red Crescent Society). A recent study has found that OT infusion increases behaviors benefiting in-group members but not members of an out-group (De Dreu et al., 2010). As such, we were also able to test whether a charity that serves US citizens (in-group) would receive larger donations than a charity serving a non-US population (out-group).

Method

Participants

Male college students from the University of California, Los Angeles (N = 132, mean age 20.8 years, *sd* = 3.3) participated in this study. Participants were racially diverse, self-identifying as Asian (58%), Caucasian (20%), Latino/Hispanic (10%), Middle Eastern (5%), African American/Black (2%), and mixed ethnicity/other (5%). We randomly assigned participants to receive either 40 IU of OT (n = 72) or normal saline (placebo; n = 57) intranasally using a double-blind design across a series of sessions consisting of 8 to 19 participants each. Three participants were removed from analyses for having donations that were more than three standard a deviations above the mean.

Procedure

The experiment was approved by the institutional review boards at UCLA and Claremont Graduate University, and written consent was obtained from all participants prior to the experiment. All participants were given a medical screening by a licensed medical doctor for possible contraindications. Exclusion criteria included significant medical or psychiatric illness, medications that interact with OT, and drug or alcohol abuse. Participants were asked to refrain from consuming alcohol and illicit drugs for 24 h prior to entering the lab. After completing the medical screen, OT or placebo was administered.

Participants completed questionnaires by using computer for 60 min to allow OT to load following published pharmacokinetics on inhaled neuropeptides (Born et al., 2002). After the loading period, participants read self-paced instructions for the monetary decision tasks while seated in partitioned computer stations. A series of economic decision-making games were played (e.g., dictator game, trust game; for description see Zak, 2008) in order to compensate participants for the experiment and to test hypotheses not addressed in this paper. Moreover, by having participants engage in these decision tasks, this money could be perceived as earned money and not money they received out of a windfall.

Once the games were completed (approximately 70 min after infusion), participants were privately informed of their study earnings and presented with an option to donate some of their earnings to one of two identified charities. Participants were then paid their remaining earnings in private by a lab administrator. After the completion of the study, the participant donations were made to the charitable organizations.

Charity task

The experimenters handed participants a sheet of paper and informed participants that it contained information on their earnings for the experiment as well as a final task to complete before they were excused. Participants were once again reminded of their anonymity. The sheet simply asked participants if they would like to donate some of what they have earned to charity. The sheet identified the charity as either the American Red Cross or the Palestinian Red Crescent Society, along with a very brief description of the organization (differences in text in parentheses):

(The American Red Cross/The Palestinian Red Crescent Society), a humanitarian organization led by volunteers, will provide relief to (Palestinian) victims of disasters and help (people/Palestinians throughout the Middle East) prevent, prepare for, and respond to emergencies.

Results

Study earnings and donations

Participants earned $37.29 on average (range = $20–$79, *sd* = $11.40), with those in the OT condition earning slightly more than those in the placebo condition (OT = $38.50, *sd* = $11.42, placebo = $35.75, *sd* = $11.28, t (127) = −1.36, $p = 0.09$). We tested for an income effect on both the decision to donate and the size of the donation for those who made donations. People who made donations did not earn significantly more than those who did not (donor M = $38.06, non-donor M = $36.84, t (127) = −0.59, $p = 0.28$). Moreover, for those who made donations, the amount earned in the games was not correlated with the amount donated ($r = -0.02$, $p = 0.46$).

Oxytocin, charity type, and donation size

Forty percent of participants receiving OT donated money to charity (n = 29), while only 32% in the placebo condition made donations (n = 18), though this was not significant, $x^2(1) = 1.04$ and $p = 0.15$. Although more participants donated and made larger donations to the

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Red Cross, these differences were not significant, $x^2(1, N=129)=0.66$, $p=0.21$, Red Cross $M=\$4.30$, Red Crescent $M=\$4.00$, $t=-0.35$ and $p=0.32$.

