The Effects of Health Information in a Worksite Hypertension Screening Program

Rick S. Zimmerman, PhD
Martin A. Safer, PhD
Howard Leventhal, PhD
Linda J. Baumann, PhD, RN

Two studies assessed the potential impact of health education messages at worksite blood pressure screenings. The messages sought to: (1) motivate hypertensives to enter or return to treatment, (2) motivate normotensives to improve health habits and (3) discourage inappropriate use of blood pressure screening by normotensives. A total of 473 participants in the two studies viewed slide/tape shows about blood pressure and/or health promotion. Individuals with elevated readings at screening viewed either a show containing standard blood pressure information or an experimental show which emphasized the asymptomatic nature of high blood pressure and which described some concrete strategies for coping with high blood pressure. In both studies, individuals with normal readings at screening viewed a standard show or an experimental show which emphasized coping strategies for preventing high blood pressure. In addition, in Study 2, some normotensive individuals viewed one of several experimental shows which focused on health promotion. Results indicate that the experimental programs were significantly more effective than the standard programs in achieving appropriate followup of screening results for both normotensives and hypertensives. Implications for worksite blood pressure screenings are discussed.

Although the medical benefits of treating high blood pressure have been clearly demonstrated,1–3 an estimated 17 million US adults have blood pressure which is high or not under control.4 In a major effort to achieve national high blood pressure control, many programs sought to screen and refer large numbers of unaware and uncontrolled hypertensives; this effort resulted in both increased awareness and improved control...
of high blood pressure. The percentage of unaware hypertensives decreased from 51.5% in 1960–1962 to 22.6% in 1976–1980. This improved awareness and control of hypertension is likely responsible, in part, for the decline in mortality due to stroke and heart disease over the past 15 years.

In spite of their apparent success in identifying and referring persons with high readings, mass hypertension screening programs have been criticized on at least two grounds: (1) that screening is a “one shot” affair which loses people to follow-up; (2) it is not cost effective. The first criticism makes clear that when screening is not directly linked to providers and persons with high readings are merely referred to their physicians, many will fail to enter treatment. The second criticism raises two points: (1) that the very great majority (at least 70%) of individuals attending mass screening programs are normotensive and gain no benefit from screening per se; and (2) a substantial number of the repeat users of such programs are “the worried well” and others who already have their blood pressure under control. As a consequence, the number of new cases relative to the number screened is far too small to be cost effective.

In recent studies, follow-up with screening has been improved in several ways: first, by screening a stable and trackable population such as workers in an industrial setting, where an internal, health system is available; second, by providing extensive health information at screening: Seraas and Weinberger used a 3-minute video tape which improved follow-up into treatment (29%–78%) by focusing on the importance of entering treatment and the consequences of failure to be treated; and third, by using follow-up phone calls, post cards, or on-the-spot appointment-making which also increased successful referrals to treatment for screening participants.

Each of the above results suggests that screening can be modified to enhance short-term coping actions, such as entering treatment. The two studies reported in the present article attempt similar, expanded educational efforts at screening. They differ, however, from the preceding studies in three ways. First, they attempt to replace many incorrect but commonly held ideas about hypertension with correct beliefs that are coupled to specific behavioral plans in the hope of sustaining appropriate treatment behaviors over the long term. Second, they provide health education designed to enhance health behavior for the vast majority of participants—normotensives; third, they provide additional, specific information to reduce overuse of screening by the “worried well.”

One of the incorrect beliefs held by most hypertensives that may be reponsible for long-term failure to control blood pressure is the assumption that high blood pressure is symptomatic, and that the absence of symptoms indicates that it is under control. Although they cannot accurately perceive when their blood pressure is high, some hypertensives apparently decide that treatment is no longer necessary because “the headache stopped” or because they “no longer under a lot of stress.” In the present studies, we sought to improve long-term blood pressure control by providing health information at screening. The information attempted to weaken trust in symptoms as indicators of blood pressure elevation as well as to teach appropriate action plans for following up high readings.

