The Sweet Smell of . . . Helping: Effects of Pleasant Ambient Fragrance on Prosocial Behavior in Shopping Malls

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In a preliminary study, passersby in a large shopping mall were significantly more likely to help a same-sex accomplice (by retrieving a dropped pen or providing change for a dollar) when these helping opportunities took place in the presence of pleasant ambient odors (e.g., baking cookies, roasting coffee) than in the absence of such odors. Participants also reported significantly higher levels of positive affect in the presence of pleasant odors. In a second study, the order in which passersby were exposed to a helping opportunity and rated their current mood was systematically varied. Results similar to those of the first study were obtained; order of task had no effect on either mood or helping, but helping was significantly greater in the presence of pleasant fragrances than in their absence. In addition, there was some evidence that fragrance-induced increments in helping were mediated by increments in positive affect.

Human beings have been using pleasant fragrances since the dawn of civilization. For example, when archaeologists excavate the tombs of Egyptian pharaohs—persons who lived thousands of years ago—they often find jars containing traces of fragrant oils (used for anointing one's body) and various forms of incense—substances that, when burned, release pleasant odors. These two major uses of fragrance have continued until the present. Current magazines are filled with ads for perfumes and colognes, and sales of devices for releasing pleasant smells into the air have been rising steadily in recent years (Foderaro, 1988). Indeed, the present author has contributed in a small way to this activity: He has patented a device for enhancing indoor environments through air filtration, noise control, and the release of pleasant fragrances (Edwards, 1995).

Do pleasant fragrances actually yield the beneficial effects that many persons assume? This question has recently received increased attention from social psychologists (e.g., DeBono, 1992; Knasko, 1993; Ludvigson & Rottman, 1989; Warm, Dember, & Parasuraman, 1991). In one sense, this growing interest in the potential effects of pleasant odors represents a logical extension of a line of investigation that has continued for more than 20 years in social psychology: efforts to study the effects of environmental variables such as temperature (Anderson, Deuser, & DeNeve, 1995; Baron, 1983a), lighting (Baron, Rea, & Daniels, 1992; Gifford, 1988), noise (Becker et al., 1992), and air quality (Baron, 1987) on social behavior. Within this context, ambient fragrances merely constitute an additional aspect of the physical environment that may, potentially, influence behavior.

However, research on this topic also represents a scientific response to strong claims by aromatherapists and others to the effect that pleasant fragrances exert powerful (one might even say magical) effects on behavior (Tisserand, 1977). Social psychologists interested in effects of the physical environment find such claims disturbing because they rest largely on informal observation rather than systematic data. The present study and several previous experiments on the potential effects of pleasant odors (e.g., Baron & Bronfen, 1994; Baron &

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Thomley, 1994; Knasko, 1995; Warm et al., 1991) were undertaken to help replace such speculation with scientific knowledge.

Initial research by social psychologists on the effects of pleasant fragrances focused on their use as aids to personal grooming. Such research considered the question of whether individuals could enhance their attractiveness to others through the use of scented products such as perfumes and colognes (Baron, 1981, 1983b, 1986). More recently, researchers have turned their attention to the second use of fragrance noted above: its release into the air as a means of enhancing indoor environments. In this context, pleasant odors are not associated with a specific person; rather, they are used simply to render indoor environments more pleasant. As noted earlier, research on this topic can be viewed as an extension of previous research on the effects of the physical environment on social behavior (cf. Baron, 1994; Bell, Fisher, Baum, & Green, 1996; Gifford, in press). The results of several recent studies on this topic (e.g., Warm et al., 1991; Dunn, Sleep, & Collett, 1995) indicate that ambient pleasant odors do indeed influence behavior. For example, in two related investigations (Baron & Bronfen, 1994; Baron & Thomley, 1994), participants worked on fairly complex cognitive tasks (forming words from scrambled letters; decoding messages) either in the presence or in the absence of several different odors previously rated as very pleasant by judges. Performance on these tasks was significantly better in the presence of these odors than in their absence. Further, when asked to help either the experimenter (by volunteering to participate in another study without compensation) or another participant, persons who worked in the presence of the pleasant odors showed significantly greater helping both immediately and at a later time (i.e., a higher proportion of persons exposed to pleasant fragrances completed a questionnaire at home on their own time and returned it to the experimenter).

