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Social Contagion of Vasovagal Reactions in the Blood Collection Clinic: A Possible Example of Mass Psychogenic Illness

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Objective: Observing or hearing about illness in another person can lead to reports of similar symptoms. Reports can occasionally be widespread. However, it has been difficult to document whether this is the result of genuine illness or the expression of anxiety with physical terminology. This study examined the effects of being able to see another blood donor experience vasovagal symptoms. ***Methods:*** Data were collected in mobile university blood collection clinics. Bedside research assistants coded whether the donor was able or not able to see another donor being treated for vasovagal symptoms. Dependent variables included subjective vasovagal symptoms indicated on the Blood Donation Reactions Inventory (BDRI) and the need for treatment oneself. Given the population of inexperienced donors, many (26% of the 1,209 participants) were able to see another donor treated for symptoms. ***Results:*** Being able to see another donor treated was associated with higher scores on the BDRI and an increased likelihood of treatment for vasovagal symptoms oneself. However, this was limited to non-first-time blood donors, perhaps because of higher levels in first-time donors (ceiling effects) or greater attention to the environment in less "overwhelmed" repeat donors. In general, donors who were able to see another react rated themselves as less relaxed and had smaller increases in heart rate. During the 2-year follow-up, first-time donors who were able to see another react were slower to return to give blood again. ***Conclusions:*** Seeing another donor being treated for symptoms contributed to the vasovagal process in many donors. This environment provides a useful context to study social influences on symptoms and illness.

Keywords: symptoms, vasovagal, social contagion, mass psychogenic illness, empathy, blood donation

Examples of mass psychogenic illness (MPI) have been reported since the Middle Ages (Sirois, 1974) and have fascinated scientists and the public alike. Several interesting phenomena are involved, including the role of suggestion in the production of physical symptoms (Lorber, Mazzoni, & Kirsch, 2007), perception and monitoring of physiological activity (Pennebaker, 1980), and social communication, although the patterns may be different for different events. For example, in the middle of the 20th century, fear of a "Mad Gasser" paralyzed the community of Mattoon, IL, for several weeks (Johnson, 1945). Several people reported symptoms consistent with chemical exposure, including nausea, vomiting, dryness of the mouth and throat, palpitations, and paralysis of the legs. The outbreak started with a midnight call to police claiming that a mother and daughter had been attacked by a deranged person with a canister of anesthetic gas and publication of a newspaper article dramatically titled "Anesthetic Prowler on Loose." Symptoms were usually experienced by women who were home alone at night. No environmental cause was ever determined, although debate about the existence of the Mad Gasser continues in the popular media today. A more "social" example of MPI occurred in a Montreal train station in 1981 (Moffatt, 1982). At the end of a long school trip, a hot and probably exhausted 14-year old girl fainted. Soon after, at least another six others in the group appeared to have fainted and reports of less severe vasovagal symptoms (dizziness, weakness, etc.) spread widely. Within the span of 2 hr, 30 children were sent by ambulance to the hospital, although all were discharged quickly with no long-term effects. The public nature of the environment may have accentuated the pace of the outbreak and the involvement of modeling.

As these examples suggest, the primary problem with this research area is that it is dominated by case reports (Clements, 2003; Gallay et al., 2002; Johnson, 1945; Jones et al., 2000; Kerckhoff & Back, 1968; Levine, 1977; Moffatt, 1982; Page et al., 2010; Sirois, 1974). Many of the reports are detailed and based on large samples, but the absence of control groups makes it difficult to discount alternative explanations and hypotheses. For example, do these processes produce actual physiological change and illness or simply influence symptom reports?

The question of whether or not social contagion of physical symptoms is "real" has important legal and public policy implications beyond the fascinating theoretical questions. Some have expressed concern that discussion of MPI may discourage thorough investigation of possible environmental causes of unexplained illness. For example, a recent outbreak of tics in New York

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State that was attributed to MPI caught the attention of environmental activist, Erin Brockovich (http://www.nytimes.com/2012/03/11/magazine/teenage-girls-twitching-le-roy.html?pagewanted=all&_r=0). On the other hand, lack of awareness and understanding of MPI could dramatically impair the ability of public health officials to deal with events such as a pandemic, industrial accident, or biochemical terrorist attack (Bartholomew & Wessely, 2002).