To increase the cost-effectiveness of mass screening, the present study provided health information at screening to benefit normotensives, the vast majority of screening participants. The information had two goals: (1) to reassure normotensives and to teach them an appropriate interval for rescreening so they do not translate interest in their health into an over-zealous use of health services, i.e., to correct tendencies to become worried well; and (2) to make positive use of the normotensives’ interest in participation in health screening by attempting to convert it into a more general concern about health and a willingness to consider changing other behaviors that increase cardiac risk, such as smoking or not exercising.

This article presents two screening studies which were conducted at worksites which had no employee health service. The goals were to test whether brief health messages at screening could achieve the following: (1) educate hypertensives about their illness, and so motivate them to enter/return to and continue treatment with their private physicians; (2) motivate normotensives to maintain and/or improve their health status; and (3) discourage inappropriate subsequent use of blood pressure screening by normotensives. Behavioral, attitudinal and blood pressure data were collected at screening and at several follow-up visits in order to assess the process as well as the impact of the health messages.

A key hypothesis in both studies is that communications must be directed toward specific behavioral goals to achieve change. For example, to reduce unnecessary screening, one must specify precisely how often screening is needed in addition to reassuring people that their blood pressure is normal. In order to reduce risk inducing behaviors such as smoking and ingestion of excess fats, and to encourage risk reducing behaviors such as exercise, one must make specific recommendations to engage in these behaviors and provide examples of ways of and occasions for performing them. Thus the slide/tape programs presented specific skills and strategies for behavior change that were made vivid (e.g., by showing pictures of salt shakers on a table versus a shelf of spices that could be used as substitute seasonings instead of salt).

The experimental materials in Study 1 specifically attempted to change hypertensives’ view that blood pressure increases are symptomatic, and to encourage normotensives to be favorable toward actions that reduce risk and promote health by making them aware of the dangers of hypertension, the asymptomatic nature of hypertension (making it necessary to establish habitual health actions over the long term), and specific suggestions for what actions to perform. These concepts were illustrated in the experimental slide/tape show by reminding subjects that one usually has acute illness experience to rely on as an indicator of health status. Acute illness is detectable by symptoms and when the symptoms go away people feel better and can consider themselves cured. But high blood pressure is different. It is not an acute illness that can be monitored by symptoms, but instead develops slowly and may not create any detectible differences in how we feel.

Educational materials in Study 2 were designed to assess as well whether motivation to reduce risk for normotensives might be stronger if the educational message encouraged a goal of positive health promotion rather than a goal of disease avoidance and whether behavioral change might differ if participants were encouraged to make behavior changes all at once rather than focusing on one at a time. Content emphasized that if one is encouraged to develop a positive health orientation that focuses on working at improving health before one gets sick, the behavior changes necessary to reduce risk can be viewed as more global or general (working on general improvement of one’s diet that involves reducing salt as well as cholesterol and calories), and may require the same commitment if made all at once or one at a time.
STUDY 1

Methods

Overview

Participants had their blood pressure taken and were classified as having a high or normal reading. All then viewed either a standard slide-tape show about blood pressure or an experimental show that focused on common misunderstandings about high blood pressure. Finally, participants answered questions concerning knowledge about high blood pressure and behavioral intentions related to health. Those with high readings at the initial screening attended second and third screenings two and four weeks later. Blood pressure was checked, questionnaires were administered and the educational material was reviewed at these sessions (see Figure 1).

FIRST SCREENING
1. Participants fill out general information questionnaire.
2. Two blood pressure readings are taken and averaged.
3. Participants view slide-tape show.
4. Participants fill out post-intervention questionnaire.

SECOND SCREENING
(for those with high readings at First Screening)
1. Participants fill out knowledge questionnaire.
2. Material learned at first screening is reviewed.
3. Participants are told new blood pressure reading and are either referred to their physician or told to return for a third screening.

THIRD SCREENING
(for those with high readings at First Screening and normal readings at Second Screening)
1. Material from screenings 1 and 2 is briefly reviewed.
2. Participants are told new blood pressure reading.
3. Participants are either referred to their physician or told to have their blood pressure checked in a year.

Figure 1. Overview of methods for Studies 1 and 2

Participants

Participants were 162 employees in a metal compressing company. The sample had the following characteristics: 82% were male; the median age was 31; most (67%) had 12 or fewer years of education; 65% were blue-collar workers; 64% were White, 28% Black, and 9% Hispanic.

