Effects of Thematically Relevant and General Stressors on Specificity of Responding in Asthmatic and Nonasthmatic Subjects

ROBERT W. LEVENSON, PHD

Twenty-nine mild asthmatics and 12 nonasthmatics were exposed to three films of varying emotional content to assess differential patterns of physiological response in the cardiac, ventilatory, and bronchial systems. Results indicated that only cardiac interbeat interval (IBI) and total respiratory resistance (RT) were reliable indices of reactivity. In a film of thematic relevance to asthmatics which depicted asthmatic children in a hospital setting, asthmatics evidenced sustained elevation of RT throughout the entire film with no reactivity in IBI. Nonasthmatics did not evidence any significant reactivity to the film. In a film of a generally stressful nature which depicted industrial accidents, asthmatics evidenced elevated RT in response to the accident scenes. Both asthmatic and nonasthmatic subjects responded to the post-accident periods with increases in IBI. In a film depicting a mother giving her child up for adoption, asthmatics responded to the relinquishing of the child with elevated RT.

These results are discussed in terms of the necessity of evolving a comprehensive theory of specificity patterns in psychosomatic disorders which goes beyond models of symptom specificity and stimulus-response specificity, neither of which can adequately account for these results. The results are further seen as supporting the utility of selecting stressors of thematic relevance to asthmatics and measuring symptom-relevant indices of physiological reactivity to isolate these specificity patterns in response to stress.

INTRODUCTION

This research is concerned with the application of a psychophysiological methodology to the study of bronchial asthma. The essential elements of this methodology are: 1) exposure of a sample of asthmatics to selected emotional stimuli; and 2) measurement of physiological response relevant to the symptomatology of bronchial asthma. The objective of this approach is to identify stimuli which produce asthma-like responses in asthmatic subjects. Bronchial asthma seems particularly well suited for study using this psychophysiological paradigm as its pathophysiology is well defined. Bronchospasm, edema of the bronchial mucosa, and hypersecretion of sputum are the major factors which produce the restriction in pulmonary air flow that results in the characteristic symptoms of the disorder.

The existence of a relationship between the onset of symptoms and emotional events is well established for asthma. Even when the causal components for the individual asthmatic are largely allergic or infective (1), emotional factors may play an important role in raising or lowering the threshold for an attack (2–4). Empirical support for the impact of emotional factors on airway response has been obtained

From the Department of Psychology, Indiana University, Bloomington, Indiana.

Address reprint requests to: Robert W. Levenson, Ph.D., Department of Psychology, Indiana University, Bloomington, Ind. 47401.

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using at least three different research approaches:

Direct Stress (5–8). In this approach asthmatics have been stressed by evoking painful memories, suggesting unpleasant possibilities, and being confronted with very difficult or impossible mental tasks.

Symbolic Representation (9–11). In these experiments asthmatics have been exposed to pictures, models, and films of objects which were known to be associated with the onset of their asthma attacks.

Inhaled Substances and Suggestion (12–16). Studies of this nature have been characterized by the use of controlled exposure to a substance of known bronchial effect (typically a bronchodilator, bronchoconstrictor, or neutral substance) accompanied by a suggestion as to the nature of the effect. The suggestion, which may convey correct or incorrect information concerning the bronchial effect of the substance, can be viewed as a potential modulator of the subject's physiological response to the substance. With one exception (17), the results of these experiments have strongly supported the efficacy of psychological suggestion for modifying the subject's expected bronchial response to the inhalant.

In terms of the psychophysiological methodology outlined earlier, these studies indicate that asthmatic subjects will exhibit a physiological response relevant to the symptomatology and etiology of their disorder when exposed to certain emotional stimuli. Issues do emerge, however, concerning both the selection of a response measure and the selection of the emotional stimuli.

As indicated by the disparate usage of pulmonary measures (e.g. forced expiratory volume [FEV], airway resistance, total respiratory resistance [RT], peak expiratory flow) in the cited research, a lack of general agreement exists regarding which pulmonary function should be measured. Most studies have utilized a measure of pulmonary function which is expected to reflect changes in bronchial constriction. Some of these measures only indirectly reflect bronchial constriction, as is the case with the effort-dependent measures of ventilation (i.e. FEV and peak expiratory flow). With the exclusion of direct bronchoscopy, probably the most sensitive and accurate measure is that of airway resistance measured in the body plethysmograph. Probably the least sensitive measures are those of respiratory period and inspiration-expiration ratio, which have generally not proved to be useful in psychophysiological research with asthma. The measure used in the present investigation, total respiratory resistance, represents a compromise. It maintains some of the sensitivity and accuracy of the airway resistance measure in a less obtrusive format which enables continuous measurement during the subject's normal breathing. It additionally satisfies an important consideration for work in this area in that it is a measure which relates to the symptoms of asthma. An investigation on asthmatics using measures such as heart rate, respiration rate, muscle tension, and skin resistance (without a reasonable measure of pulmonary functioning) is at a marked disadvantage. Conversely, an investigation only using a pulmonary measure is hindered by its inability to describe the nature of accompanying autonomic and central nervous system responding (if any exists) which other physiological measures provide.

