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The Effect of Status on Blood Pressure During Verbal Communication

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Blood pressures and heart rates of 40 subjects were recorded at 1-min intervals over 35 min during which subjects engaged in a variety of verbal activities with either a high-status or an equal-status experimenter. All subjects showed statistically significant increases in blood pressure and heart rate when speaking compared to when quiet. Blood pressure increases during speaking of the 20 subjects exposed to a high-status experimenter were significantly greater than those of subjects exposed to an equal-status experimenter. While the blood pressure increase was related partly to the act of speaking, the amount of increase was also related to the social distance between experimenter and subject. The results are discussed relative to behavioral interventions for the treatment of hypertension.

KEY WORDS: blood pressure; status; communication; social distance.

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INTRODUCTION

Among the many aspects of interpersonal relationships, we have observed that the simple act of speaking produces rapid and significant elevations in blood pressure (BP) of both hypertensive and normotensive subjects (Lynch *et al.,* 1980, 1981). These increases were found to occur even independent of the content of communication and seemingly were more dependent upon the mere act of communicating. Perhaps of even greater clinical significance, we found that the magnitude of increase in BP during talking was significantly correlated with the baseline pressure. That is, the higher the baseline pressure, the greater the increase during talking, with hypertensive individuals exhibiting the largest increases (Lynch *et al.,* 1981). As described elsewhere these observations were contingent upon the recent development of a reliable, noninvasive, automated method for measuring BP.

Other studies using different recording techniques have also noted that BP increases during communication (Ulrych, 1969; Silverberg and Rosenfeld, 1980). It has been suggested that these increases are more bound to the fact that something is being communicated than to the content of the communication (Williams *et al.,* 1972). The relationship between communicators may be an important mediating factor influencing the amount of pressure changes.

Beginning with the research of Reiser *et al.* (1955), it has been known that status differences between the observer and the patient can effect baseline BP. These researchers found that military personnel showed higher postinterview BP when measured by a physician than when their BP was measured by an enlisted person. They suggested that status differences might have an important influence upon BP. Others have found that BP taken in the presence of a physician tends to be higher than that taken by a nurse (Richardson *et al.,* 1965). The importance of this effect is further suggested by the common finding that BP taken at home is generally lower than BP taken in a doctor's office (Julius *et al.,* 1974; Laughlin *et al.,* 1979).

Given both the magnitude and the clinical importance of BP changes previously noted during verbal communication, it seemed critically important to evaluate certain nonspecific factors, such as status differences, as they might affect BP changes during human communication. This study was conducted to assess the importance of communication and status differences as mediating variables influencing both baseline pressure and blood pressure during talking.

METHOD

Subjects

Forty normotensive Caucasian college students (14 male, 26 female; mean age, 21.2 years) were sequentially selected from a sign-up list that was distributed in psychology and social-work classrooms at two different colleges. Students were told in advance that they would be volunteering 1 hr of time for the study. They were told that their BP would be monitored during the study and that they would be required to engage in a variety of verbal tasks that involved reading and talking.

Apparatus

Blood pressure and heart rate were recorded at 1-min intervals using a Dinamap 845 automated unit. This is an oscillatory cuff device that gives a minute-by-minute digital and printout display of systolic, diastolic, and mean arterial pressures and heart rate. It has been shown to give both reliable and valid readings that correlate highly ($r = 0.98$) with intraarterial pressures (Ramsey, 1979; Yelderman and Ream, 1979). The cuff initially inflates to 160 mm Hg and then deflates at 0.5-mm Hg increments until arriving at a diastolic pressure. Subsequent inflations are 30 mm Hg above the previously recorded systolic pressure. The experimenter is given both a digital display and a printed record of minute-by-minute blood pressures.

Procedure

Subjects were assigned on a rotating basis to either a high-status or an equal-status experimental group prior to the beginning of the procedure. One investigator (JML) served as the experimenter for all subjects.

The high-status experimenter was introduced by a secretary as a doctor. He was dressed in a suit and tie with a name tag identifying him as a doctor of internal medicine. The experimenter took a formal posture and referred to the subject as Mr. or Ms.

The equal-status experimenter introduced himself by first name and said that he was assisting in a blood-pressure experiment. He was dressed casually in blue jeans and shirt. He had no name tag. The experimenter took an informal posture and referred to the subject by first name.

After an introduction, the subject was escorted to a private office by the experimenter and both were seated in comfortable chairs. The experimenter gave a brief explanation of the experiment and then demonstrated the BP cuff, attached it to the subject's left arm, and exited, leaving the subject alone for the first 15 min of the experiment. The experimenter reentered for the final 20 min. The Dinamap 845 was in an adjoining room, and the BP was not seen by the subject.