Previous research also suggests one potential mechanism through which ambient fragrances might influence social behavior: by producing mild increments in positive affect. Several findings offer support for this possibility. First, in some recent studies (e.g., Baron & Thomley, 1994), participants exposed to pleasant odors reported higher levels of positive affect than those not exposed to such odors. Similarly, hospital patients exposed to pleasant odors report significantly greater improvements in mood than patients not exposed to such aromas (Dunn et al., 1995). Finally, exposure to pleasant fragrance has been found, in two studies, to increase helping to the same extent as receipt of a small, unexpected gift (Baron & Bronfen, 1994; Baron & Thomley, 1994). Because previous research indicates that receipt of a small gift produces increments in positive affect (cf. Isen, 1987; Spacapan & Oskamp, 1992), these findings suggest, through the method of *converging operations*, that the effects of pleasant odors on social behavior may also stem, at least in part, from fragrance-generated increments in positive affect (Garner, Hake, & Eriksen, 1956).

The present study was designed to both replicate and extend previous findings concerning the effects of pleasant odors on social behavior and to further investigate the possibility that such effects are mediated, to some degree, by fragrance-induced increments in positive affect. Specifically, it sought to determine whether effects similar to those reported in previous laboratory studies would also be obtained in a field setting and with helping tasks different in nature from those employed in previous investigations. To examine these questions, it was necessary to identify field locations where pleasant odors are present and where individuals can engage in spontaneous acts of helping. Shopping malls appeared to meet these requirements. In large malls, numerous businesses release pleasant odors into the air (e.g., bakeries, coffee-roasters, candle and scent retailers). Moreover, the high volume of shoppers provides ample opportunity to measure several forms of spontaneous helping behavior (cf. Levine, Martinez, Brase, & Sorenson, 1994).

On the basis of the studies described above, it was predicted that passersby would experience mild elevations in mood in the presence of pleasant odors and would, therefore, be more likely to engage in acts of spontaneous helping in the presence than in the absence of this environmental variable. To investigate this hypothesis and to establish appropriate methodology, a preliminary study was conducted. In this investigation, 232 passersby at a large shopping mall were exposed to one of two different opportunities to help a stranger: retrieving a pen dropped by an accomplice or providing the accomplice with change for $1. Immediately after exposure to one of these two helping opportunities, participants were approached by a second assistant and asked to rate their current mood on a simple 5-point scale (1 = *very bad*, 5 = *very good*). Results indicated that helping by passersby was significantly increased for both tasks by the presence of pleasant ambient fragrances ($p < .05$ in both instances). Moreover, persons exposed to pleasant fragrances reported being in a significantly more positive mood than persons not exposed to pleasant odors.

Interpretation of these findings was rendered somewhat problematic, however, by the fact that in this preliminary study, all participants were first presented with an opportunity to help a stranger and then, after this, were asked to rate their current moods. Previous research indicates that helping others can produce increments in positive affect (e.g., Williamson & Clark, 1989).

Thus it is possible that the higher levels of positive affect reported by participants in the pleasant-fragrance condition stemmed from their higher incidence of helping rather than from the presence of pleasant odors. To test this possibility, as well as to replicate the findings of the initial study, a second study—the one reported in detail here—was conducted.

METHOD

Participants and Design

Participants were 116 passersby in a large shopping mall. The study employed a 2 × 2 × 2 factorial design based on the presence or absence of pleasant odors, gender of passersby, and order (mood measure first, helping opportunity second; helping opportunity first, mood measure second).