To determine whether OT infusion had an effect on donation size, we conducted a 2 (treatment: OT/placebo) by 2 (charity: Red Cross/Red Crescent) between-subjects factorial analysis of covariance (ANCOVA) test, covarying earnings. We found a main effect for the treatment condition, $F(1, 124)=3.50$ and $p=0.03$, $\eta^2=03$. Participants on OT gave significantly more than those in the placebo condition (OT: \$1.92, placebo: \$1.02; Fig. 1 presents only those who made donations). There was no covariate main effect for earnings, $F(1, 124)=0.01$ and $p=0.91$, and the main effect for charity was not significant, $F(1, 124)=0.64$ and $p=0.21$, nor was there a significant interaction, $F(1, 124)=0.08$ and $p=0.39$. Selecting those who made donations, independent samples t-tests found that those on OT donated significantly more to the Red Cross than those on placebo, OT: \$5.12, placebo: \$3.09; one-tailed t $(25)=-1.83$ and $p=0.04$; Fig. 2. There was no difference between those on OT and placebo for donations to the Red Crescent, OT: \$4.31, Placebo: \$3.43; one-tailed t $(18)=-0.96$ and $p=0.35$. Significant results were unaffected by covarying ethnicity or removing those self-identified as "Middle-Eastern" from analyses.

Game effects

Prior to charity decisions, participants played a series of economic games including the dictator game and trust game. Larger transfers in the dictator game were found to positively correlate with the decision to donate ($r=0.26$, $p=0.05$) and the size of charitable contributions ($r=0.31$, $p=0.02$). Other behavior and outcomes (i.e., overall trust, reciprocity/trustworthiness, receipt of small/large dictator transfers, receipt of small/large trust transfers) in these games were not significantly associated with the decision to donate ($rs=0.02$–0.16, ns) or the donation amount ($rs=0.12$–0.13, ns). Moreover, these behaviors did not significantly affect the results above when used as covariates.

Discussion

This study is the first to demonstrate that oxytocin influences prosocial behaviors that have delayed and distant effects. Although the decision to donate itself was statistically unaffected by OT, we found that OT increased donations by 48% relative to placebo among those who made donations. These findings suggest that OT can promote acts of giving that indirectly benefit others. Unlike previous studies using a monetary task, the prosocial target in this study was an organization

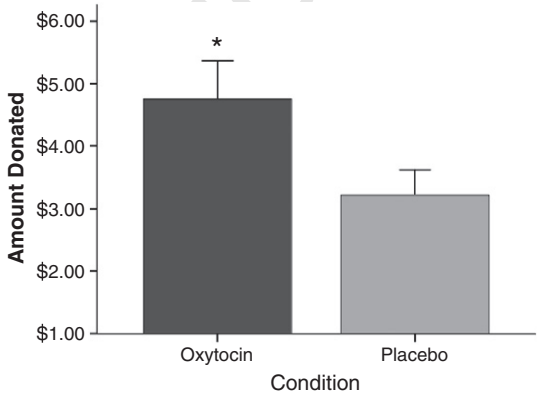

Fig. 1. The amount donated in dollars for participants who made donations (N = 47). As compared with placebo, oxytocin significantly increased the amount donated to charity (*$p<0.05$). Error bars represent standard error of the mean.

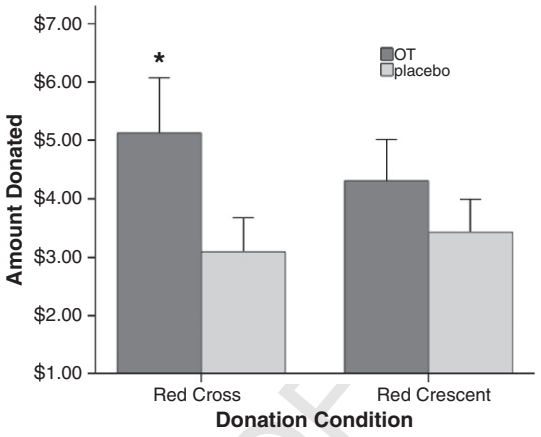

Fig. 2. Oxytocin administration increased donations for those who were presented with the option to donate to the Red Cross, as compared with donations to the Red Crescent (*$p<0.05$). Error bars represent standard error of the mean.