The 15-min period with the subject alone was used to acclimate the subject to the automatic minute-by-minute cuff inflation and to a textbook to be read while the experimenter was present. The subject sat quietly for the first 5 min (the last 3 of which were taken as a reference point for statistical comparison). During the remainder of this 15-min alone period, the subject alternately read out loud for 3 min and remained quiet for 2 min. These periods were cued by a tap on the door.

The experimenter then entered the room and sat quietly with the subject for 2 min. Eye contact was kept at a minimum. The subject then read aloud from a textbook for 3 min, sat quietly for 2 min, and then talked about school for another 3 min. The experimenter then spoke about BP and its measurement for 3 min. In the final 2 min the experimenter asked the subject to "tell me all you remember of what I have just spoken to you about." During each experimental period in which the subject spoke, the experimenter spoke only to facilitate continued talking by the subject. Minute-by-minute BP and heart rate (HR) were recorded for the entire experimental procedure.

At the conclusion of the experiment, another investigator questioned the subject as to what he/she believed the experiment to be about. The subject was also given a short questionnaire asking him/her to rank the degree of similarity between him/herself and the experimenter. After this the first experimenter (JML) answered the subject's questions relating to the experiment and his/her BP.

RESULTS

The effectiveness of the status manipulation was evaluated by a questionnaire that asked subjects to rank on a 0–5 scale the degree of similarity with the experimenter. A comparison between the two groups showed that subjects in the equal-status group rated themselves significantly more similar to the experimenter than did those in the high-status group (average similarity—equal status = 3.5, high status = 2.5; $t = 3.01$; $p < 0.01$).

Table I. Average Cardiac Levels During Two Activities: Resting and Speaking

Measure	Average (N = 40)		High-status experimenter (N = 20)		Equal-status experimenter (N = 20)	
	Quiet[a]	Speaking	Quiet	Speaking	Quiet	Speaking
MAP (mm Hg)	84.9	91.6	86.5	95.0	83.4	88.1
SBP (mm Hg)	116.4	122.2	119.1	125.9	113.6	118.4
DBP (mm Hg)	67.7	74.0	68.9	77.6	66.4	70.4
HR (bpm)	70.3	76.3	73.2	80.6	67.4	72.0

[a]Each level is the result of 16 measurements from each subject.

As shown in Table I, verbal communication rapidly and significantly elevated BP above resting levels. The increase in BP and HR occurred in both the high-and the equal-status groups, as shown in Fig. 1. Two-way analyses of variance with repeated measures were used to examine the effects of status and activity (rest or speak) on MAP, SBP, DBP, and HR. The results of these analyses are presented in Table II. In all four cases the activity had a significant effect ($p < 0.001$). Status also had a significant effect on all four cardiac measures ($p < 0.05$). Thus for MAP, SBP, DBP,

Table II. Two-Way Analyses of Variance for Effects of Status and Activity in MAP, SBP, DBP, and HR

Cardiac measure	Source	Sum of squares	df	Mean square	F	$p <$
MAP	Mean	623246.0	1	623246.0	4814.3	0.001
	Status	510.6	1	510.6	3.9	0.05
	Error	4919.4	38	129.4		
	Activity	882.3	1	882.3	99.7	0.001
	Activity × status	71.0	1	71.0	8.0	0.007
	Error	336.2	38	8.8		
SBP	Mean	1137840.3	1	1137840.3	5404.9	0.001
	Status	854.1	1	854.1	4.1	0.05
	Error	7999.7	38	210.5		
	Activity	668.6	1	668.6	81.1	0.001
	Activity × status	20.0	1	20.0	2.4	0.13
	Error	313.1	38	8.2		
DBP	Mean	401505.4	1	401505.4	4365.8	0.001
	Status	470.9	1	470.9	5.1	0.03
	Error	3494.7	38	92.0		
	Activity	806.8	1	806.8	98.0	0.001
	Activity × status	104.5	1	104.5	12.7	0.001
	Error	312.8	38	8.2		
HR	Mean	430348.7	1	430348.7	1781.3	0.001
	Status	1037.0	1	1037.0	4.3	0.05
	Error	9180.6	38	241.6		
	Activity	718.6	1	718.6	49.9	0.001
	Activity × status	38.9	1	38.9	2.7	0.11
	Error	546.7	38	14.4		