Overview. Passersby in a large shopping mall were approached by two accomplices of the same gender as themselves. One of these accomplices asked for change for $1. The second accomplice indicated that he or she was conducting a study of the air quality in the mall and then asked participants whether they smelled anything in the air and, if they did, to rate this odor on a 5-point scale ranging from 1 (*unpleasant*) to 5 (*very pleasant*). The second accomplice also asked participants to rate their current mood, again on a 5-point scale (1 = *very bad*; 5 = *very good*). The order in which these two interactions took place was systematically varied so that half of the participants were first asked for help and then asked to rate the air in the mall and their own mood, whereas for the remaining half, the order of these events was reversed.

Permission to collect data was obtained from the mall director. Permission was granted with one restriction: that accomplices approach only persons of the same gender as themselves. (The mall director was concerned that cross-gender requests for help might be perceived as "pick-up" attempts and would thus be annoying to shoppers.) Specific locations where the study would be conducted were identified so that security guards and store managers could be alerted to the presence of the researchers.

Fragrance. Prior to the start of the investigation, the author and several other persons (graduate students and a psychologist) visited the mall to identify areas containing and not containing pleasant odors. Locations with pleasant fragrance were near such businesses as Cinnabon (a bakery), Mrs. Field's Cookies (a bakery), and The Coffee Beanery (a coffee-roasting cafe). In contrast, locations without pleasant fragrance were generally located near clothing stores and similar establishments (e.g., Banana Republic, Nine West, and Chess King). Every effort was made to match locations containing fragrance with locations not containing fragrance in terms of volume of pedestrians, mix of nearby stores, lighting, and proximity to mall entrances. Original plans called for conducting the fragrance and no-fragrance conditions in the same locations at times of the day when the businesses in question were, or were not, emitting pleasant odors. However, this proved to be impossible because detectable odors were present near most of the odor-producing businesses at all hours of the day. For this reason, it proved necessary to conduct the fragrance and no-fragrance conditions in different, but closely matched, locations.

Request for help and measures of helping. The accomplice approached an individual passerby and, showing a $1 bill, asked for change of this bill. Responses to the accomplice's request were scored as *helping* only if the passerby stopped and made change; all other responses (e.g., ignoring the accomplice, indicating verbally that the passerby did not have change) were scored as *no helping*. In all cases, the accomplices approached only passersby of their own gender who were walking toward them alone; passersby who were part of groups were not approached by the accomplices.

The study was conducted in the late morning (11:00 AM to 12:00 noon) and in mid-afternoon (2:00 PM to 4:00 PM) on weekdays. At these times, pedestrian traffic in the mall was moderate, and many passersby were alone rather than in groups.

Because of the questions asked of participants (e.g., "Do you smell anything?"), it was impossible to conceal from accomplices the fact that the study was concerned, in part, with the effects of odors. However, accomplices were unaware of the specific hypothesis under investigation and were carefully trained to behave in an identical manner across conditions and for all participants. Careful, unannounced observation of their behavior by the author confirmed that their behavior did not vary across conditions.

Additional demographic data. In addition to gender, observers recorded each participant's apparent age (20-30, 31-40, 41-50, 51-60, 61 and over), ethnic background (Caucasian, African American, Asian, Hispanic, American Indian, Asian Indian, other), and style of dress (very sloppy to formal).

RESULTS

Helping Behavior

To examine the effects of fragrance condition, task order, and gender on helping, a hierarchical loglinear analysis was conducted on the helping data. In this analysis, three variables—fragrance condition, order,

and gender—as well as all two-way and three-way interactions between these variables were examined. This analysis employed a backward elimination procedure ($p = .05$). Results indicated that only removal of the main effect for fragrance condition produced a significant χ^2 for the goodness-of-fit test, $\chi^2(1) = 26.13$, $p < .001$. Neither removal of order, $\chi^2(1) = 0.18$, $p > .71$, nor gender, $\chi^2(1) = 0.34$, $p > .085$, produced significant effects, nor did removal of any of the two-way interactions or the three-way interaction produce significant effects. These findings indicate that a higher proportion of passersby helped the accomplice when pleasant fragrances were present than when they were absent and that this was true for both female and male passersby and occurred regardless of the order in which participants in the study were exposed to the helping request and asked to rate their current moods. The proportion of individuals who helped the accomplice in each condition is shown in Table 1.