First Screening

Groups of five to eight employees attended a blood pressure screening on company time at the worksite. The pre-screening questionnaire asked about education, race, sex, age, physician utilization, blood pressure history, and recent symptom experience. Two blood pressure readings were taken and averaged. Following American Heart Association criteria in use at that time, persons over 49 years old were considered to have a high reading if their average systolic exceeded 159 mm Hg or their average diastolic exceeded 89 mm Hg; persons 49 or younger were considered to have a high reading if their average systolic exceeded 139 or their average diastolic exceeded 89. Participants were told their averaged reading and whether or not it was high; they were then seated in one of two rooms where they viewed one of several educational slide/tape shows on high blood pressure. Participants were not told that the show and room assignments were related to their blood pressure readings.

After viewing the slide-tape show (described in detail below), participants completed a 28-item questionnaire which dealt with knowledge about blood pressure, the relationship between symptoms and blood pressure, the linkage between risk factors and blood pressure, and intentions for further screening and treatment of blood pressure. Those with high readings were scheduled for a second screening two weeks later.

Educational Materials

Each participant viewed one of the three 9 to 11 minute slide-tape shows outlined in Table 1. The shows used in this study, along with several others, were pretested with 209 undergraduates for clarity, vividness and interest of presentation, and for their impact on knowledge and attitudes. They also were tested for comparability on "readability level." The shows ultimately chosen for this study were those that best met these criteria.

The standard show was a nine-minute illustrated lecture based on material in pamphlets on high blood pressure used at screenings. It gave general information about high blood pressure and its measurement, predictors and consequences, and concluded with a comment about the lack of a relationship between symptoms and high blood pressure. The same standard program was used both for participants with high and normal readings.

Two different experimental slide-tape shows were prepared: one for the participants with high readings (slightly over 11 minutes), and one for those with normal readings (slightly over 10 minutes). The information in both experimental shows was presented as part of a group discussion among a physician and three of his patients.

The primary aim of the experimental show for participants with high readings was
to encourage appropriate long-term coping behavior by helping participants understand the asymptomatic and chronic nature of high blood pressure. This was done by having three patients relate their personal experiences with high blood pressure and having a doctor interpret and respond to those experiences. The experimental show presented the same basic information about blood pressure (risk factors and consequences of hypertension) as did the standard show, but also gave personal examples of symptom experience and attributions, concrete action plans and emotional reactions. For example, to disabuse listeners of the commonly held belief that symptoms are indicators of high blood pressure, the three patients reported episodes of symptoms which they mistakenly thought were signs of high blood pressure. The physician provided alternative explanations for the symptoms which the patients might have associated with high blood pressure, for example, that headaches were due to tiredness. The program also explained that high blood pressure was chronic and suggested it was similar to chronic conditions such as being overweight, in contrast to acute conditions such as measles and allergies. Finally, all three patients described specific plans for following up their high readings.

The experimental show for patients with normal readings presented general information about blood pressure and the consequences of hypertension. In this show, the information was presented by the physician to three patients who had just learned their pressures were normal. Then, the patients gave concrete descriptions of how they did or could change their behavior to reduce risk, by stopping smoking, exercising, losing weight, and reducing fat and salt consumption. The show concluded that an annual blood pressure check is sufficient for persons with normal readings.

Each group of employees attending a particular screening session was randomly assigned to view either the standard or experimental (normal- and high-reading) shows. Twenty-three participants with high readings saw the standard show, and 14 saw the experimental high-reading show; 64 participants with normal readings saw the standard show, and 61 saw the experimental normal-reading show.

**Second and Third Screenings**

Participants with high readings attended a second, 30-minute individual screening session two weeks later. An interviewer tested the participants for retention of blood pressure information, recorded the average of two new readings, and reviewed information from the particular slide show the participant had seen earlier. The interviewer instructed those with a high reading to see their personal physician and those with a normal reading to return for a third screening in two weeks. At the third screening, the interviewer referred those with high readings to their physician and told those with normal readings to have their blood pressure checked in a year.