In a recent study, Lorber et al. (2007) attempted to develop a laboratory analogue of MPI. Half of the participants were asked to inhale a suspected mild environmental toxin (in reality, plain air) in the presence or absence of a confederate who modeled expected symptoms. Women who observed the confederate experiencing symptoms were more likely to report symptoms themselves. Although promising, the study was limited by the fact that the effect was not specific to those who inhaled the placebo (in general, women who observed the confederate experiencing symptoms reported symptoms) and the self-report nature of the data.

The research presented here approached the question somewhat differently, attempting to blend naturalistic observation with some degree of experimental control. One public environment where physical symptoms are often observed is the blood donation clinic. There are several reasons that blood donor clinics are well suited to this kind of research. First, although the procedure is safe and relatively painless, it is at least somewhat anxiety-provoking because of the insertion of a fairly large needle in the arm for a fairly long period of time (e.g., 15 min) and withdrawal of a significant amount of blood that is usually visible to the donor. At the same time, there are substantial individual differences in anxiety, and it usually drops significantly with experience. Regardless, the procedure also inevitably involves some physical sensations that might be construed as aversive and symptoms of ill health, including pain, weakness, and perhaps dizziness. Once again, these can be quite mild, and more experienced donors are less likely to experience pain and vasovagal symptoms, but the nature of the procedure ensures at least some physical stress. Finally, most mobile blood clinics are very public events, with beds close together.

As a result, it is not surprising that the idea of psychosocial contagion of vasovagal symptoms is common clinical lore in blood collection and has been described as "epidemic fainting" (Hillyer, 2009). That said, to our knowledge only one study has systematically examined this question before (Ferguson & Bibby, 2002). The investigators found that donors who said they saw others faint felt more faint themselves compared with donors who did not report seeing another donor faint. Although an interesting observation, the results are limited by the self-report nature of the data in the ability of participants to observe fainting and fainting themselves. Further, asking participants directly if they had seen another donor faint may have biased reports.

The study presented here was part of a trial examining the effects of the muscle-tensing technique, applied tension (AT), on blood-donation-related vasovagal symptoms (Ditto, France, Albert, & Byrne, 2007) that included several objective measures of symptoms including some from an independent observer—a bedside research assistant (RA). In addition to noting whether or not the participant required treatment for symptoms and so forth, the RA recorded whether or not any other donors could be seen receiving treatment. Associations between being able to see such an event and various blood donation outcomes were examined.

Methods

Participants

Data were obtained in the context of a study examining the effects of several versions of AT on blood-donation-related vasovagal symptoms and donor return in 1,209 participants (Ditto et al., 2007; Ditto, France, Albert, Byrne, & Smyth-Laporte, 2009). AT is a simple muscle-tensing technique commonly used in the treatment of blood and injury phobias that has been adapted for nonphobic medical patients (Ditto, France, Lavoie, Roussos, & Adler, 2003; Ditto, Wilkins, France, Lavoie, & Adler, 2003). Participants were healthy adults, operationalized by their acceptance as blood donors by the provincial blood collection agency, Héma-Québec, in mobile clinics held in local colleges and universities. Those who were subsequently able to see or not able to see another donor react did not differ in age, sex, body mass index, previous blood donation experience, whether or not they practiced AT or the version of AT, or predonation anxiety (see Table 1).

Procedure and Measures

Participants were recruited after they registered at the blood clinic. They completed a brief predonation questionnaire requesting demographic information and ratings of anxiety via an abbreviated version of the Spielberger State Anxiety Inventory (Spielberger, Gorsuch, & Lushene, 1970). Two measures of resting blood pressure and heart rate were obtained with the arm supported at heart level using a Thermor Model 7052–1 digital monitor (Markham, Ontario, Canada). The participant was assigned randomly to condition and, if applicable, watched a 2-min video depicting one of five slightly different versions of AT (e.g., repeated 5-s cycles of whole-body isometric muscle contraction, contraction of just the legs or just the arms). The use of different

Table 1
Characteristics of Donors Who Were Able (n = 315) or Not Able (n = 887) to See Another Donor Being Treated for Symptoms (% or M ± SE*)*