TABLE 1: Percentage of Passersby Who Helped the Accomplice as a Function of Presence of Pleasant Fragrance, Order, and Gender

	No Fragrance		*Fragrance*	
	Helping First	*Mood First*	*Helping First*	*Mood First*
Males	22.22	25.00	45.45	61.11
Females	16.67	12.50	60.87	59.09

Mood

An ANOVA in which fragrance, gender of participants, and order were the independent variables was performed on the data for self-reported mood. This analysis yielded one significant effect, that for fragrance condition, $F(1, 114) = 7.95$, $p < .01$. Participants exposed to pleasant fragrance reported higher levels of positive affect ($M = 4.11$) than those not exposed to pleasant fragrance ($M = 3.81$). No other effects in the analysis were significant.

Potential Mediating Role of Positive Affect

To examine the potential mediating role of positive affect (mood) with respect to the effects of pleasant fragrance on helping, procedures recommended by Baron and Kenny (1986) were adopted. These procedures involved a series of regression analyses. In the first, the proposed mediator (self-reported mood) was regressed on the independent variable (fragrance). In the second, the dependent variable (helping) was regressed on the independent variable (fragrance). Finally, in the third, the dependent variable (helping) was regressed on both the independent variable (fragrance) and the mediator (affect). According to Baron and Kenny, there would be evidence of mediation if the following findings emerged: (a) the independent variable affected the mediator in the first equation, (b) the independent variable affected the dependent variable in the second analysis, and (c) the mediator affected the dependent variable in the third equation, whereas the effect of the independent variable was reduced relative to the second analysis.

The results of these analyses indicated that fragrance condition was a significant predictor of mood ($\beta = -.253$, $t = -2.90$, $p < .005$) and was also a significant predictor of helping ($\beta = .119$, $t = 2.13$, $p < .05$). However, when the mediator (mood) was entered into the regression equation along with fragrance condition, fragrance condition was no longer a significant predictor of helping ($\beta = .158$, $t = 1.74$, $p > .08$). In other words, as required by the Baron and Kenny (1986) procedures, the effect of fragrance on the dependent variable was reduced relative to the second equation. Together, these findings offer some support for the suggestion that positive affect (i.e., current mood) mediates the effects of pleasant fragrance on helping. However, once again, this evidence should be interpreted with a degree of caution.

Participants' Awareness of Ambient Fragrance

Among participants in the fragrance condition, 64.4% reported smelling a fragrance. Among those in the no-fragrance condition, 35.6% reported smelling a fragrance, $\chi^2(1) = 4.93$, $p < .03$. Thus it appeared that participants were differentially aware of ambient fragrance in the two conditions.

Demographic Variables

A large majority of the shoppers were Caucasian, relatively young, and casually dressed. Analyses were performed to examine the potential effects of ethnic background, age, and style of dress on helping. None of these analyses yielded significant effects. Thus it appeared that within the limits imposed by the demographic characteristics of shoppers at this mall, the pleasant ambient fragrances exerted similar effects on passersby regardless of their ethnic background, age, or style of dress.

DISCUSSION

The present findings serve to replicate and extend those reported in previous research (e.g., Baron & Bronfen, 1994; Baron & Thomley, 1994; Warm et al., 1991). As in earlier studies, pleasant odors in the air significantly influenced the behavior of participants. Specifically, passersby were more likely to help the accomplice when pleasant fragrances were present in the air than when they were absent. These findings were obtained in a field setting—a busy shopping mall—with

tasks quite different from those employed in previous research. Moreover, they occurred regardless of the order in which participants were exposed to a helping opportunity and rated their current mood. Together, these findings suggest that the effects of pleasant ambient fragrances on behavior may be quite general in scope—that is, they may occur in a wide range of settings.