rather than a specific individual. Moreover, this study found that OT affects unilateral monetary transfers. A previous study found that 40 IU of intranasal OT did not affect a unilateral dyadic transfer in the dictator game (Zak et al., 2007). Although both the charity task and the dictator game share a similarity in that the action is unidirectional, the charity task may provide individuals with a stronger motive to donate money because of the perceived need of eventual recipients. It is also important to note that the qualities of charitable giving (i.e., indirect, delayed, distal helping) make it much more abstract than other monetary tasks for which an OT effect has been found (e.g., trust game, ultimatum game, prisoner's dilemma game).

It is possible that the charitable donation decision triggered an empathic response by being framed as an act of helping to alleviate the suffering of others, whereas the dictator game request was presented in a neutral frame. Endogenous OT release was recently associated with the subjective experience of empathy after viewing a highly emotional video (Barraza and Zak, 2009). Those who were most empathically engaged also showed greater generosity towards a stranger in a zero-sum share-the-money task.

Yet, t-tests suggested that the OT effect on donations may not impact all charities. Participants in the OT condition gave the most to the American Red Cross, versus the Palestinian Red Crescent Society. This finding would be in line with findings that OT infusion increases in-group benefiting behavior that comes at a cost to an out-group (de Dreu et al., 2010). The social psychological literature has found similar results indicating empathy-motivated helping as largely an in-group phenomena (e.g., Sturmer et al., 2005). However, we cannot rule out that the slightly larger donations to the American Red Cross were due to the organization's greater familiarity or existing attitudes toward each charity. Moreover, the lack of a significant interaction between treatment and organization, as well as the lack of measures indicating attitudes or familiarity with each charity, renders the group effect tentative. It is possible that an OT group-moderated effect may depend on existing intergroup dynamics or those elicited by the task used in a given experiment (e.g., zero-sum interactions, power imbalance, existing attitudes toward an "out-group").

We also found that the amount people earned in the experiment did not increase the frequency or size of donations. This finding is contrary to the prediction made by the warm-glow hypothesis that individuals will give more when their incomes are higher (Andreoni, 1990). It is possible that receiving greater earnings may have psychological consequences, such as making individuals more self-focused and less likely to help others (Vohs et al., 2006). A related limitation to our study, however, is that we did not measure participant socioeconomic status (SES). We may not have found a lab-

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generated "wealth" effect, but it is possible that existing SES may correlate with charitable donations in the lab.

Although a larger percentage of participants in the OT condition decided to make donations than in the placebo condition, this difference was not statistically significant. That OT may affect donation size but not the decision to donate may have several explanations. For instance, the donation appeal was designed to be as neutral and non-emotional as possible in order to examine the impact of OT in the most conservative case. Typical appeals by charities use emotional stimuli (e.g., a heart-wrenching image or emotional narrative). Given this simple appeal, it is possible that dispositional factors (e.g., giving habits, heuristics) had a greater impact on the decision to donate. Also, since the decision to donate was low (36% of the sample) it is possible that slightly raising OT may not affect the decision to engage in infrequent behaviors. Future studies can investigate stronger appeals that may enhance the frequency of donations, or include multiple charities from which to choose.

Our findings indicate that OT causes individuals to engage in acts of indirect generosity, increasing the size of monetary donations to charitable organizations. As there are no direct benefits to anonymous charitable giving for the donor, donation behavior can be seen as a form of altruism. These findings add to previous research showing that OT affects virtuous behaviors directed at individuals, revealing that OT affects a wide range of prosocial behaviors that may be considered uniquely human.

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