Characteristics	Not able	Able
Sex (% female)	51	48
Body mass index (kg/m^2)	23.6 ± 0.1	23.9 ± 0.2
Age (years)	22.0 ± 0.1	21.7 ± 0.2
Previous donations (#)	2.2 ± 0.1	2.3 ± 0.1
Assigned to AT condition (%)	84	80
Predonation anxiety (units)	3.7 ± 0.1	3.7 ± 0.2
Time of arrival (min from midnight)	816 ± 4.3	838 ± 7.2*
Wait time (arrival to chair)	33 ± 0.7	36 ± 1.1*
Initial relaxation rating (units)	79.0 ± 0.6	78.4 ± 1.1
Ease of needle insertion (nurse rating)	1.6 ± 0.3	1.6 ± 0.5
Needle adjustment required (%)	21	17
Pre and post physiological change:		
Systolic blood pressure (mmHg)	−5.4 ± 0.6	−5.4 ± 1.0
Diastolic blood pressure (mmHg)	−0.5 ± 0.4	−0.5 ± 0.6
Heart rate (bpm)	4.6 ± 0.4	2.6 ± 0.7*

* $p < .05$.

versions of AT was intended to distinguish important components, although, as noted above, there was no association between a participant's randomly determined experimental condition and whether or not they could see another donor being treated for symptoms. More details concerning the study population and procedures of the trial can be found in Ditto et al. (2007).

After these initial activities, the participant proceeded through the normal blood donation screening and withdrawal procedures. The interventions and other study procedures were designed to minimize the effect of the research on the functioning of the blood collection clinics. Upon their arrival at the chair, the participant was visited by a research assistant who reminded them to practice the assigned technique, if any, and requested a verbal rating of relaxation on a scale of 0–100. However, in general, the RA was instructed to allow the phlebotomist to conduct the procedure uninterrupted and discreetly record several variables such as whether the participant required treatment for vasovagal symptoms and whether other donors who were being treated for symptoms could be seen from the vantage of the participant. At the end of the blood draw, just before they were about to stand up, another rating of relaxation was obtained. The RAs were not informed of the hypothesis concerning the effects of observation on vasovagal symptoms.

Afterward, the participant completed a longer postdonation questionnaire including the Blood Donation Reactions Inventory (BDRI; France, Ditto, France, & Himawan, 2008) while seated in the recovery area. The BDRI assesses subjective vasovagal symptoms of faintness, dizziness, lightheadedness, and weakness. Visual analogue ratings of pain due to the screening finger prick, the blood donation venipuncture, and arm pain during the donation were also obtained as well as several measures unrelated to the research presented here. Finally, two more measures of heart rate and blood pressure were obtained.

Data Analyses

As noted above, there were no significant differences, or anything that approached significance, between those who were able to see or not see another donor being treated for symptoms in demographic characteristics such as age, sex, and previous blood donation experience. The procedures of the two groups began similarly. There were no differences in ratings of relaxation when they arrived at the donation chair, phlebotomist ratings of the difficulty of needle insertion, or whether or not a needle adjustment was required. However, people who were able to see another donor react entered the clinic somewhat later in the day and had longer wait times between registration and arriving at the chair (see Table 1). As a result, time of entry and wait time were included as covariates in all analyses.

To address possible alternative explanations of the results, several measures of vasovagal symptoms were used. For example, although the BDRI has excellent psychometric properties (France et al., 2008), it is a self-report measure that might be influenced by other factors beyond the experience of vasovagal symptoms. This issue will be discussed in more detail below. Observational measures might seem more promising, although symptoms such as pallor, sweating, and sighing vary considerably between people, and even the presence or absence of vasovagal syncope (fainting) can be difficult to determine, especially without direct access to the patient (Ritz, Meuret, & Ayala, 2010). Outright fainting is also relatively uncommon in blood clinics (3% according to RA reports in the case presented here).