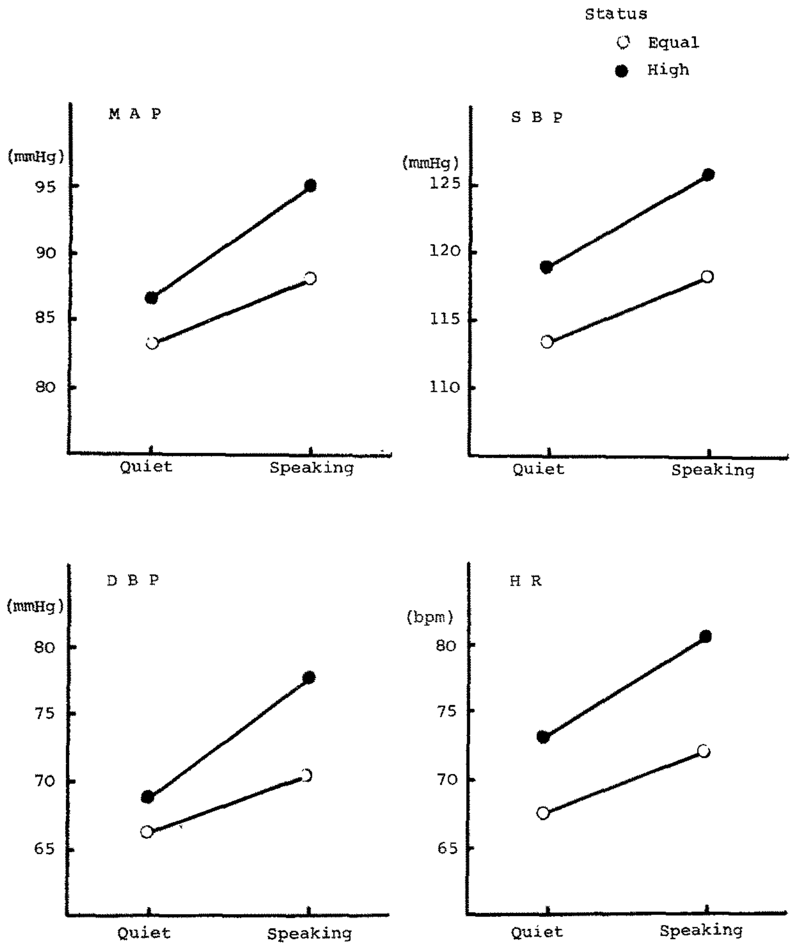

Fig. 1. Average MAP, SBP, DBP, and HR levels while quiet and speaking for the two subject groups: experimenter of high status ($N = 20$) and experimenter of equal status ($N = 20$).

and HR, levels were significantly higher while speaking than while resting and were significantly higher for those subjects who were seen by a high-status experimenter than for those exposed to an equal-status experimenter. Additionally, there were significant interactions between activity and status for MAP ($p < 0.007$) and for DBP ($p < 0.001$). In both of these cases there was a greater increase in cardiac level from quiet to speaking for those subjects with the high-status experimenter than for those subjects with the equal-status experimenter.

DISCUSSION

Previous reports have identified verbal interaction and the act of communicating as important determinants of BP (Lynch *et al.,* 1980). Data obtained in this study replicate previous findings of increases in BP during communication. The present study adds to these findings by demonstrating that social distance (status differences) also affects BP during communication. This apparent interaction between social distance and verbal demand points to an important transactional aspect of BP reactivity heretofore unrecognized.

The BP increases found in this study during communication, and exacerbated by status differences, both substantiate and extend previous findings. Reiser *et al.* (1955) first noted the interactive nature of status, communication, and BP changes. In previous research, we reported that communication consistently and significantly elevates BP (Lynch *et al.,* 1980, 1981, 1982) and can change HR (Thomas *et al.,* 1975; Lynch *et al.,* 1977). The present study indicates that elevation in pressure is not a one-dimensional phenomenon related to communication but is at least two dimensional, related to both communication and social distance between communicators.

The significant rise in BP during verbalization, augmented by status differences, may have both clinical and diagnostic significance for the development of both hypertension and coronary heart disease. Weiner (1979) suggests that the person who experiences the most marked changes in BP and HR during interpersonal communication may find communicating to be so physiologically uncomfortable that he or she would withdraw from further social interactions. Such withdrawal might in turn lead to vascular overreactivity during subsequent social interaction. Links between cardiovascular disease, including hypertension, and social interaction have already been documented (Lynch, 1977; Lynch *et al.,* 1977, 1982; Lynch and Convey, 1979). While the full clinical, therapeutic, and social importance of these findings remains to be demonstrated, it is clear that the cardiovascular system and the surrounding social system and interpersonal communications in these surroundings are all intimately connected.

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