The present findings also provide additional support, albeit far from conclusive, for the suggestion that the effects of pleasant fragrances on social behavior stem, at least in part, from fragrance-induced increments in positive affect. Support for this suggestion is provided by the results of the regression analyses conducted in accordance with the Baron and Kenny (1986) model for testing mediating effects. These analyses indicated that fragrance condition was a significant predictor of current self-reported mood and a significant predictor of helping. However, this was no longer the case when mood was added to the regression equation. Although these results are consistent with the reasoning of the Baron and Kenny model, they should be interpreted with caution pending the collection of additional data. It should also be emphasized, once again, that there is no intention here of suggesting that affective states are the only potential mediator of pleasant fragrances. On the contrary, recent studies on the behavioral effects of fragrance suggest that other factors, too, may play a role (e.g., Knasko, 1993). Thus further research is clearly needed to obtain full understanding of the mechanisms through which pleasant fragrances influence behavior. What does seem clear from the present and previous findings, however, is that this environmental variable can indeed produce significant effects on some forms of social behavior.

At this point, it should be noted that the present findings are consistent with predictions derived from a model of the influence of affective states on social judgment proposed by Forgas (1995). According to this affect infusion model, the extent to which affective states influence social judgments—and, therefore, many forms of social behavior—is partly a function of the processing demands of a given situation. According to this model, when individuals can make decisions on the basis of previously formed judgments or make them in accordance with strong motivational pressures to reach particular judgments, the potential for affect infusion is low: The impact of current affective states on such judgments will be minimal (Forgas, 1995, pp. 46-47). In contrast, when individuals engage in more substantive processing, the potential for affect infusion is greater. One set of conditions under which affect infusion is expected to occur is described by Forgas (1995, p. 47) as involving *heuristic processing*. In such situations individuals have neither prior evaluations nor strong motivational goals but do wish to make judgments as quickly and effortlessly as possible because they do not view the decisions as important or as requiring high levels of accuracy and because they have limited time at their disposal. In such situations, Forgas suggests, the potential for affect infusion is great.

It can be argued that this is precisely the kind of situation confronted by passersby in the present research: They were approached by an individual who made a simple and relatively uncontroversial request; the decision as to whether to help this person was not an important one; and passersby, who were all walking toward some destination, may have experienced at least moderate time pressures. According to the affect infusion model, this situation was one in which affect elicited by unrelated conditions or events (in this case by pleasant fragrances) could readily influence judgments about whether to help the accomplice. Indeed, in describing situations involving heuristic processing, Forgas (1995, p. 47) specifically calls attention to the potential impact of environmental variables that can influence affective states—for example, uncomfortably high temperatures.

In short, the affect infusion model provides one useful framework for interpreting the finding that pleasant fragrances influenced helping in the present research. In addition, this theoretical framework suggests future studies that could shed additional light on the potential role of positive affect as a mediator of such effects. According to the affect infusion model, pleasant fragrances (or other environmental variables) would be less likely to influence judgments and behavior in situations in which individuals can draw on previously formed judgments about helping. For example, in the present context, the impact of pleasant fragrances might be reduced if the person in need of help appeared to be either especially deserving of assistance (e.g., a child, a handicapped person) or especially undeserving of help (e.g., a person who appeared to be drunk or on drugs). Under these conditions, most persons would have previously formed judgments about helping—strongly favorable in the first instance, strongly unfavorable in the latter case. According to the affect infusion model, positive affect from other sources (e.g., pleasant fragrances) would be less likely to influence their tendency to help under these conditions.

In contrast, the potential for affect infusion would be considerably greater in situations in which passersby were required to engage in substantive processing—for instance, if they were asked to respond to survey questions dealing with important aspects of their personal lives or attitudes they view as important (Forgas, 1995). These and other predictions derived from the affect infusion model can be readily tested in further research. The results of such studies may well yield further evidence on the potential mediating role of positive affect

with respect to the effects of pleasant fragrances on social behavior and social judgments.

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