As a result, the primary dependent measure used in the study was whether or not the participant was treated for vasovagal symptoms. This was viewed as an excellent index of vasovagal symptoms for several reasons, including the fact that it is based on the judgment of experienced clinicians who monitor the donor carefully. A donor who is judged to be experiencing a reaction is treated by lowering the head relative to the legs and perhaps other means, such as applying a cool cloth to the forehead. Often, the phlebotomist requests the assistance of others. Thus, the presence or absence of treatment for vasovagal symptoms is a clear, easily observed index that did not require a subjective judgment by the RA.

On the other hand, it could be argued that the public nature of treatment for vasovagal symptoms could influence phlebotomist behavior as well as donor symptoms. Given the experience of most phlebotomists in the recognition and treatment of vasovagal symptoms, it is unlikely that treatment in any case was initiated without reason, but it is possible that some may have initiated treatment more quickly in an environment where reactions seemed common. As a result, several measures of vasovagal symptoms that were not based on RA reports were also examined. The BDRI provides a measure of vasovagal symptoms from the perspective of the participant as opposed to the phlebotomist. Another advantage is that it taps more subtle symptoms such as mild dizziness and weakness. A potential disadvantage of the BDRI is that participant ratings of symptoms might be influenced by the actions of the phlebotomist (e.g., "I must be feeling dizzy since the phlebotomist raised my legs"). To address this possibility, analyses of BDRI data were conducted with and without treatment as an additional covariate.

Furthermore, these behavioral and self-report measures were supplemented by three physiological indices of the vasovagal process (heart rate, systolic and diastolic blood pressure) and information about subsequent blood donor return (Ditto et al., 2009). The physiological variables are especially useful as potential objective measures of vasovagal symptoms.

The primary independent variable used in the study was whether or not the donor could, based on the orientation of their chair and events in the clinic, see another donor being treated for symptoms. In general, it was predicted that those who were able to see another donor being treated for symptoms would be more likely to experience symptoms themselves. On the basis of their lack of familiarity with the blood donation environment and their well-documented risk for vasovagal reactions (Callahan, Edelman, Smith, & Smith, 1963; Graham, 1961; Meade, France, & Peterson, 1996), it was also predicted that first-time donors would be especially susceptible to the effects of seeing another donor treated for symptoms. Ferguson and Bibby (2002) found that "occasional" donors who observed others experiencing symptoms were less likely to return to give blood afterward. As a result, participants were also divided into first-time and repeat donors, and this factor was included as an additional independent variable along with the interaction with observation.

Continuous measures such as the BDRI were analyzed using 2 (Able vs. Not Able to See Another Donor Being Treated) × 2 (First-Time vs. Repeat Donor) analyses of covariance (ANCOVAs). A similar logistic regression equation was used for the dichoto-

mous outcome variable of being treated for vasovagal symptoms oneself.

Results

According to the bedside RAs, 26% of the participants were able to see another donor being treated for symptoms (see Table 1).

Vasovagal Symptoms, Relaxation, and Pain

There was a significant interaction between experience and being able to see another donor treated for symptoms on receiving treatment for symptoms oneself (odds ratio [OR] = 2.50, 95% confidence interval [CI] = 1.16–5.39, $p = .02$, McFadden's $R^2 = .05$). It is somewhat surprising to note that the effect of being able to see another react was observed in repeat rather than first-time blood donors, as can be seen in Figure 1. Among repeat donors, risk of requiring treatment for vasovagal symptoms oneself doubled if another donor could be seen receiving treatment (OR = 2.09, 95% CI = 1.26 – 3.46, $p = .004$, McFadden's $R^2 = .02$). Likewise, the ANCOVA of BDRI scores produced a significant interaction between experience and being able to see another donor treated for symptoms ($F(1, 1121) = 8.42$, $p = .004$, $\eta^2 = .007$) because of an increase in symptoms reported by repeat donors who could see another react compared with those who could not ($\bar{X} = 2.4 \pm .2$ vs. $1.8 \pm .1$; $F(1, 786) = 4.56$, $p = .033$, $\eta^2 = .006$). This effect was maintained when the receipt of treatment by participants was included as an additional covariate ($F(1, 1119) = 3.88$, $p = .049$, $\eta^2 = .002$).