**Results**

The results will be presented in two parts—first, for the groups with high blood pressure readings, and second, for the groups with normal blood pressure readings.
Table 3. Comparison of High Reading Groups at Screening 2 (Study 1)

<table>
<thead>
<tr>
<th>Item</th>
<th>Mean Score</th>
<th>Standard Error</th>
<th>t</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symptoms and BP</td>
<td>2.56</td>
<td>0.06</td>
<td>2.55</td>
<td>2.31</td>
<td>0.02</td>
</tr>
<tr>
<td>BP increases due to excitement</td>
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<td>0.06</td>
<td>2.55</td>
<td>2.31</td>
<td>0.02</td>
</tr>
<tr>
<td>Headaches due to stress</td>
<td>2.56</td>
<td>0.06</td>
<td>2.55</td>
<td>2.31</td>
<td>0.02</td>
</tr>
<tr>
<td>Worn out at night</td>
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<td>2.55</td>
<td>2.31</td>
<td>0.02</td>
</tr>
<tr>
<td>Total</td>
<td>13.12</td>
<td></td>
<td>4.41</td>
<td>4.41</td>
<td>0.001</td>
</tr>
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</table>

Positive t-values indicate the experimental group answered more accurately than the standard group.

Table 2. Comparison of High Reading Groups at Screening 1 (Study 1)

<table>
<thead>
<tr>
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Positive t-values indicate the experimental group answered more accurately than the standard group.

Table 1. Comparison of High Reading Groups at Screening 2 (Study 1)

<table>
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change, know that lifestyle factors are risks for high blood pressure, and plan to wait for another blood pressure check for more than three months.

Discussion

In Study 1, health information at screening had a significant impact on both individuals with high and normal blood pressure. The experimental high reading group learned in several minutes and retained for at least two weeks that symptoms are not reliable indicators of chronic high blood pressure.

The experimental normal reading group learned three sets of information better than their standard group counterparts: that symptoms are not reliable indicators of blood pressure change, that poor health habits may lead to high blood pressure, and that the appropriate interval for checking blood pressure is one year.

We found, in short, that brief educational messages could be effective in changing beliefs and attitudes about health and high blood pressure, even when compared to the better-than-average "standard" materials we had prepared.

STUDY 2

Introduction

Study 2 had two goals: the first was to replicate the findings of Study 1 in a setting with white-collar and clerical workers; the second was to extend the findings of Study 1 by adding for normotensive participants two new shows that focused on health-promotion rather than blood pressure. The health promotion programs were designed to enhance intentions to change risk-related habits in normotensive viewers. The two health-focused shows for normotensives differed in one respect: one recommended changing all of one's bad health habits at once and the other recommended changing one at a time. Meyer and Henderson have suggested that multiple risk factor change may be more effective, but we know of no research which directly compares the effects of attempting to change single versus multiple poor health habits.

Methods and Materials

Educational Materials

Participants with high readings saw one of two slide-tape shows as in Study 1, so that the results of the two studies could be compared. Normotensives saw one of four shows; two shows—the "standard" and "experimental blood pressure"—were the same as those used in Study 1. Two new experimental shows emphasized how to change cardiac risk-increasing behaviors, but only briefly discussed blood pressure (Table 1). Both of the new experimental health-focused shows, like the experimental blood pressure show, depicted a conversation between a doctor and three patients in which
the patients indicated specifically how they had changed or would change their smoking, exercise and/or eating habits. In the two new shows, however, blood pressure was discussed only briefly. The two new shows differed in that one recommended changing bad habits “all at once,” (“If you start to exercise, that will help you lose weight and quit smoking”), while the other show recommended changing habits “one at a time” (“Be sensible. Don’t try to change all at once.”).

Participants

Participants were 311 government clerical and white-collar employees, 136 (44%) of whom were males and 258 (94%) of whom were white. The median age of the sample was 37; slightly over half (52%) were college graduates.

Procedure

Employees attended a blood pressure screening during their work day in groups of four. As in Study 1, participants completed a general information questionnaire, and were told their averaged blood pressure reading (based on two readings) and whether or not it was high (Figure 1). Next, participants with normal readings and those with high readings saw different slide-tape shows in separate rooms. After the show, participants with high readings answered six questions about their knowledge and understanding of high blood pressure, whereas those with normal readings answered two questions about blood pressure and four about their attitudes towards preventive health behaviors. All participants then completed a questionnaire about plans for future blood pressure screening, intentions to improve health habits, and interest in receiving pamphlets on how to change poor health habits. Second and third screenings occurred at the same intervals as in Study 1 (Figure 1).

Results

High Reading Groups

Equivalence of groups. Of 41 participants with high readings in the first screening session, 20 saw the standard show and 21 the experimental show. The two groups were compared on 27 baseline variables—including sociodemographic factors, health-related behaviors, and blood pressure—and differed significantly on only one variable, smoking ($p < .01$). Eight of 21 participants (38%) in the experimental group smoked cigarettes, compared to 2 of 20 (10%) in the standard group.

First screening. As in Study 1, participants seeing the experimental show were more likely to agree on the absence of a relationship between symptoms and blood pressure. On the three-item scale (with items such as “blood pressure increases are impossible to feel”), significantly more accurate responses were given by the experimental high-reading group than by the standard group, $t(39) = 5.12, p < .001$. The difference occurred despite near-ceiling effects for accuracy on two of the items (Table 5).

The experimental and standard groups differed on only one of the four items used to assess intentions to change poor health habits (salt use, use of the stairs, consumption of sweets, and trimming of fat off of meat)—using the stairs more and the elevator less, $t(39) = 2.22, p < .05$. Two additional items were appropriate only to smokers and one item about weight loss was appropriate only for participants who were 20% or more over ideal weight. There were no significant group differences on these or on requests for pamphlets about these risk factor changes.

The experimental show presented with greater emphasis the need to have one’s blood pressure checked in the near future. More participants in the experimental group (76%) than in the standard group (32%) indicated that they would return “in a week or two” for another blood pressure check, $X^2(1) = 8.02, p < .01$.

Second and third screenings. All 21 participants who saw the experimental show and 18 of 20 who saw the standard show returned for the second screening, one week later. The two groups did not differ significantly on any of six items covering general information about blood pressure that was common to the two shows (on the meaning of blood pressure, the variability of blood pressure, and the ability to do something about blood pressure in one’s daily life).

For items measuring information unique to each show, as in Study 1 there were substantial group differences. Participants answered four questions (coefficient $\alpha = .57$) on the independence of blood pressure and symptoms (“feeling my heart pound is a sure sign that my blood pressure has gone up”), and, as shown in Table 6, the experimental group was still more knowledgeable than the standard group, $t(36) = 3.12, p = .005$. On the other hand, the standard group was more accurate $t(36) = 4.94, p < .001$, in answering a set of four questions about information presented only in the standard show (“the blood pressure cuff cuts off circulation”).

Of the 10 participants at the second screening, 27 had a high reading and were
Table 6. Comparison of High-Reading Groups at Second Screening (Study 2)

<table>
<thead>
<tr>
<th>Item</th>
<th>Mean Score, Standard Group (N = 18)</th>
<th>Mean Score, Experimental Group (N = 21)</th>
<th>t</th>
<th>Two-Tailed p</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Symptoms and BP</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heart pounding means BP is up</td>
<td>2.17</td>
<td>2.90</td>
<td>3.69</td>
<td>.001</td>
</tr>
<tr>
<td>Headaches due to tiredness, not HBP</td>
<td>1.71</td>
<td>2.05</td>
<td>1.33</td>
<td>ns</td>
</tr>
<tr>
<td>BP increases impossible to feel</td>
<td>2.33</td>
<td>2.90</td>
<td>2.72</td>
<td>.01</td>
</tr>
<tr>
<td>BP okay when symptoms go away</td>
<td>3.00</td>
<td>2.95</td>
<td>-0.92</td>
<td>ns</td>
</tr>
<tr>
<td>Total</td>
<td>9.24</td>
<td>10.81</td>
<td>3.12</td>
<td>.004</td>
</tr>
<tr>
<td><strong>Standard Information</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cuff cuts off circulation</td>
<td>2.28</td>
<td>1.70</td>
<td>-2.19</td>
<td>.04</td>
</tr>
<tr>
<td>BP measures speed of heart</td>
<td>2.17</td>
<td>2.29</td>
<td>0.42</td>
<td>ns</td>
</tr>
<tr>
<td>Blacks have more HBP</td>
<td>2.50</td>
<td>1.43</td>
<td>-4.36</td>
<td>.0001</td>
</tr>
<tr>
<td>Kidney disease causes HBP</td>
<td>2.39</td>
<td>1.62</td>
<td>-3.51</td>
<td>.001</td>
</tr>
<tr>
<td>Total</td>
<td>9.33</td>
<td>7.00</td>
<td>-4.94</td>
<td>.0001</td>
</tr>
<tr>
<td><strong>General Information</strong></td>
<td>no significant differences</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Items are rated on a 3-point scale and coded so “1” is the least accurate response and “3” is most accurate.