The ANCOVA of final relaxation ratings produced a significant main effect of being able to see another donor react ($F(1, 1126) = 6.22$, $p = .013$, $\eta^2 = .006$). Overall, participants who were able to see another donor react rated themselves as less relaxed after the blood draw ($\bar{X} = 85.4 \pm .8$ vs. $87.2 \pm .5$). This was not moderated by experience—the interaction effect was not significant. The effect on relaxation ratings was not simply a response to treatment for vasovagal symptoms. The effect was maintained after inclusion of treatment as an additional covariate in the ANCOVA ($F(1, 1124) = 4.15$, $p = .042$, $\eta^2 = .004$).

On the other hand, there were no significant main effects or interactions in the ANCOVAs of the three measures of blood donation pain (all $p > .25$).

Physiological Measures

The physiological measures were analyzed using 2 (Able vs. Not Able to See Another Donor Being Treated) × 2 (First-Time vs. Repeat Donor) × 2 (Time: Predonation vs. Postdonation) ANCOVAs. The only significant effect in the analysis of systolic blood pressure was the main effect of time. Blood pressure decreased from the beginning to the end of the procedure (Table 1; $F(1, 1103) = 4.77$, $p = .029$, $\eta^2 = .004$). The expected complementary prepostdonation increase in heart rate was also observed ($F(1, 1102) = 4.75$, $p = .029$, $\eta^2 = .004$). However, in addition, the ANCOVA of heart rate produced a significant interaction between time and being able to see another donor receive treatment ($F(1, 1102) = 6.31$, $p = .012$, $\eta^2 = .006$). Donors who were able to see another being treated had significantly smaller increases in heart rate from the beginning to the end of the procedure (see Table 1). This effect was maintained after inclusion of treatment for vasovagal symptoms as an additional covariate ($F(1, 1100) = 6.35$, $p = .012$, $\eta^2 = .006$). There were no significant effects in the ANCOVA of diastolic blood pressure.

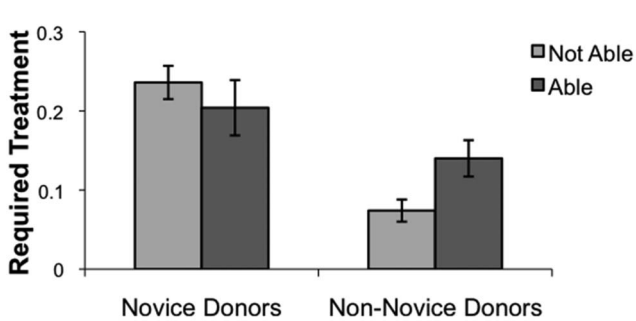

Figure 1. Nurse-initiated treatment for vasovagal symptoms in donors who were able and not able to see another donor react ($M \pm SE$).

Blood Donor Return

Follow-up data concerning the number of subsequent blood donations in a 2-year period were obtained from the provincial registry for 1,059 (88%) of the participants. Although not the main focus of the study, it was interesting to examine the possible effect of seeing another donor react on subsequent blood donation behavior. There was no effect on whether or not people returned to give blood at some point. Sixty-five percent of people who could not see another react and 67% of those who could see another react returned to give blood at some point during the 2-year follow-up. However, there was a difference in time to the first subsequent donation in first-time but not repeat donors (see Figure 2). Because not everyone returned, these data were evaluated using survival analysis with identical covariates. A significant log-rank difference was observed among first-time donors, indicating slower return among those who may have seen another individual react compared with those who did not, $\chi^2(1) = 4.44$, $p = .035$.

Although some main effects of sex were observed, addition of sex to the ANCOVAs and other analyses did not influence the pattern of the results, with exception of the finding concerning time to return. The slower return of first-time donors who may have seen another react was driven by first-time female donors, $\chi^2(1) = 4.56$, $p = .033$. First-time male donors who may have seen another donor being treated returned as quickly as first-time male donors who did not.