+Positive t-values indicate the experimental group answered more accurately than the standard group.

referred to their physician. All 12 participants with normal readings returned a week later for a third screening. Three had high readings and were referred to their physician, while the nine with normal readings were told to check their blood pressure in a year. Two screeners who failed to return for the second screening were also referred, for a total of 32 referred hypertensives.

**Normal Reading Groups**

*Equivalence of groups.* Of the 270 participants with normal readings, 67 viewed the standard show, 64 the experimental blood pressure show, 68 the experimental “all at once” show, and 71 the experimental “one at a time” show. The groups did not differ significantly on any of 27 baseline variables—including demographics, health-related behaviors, and blood pressure.

*First screening.* Participants differed in their response to two items depending on whether they saw the “all at once” or the “one at a time” show. As shown in Table 7, those viewing the “all at once” show were more likely to agree that it is best to change habits all at once, $F(1,266) = 188.22, p < .0001$; those viewing the “one at a time” show were more likely to agree that it is best to change habits one at a time, $F(1,266) = 188.91, p < .0001$. Thus, both shows were equally effective in communicating opposing recommendations on how to change health habits.

The remainder of the post-show questionnaire assessed knowledge about blood pressure, beliefs about the importance of preventive health behavior, plans to recheck blood pressure, intentions to change health habits, and requests for pamphlets on changing health habits. The data were analyzed using three orthogonal planned comparisons. One compared the standard group to the three experimental groups; the
second compared the experimental blood pressure group to the two experimental health-focused groups; the third compared the two experimental health-focused groups with one another.

The two experimental health-focused groups did not differ on any of the measures to be discussed below. Thus, this third comparison will not be discussed further.

Two knowledge items dealt with the lack of a relationship between blood pressure and symptoms. The standard information group was significantly less accurate on this two-item scale than the three experimental groups taken together, $F(1,265) = 15.78$, $p < .001$. In addition, the experimental blood pressure group, which received the most information about the inadequacy of symptoms as indicators of blood pressure change, was more accurate on the scale than the two experimental health-focused groups, $F(1,265) = 12.90$, $p < .001$.

There was almost complete agreement in all four groups on two items assessing beliefs about the importance of preventive health behavior ("I only take care of my health when I'm sick"). These ceiling effects precluded our finding differences among the groups.

62% of the participants in the three experimental groups, compared to 33% in the standard intervention group, indicated correctly that those with normal readings need to have their blood pressure checked only once a year, $\chi^2(1) = 15.69$, $p < .001$. In addition, the experimental blood pressure group was more likely than the two experimental health-focused groups to indicate the proper screening interval, $\chi^2(1) = 5.67$, $p < .025$.

Seven items dealt with intentions to change poor health habits. Four items—assessing intentions to relax more, use the stairs more, eat fewer sweets, and cut fat off of meat more often—described changes that could be made by all participants, and were added together to form a scale ($\alpha = .62$). Participants in the three experimental groups indicated their intentions to change more than participants in the standard group, $F(1,266) = 11.29$, $p = .001$. Intentions to reduce smoking, quit smoking, and lose weight were asked in each group indicating 1 year. Statistic used is $\chi^2$.

In the absence of a health program at either of these work settings, this study focused on short-term change. We did, however, collect nine-month follow-up data on 82% ($N = 103$) of normotensives in Study 1 and 87% ($N = 236$) of normotensives in Study 2 through a mailed questionnaire, and found only inconsistent and marginally