Discussion

Being able to see another donor treated for vasovagal symptoms had several effects on blood donation outcome, including a significant increase in the need for treatment for vasovagal symptoms oneself. The fact that phlebotomists were more likely to initiate treatment for these individuals is a key finding, although it might be argued that this was due to the phlebotomist seeing another donor react, anticipating symptoms in the patient, and beginning treatment on a preventive basis. This seems unlikely for several reasons. First, most phlebotomists are very experienced in blood withdrawal and the recognition and treatment of vasovagal symptoms. In fact, in Quebec, blood is obtained by teams that include a nurse, who inserts and removes the needle and supervises the procedure, and an assistant, who remains with the donor through-

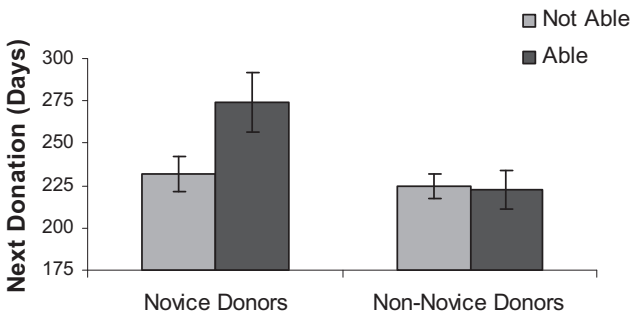

Figure 2. Time until the subsequent blood donation in donors who were able and not able to see another donor react ($M \pm SE$).

out the procedure. Thus, the donor is monitored closely and the team is unlikely to unnecessarily initiate treatment. There is also a practical incentive for caution. Once treatment is initiated, the needle must be withdrawn, which may render the donation useless. Blood donation bags come with a premixed anticoagulant/preservative solution in anticipation of a specific volume of blood. If this is not obtained, then the sample is discarded and the blood, the participant's time, and clinic resources may be "wasted." In the sample presented here, 51% of donors treated for vasovagal symptoms produced a full unit of blood compared with 95% of those who were not treated. Finally, the effect of observation on the BDRI and other variables was maintained after statistical adjustment for treatment. Nevertheless, given the importance of this potential confound, future research should more directly examine phlebotomist behavior.

The lack of an association between being able to see another donor react and treatment for vasovagal symptoms oneself in first-time donors was somewhat unexpected. We originally expected that the observation of symptoms in others would be especially likely to affect people without previous blood donation experience. However, the results are perhaps not surprising. First, as can be seen in Figure 1, the percentage of first-time donors who required treatment was high. This may have created a ceiling effect, making it difficult to observe more subtle influences such as the effect of being able to see another donor react. First-time donors were also significantly more anxious than repeat donors (results not reported), raising the additional possibility that they focused less on their surroundings. An interesting complementary idea is related to Schachter and Singer's (1962) classic suggestion that people interpret physiological cues using information about the external and internal environment. That is, repeat donors who, by definition, had successfully undergone the procedure before were probably less likely to anticipate physical sensations at the outset. As a result, compared with first-time donors who had a clear explanation for any physical sensations they might experience (i.e., anxiety), repeat donors might have been more likely to become alarmed by subtle physical sensations in the presence of another donor who was being treated for vasovagal symptoms, leading to further escalation. Although an interesting notion, this is obviously speculative, and further research is required to sort out these ideas.

Although the results emphasize effects on non-first-time donors, the results concerning donor return (see Figure 2) suggest that first-time donors may not have been entirely "unscathed" by seeing another donor react. It may have been difficult to observe significant effects on vasovagal symptoms in first-time donors, but the slower return suggests some reticence about the procedure, particularly in first-time female donors. Speed of return is clinically important because it is a well-documented predictor of likelihood of becoming a regular blood donor (James & Matthews, 1993; Schreiber et al., 2005). This finding also partially replicates those of Ferguson and Bibby (2002). In addition to noting an effect of observation on self-reported vasovagal symptoms, they found that occasional donors who reported seeing another donor experience symptoms were significantly less likely to return to give blood again.

The apparent corroboration of the effect of being able to see another donor react on vasovagal symptoms by changes in heart rate is intriguing. Although a decrease in heart rate was not observed, those who were able to see another donor treated for symptoms did not display as large of an increase from the beginning to the end of the procedure. In the absence of a vasovagal reaction, the normal physiological response to mild-moderate hemorrhage includes a sympathetically mediated increase in heart rate to help maintain blood pressure in the face of blood loss (Chien, 1967). In contrast, vasovagal reactions usually include a decrease in heart rate that is at least partly due to an increase in parasympathetic nervous system (vagal) activity. Although continuous measures of physiological activity were not obtained and heart rate did not decrease from baseline levels, the results suggest that being able to see another treated for symptoms produced a change in autonomic nervous system activity consistent with a vasovagal reaction, buffering the increase in heart rate. Once again, further research is required, but the findings of this objective measure increase confidence in the general pattern of results.

Social influences appear more likely to influence symptoms with a strong affective component such as pain (Langford et al., 2006; Singer, 2006). For example, Botvinick et al. (Botvinick et al., 2005) alternately administered painful thermal stimuli to participants and had them view facial expressions of pain in others during functional magnetic resonance imaging scanning. They found that viewing others in pain stimulated similar areas of the brain as experiencing pain oneself, although Singer et al. (Singer et al., 2004) argue that empathetic activation occurs primarily in areas involved in the emotional as opposed to sensory aspects of pain, such as the anterior cingulate cortex (ACC). Likewise, Wicker et al. (Wicker et al., 2003) found that looking at facial expressions of disgust elicited similar brain activity to smelling disgusting scents, including sites in the anterior insula and the ACC. This may be related to the research presented here given the links among disgust, dizziness, and the vasovagal response. However, an important feature of this study is the fact that observation produced not only subjective symptoms and evidence of a physiological response but (also) a clinically relevant (albeit brief) illness.

There were several additional limitations to this study. Although the ability to examine symptoms in donors who could and could not observe others with symptoms (i.e., a control group) was a major advantage of the study, it was not possible to assign participants a priori to observe and not-observe conditions. A certain degree of randomness was created by the large scale of the clinics, the unpredictability of vasovagal symptoms in others, and arbitrary

decisions about things such as bed assignment, but this was not under experimental control. Related to this is that, among those who had the opportunity to observe another donor react, it is not possible to determine whether or not participants actually noticed the event. They were not questioned directly about this issue. On one hand this is desirable because it eliminated demand characteristics and possible priming of responses. On the other hand, we cannot be certain that participants were equally observant of their surroundings, although this is a conservative source of error.

Although the results are consistent with the notion of social contagion of symptoms and a quasi-experimental "model" of MPI would be very useful, is this really an example of MPI? Bartholomew and Wessely (2002) have described it as "the rapid spread of illness signs and symptoms affecting members of a cohesive group, originating from a nervous system disturbance involving excitation, loss or alteration of function, whereby physical complaints that are exhibited unconsciously have no corresponding etiology." In many respects, this definition appears to match what is happening in the blood clinic, such as the rapid development of vasovagal symptoms after observing another blood donor being treated for symptoms. On the other hand, the social contagion does not involve a great deal of priming or verbal interaction (although blood donors are routinely informed of potential adverse effects during recruitment and many classic examples of MPI such as the Mad Gasser involve relatively solitary individuals). Whether or not this is a useful environment to study MPI remains to be seen.

Finally, the results provide no insight into the level of processing of observational information. Participants who may have seen another donor react rated themselves as significantly less relaxed as they were just about to get up from the chair, but was this due to conscious awareness of symptoms in others or a vague, difficult-to-articulate sense of unease? In Pennebaker's (1980) study of social contagion of coughing in classroom, most people could not determine the reason for their symptoms. More recently, Afzal, Potokar, Probert, and Munafo, 2006 found that people at risk for gastrointestinal symptoms (irritable bowel syndrome patients) were especially sensitive to disorder-relevant words presented subliminally. Although blood donors do not suffer from a particular disorder (in fact, they are selected based on good health), given the nature of the environment it is reasonable to suspect that they are primed for information about vasovagal symptoms. For example, it is interesting that the lower ratings of relaxation in those who may have seen another donor react were not associated with increased pain. This also suggests that the results cannot be attributed to a general sense of anxiety triggered by viewing another donor react, which may have lead to higher ratings of pain as well as vasovagal symptoms. It would have been very interesting to monitor participants' awareness and recall of the blood donation environment.

The results are consistent with clinical lore and Ferguson and Bibby's (2002) initial finding that observing another donor experience vasovagal symptoms may contribute to the development of similar symptoms in oneself. The details of this fascinating process, with clinical and theoretical implications beyond the blood donation clinic, remain to be determined.

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