The problem of selecting an appropriate

emotional stimulus should also be mentioned. Mathe and Knapp (7) acknowledge this issue and note the lack of agreement on how and if stimuli should be classified. The present author would argue that a relevant stimulus is one which either has been shown empirically to be related to the disorder of interest or which is theoretically related to the disorder in a manner amenable to empirical verification. The research reviewed in this paper has used relevant stressors for asthmatics such as problematic life events and purported exposure to allergen. Studies using less relevant stressors have not always found them to have a significant effect on pulmonary function. An example of this can be found in Miklich et al. (18) in which mental arithmetic was used as a stressor for young male asthmatics (age, 11–16 yr). This stressor was found to have no effect on peak expiratory flow rate, although it did have an effect on nonpulmonary physiological functions such as heart rate and finger pulse volume.

In the present investigation, stressors of varying hypothesized relevance to asthmatics were used as stimuli and their effects on pulmonary and nonpulmonary physiological functions were measured.

METHOD

Subjects

An advertisement was placed in the Indiana University newspaper asking for students who had asthma and were interested in participating in a paid experiment. Respondents were contacted by phone for verification and were subsequently mailed a package of questionnaires which assessed, among other items, the severity of their asthma. Respondents were classified as "mild asthmatics" if they: (1) were not on chronic medication; (2) had infrequent attacks (but at least one attack in the year prior to the experiment); and (3) did not require frequent physician or emergency room visits. From approximately 50 respondents, 29 (11 male, 18 female) met the selection criteria and participated in the experiment. They were paid $10.00 at the completion of the experiment.

Twelve (5 male, 7 female) undergraduates with no history of respiratory illness were recruited from the introductory psychology classes to serve as a nonasthmatic control group. They received experimental credit toward fulfillment of a course requirement and were paid $3.00 at the completion of the experiment.

Apparatus

Physiological Data. Data were obtained for the following physiological variables: (1) R_T; (2) respiration period or intercycle interval (ICI); (3) inspiratory period; (4) expiratory period; (5) ratio of inspiratory to expiratory period (I-E ratio); (6) heart period or interbeat interval (IBI); and (7) general motor activity (GA).

R_T was determined by the method of forced oscillation using a Lexington Instruments Respiratory Resistance Unit (RRU)[1] with a Grass model 7 polygraph and a PDP 11/10 digital computer. The RRU functioned by imposing a 3-Hz forced oscillation at a pressure of 2 cm H_2O at the subject's mouth during breathing through a mouthpiece with the nose clamped. The computer was progammed to determine the amplitude of the imposed flow and pressure signals at the start of each inspiration, thus allowing a computation of R_T for each breath using the formula: R_T = pressure/flow. A detailed description of the operation of this system has been previously published by the author (19).

Ventilatory variables of ICI, inspiration period, expiration period, and I-E ratio were also determined from the output of the RRU under computer control. IBI data were recorded bipolarly using Beckman surface electrodes with the polygraph and computer. GA was determined using an electromagnetic sensor under the subject's chair. The sensor produced an analogue signal which was integrated at a fixed rate using a Grass polygraph integrator. The computer was used to determine the amount of activity inte-

[1]The author wishes to thank Dr. Hans Strupp of Vanderbilt University for allowing use of the RRU for this study.

grated over a fixed time period, yielding a measure of GA which was comparable between subjects and between experimental sessions.

Stressor Films. Three 16-mm films (to be described below) were copied on video tape in black and white using a film chain. The video tapes were copied again with the addition of an inaudible tone (18 kHz) mixed into the soundtrack at fixed intervals. A phase-locked loop device was used to detect the presence of this tone during playback and to signal the computer. In this manner, collection of physiological data was accurately synchronized to the films in a manner which did not vary among the subjects.

Procedure

Subjects were scheduled for three experimental sessions within a 7-day period. In each session they viewed one of the stressor films. Six orders for viewing the films were counterbalanced between subjects. The procedure for each session was as follows:

1. Attachment of physiological recording devices
2. Adaptation (10 min)
3. Base-line recordings (two 3-min periods)
4. Announcement of film content (1 min)
5. Postannouncement base line (1 min)
6. Stressor film (physiological data quantified each minute)
7. Postfilm base lines (two 3-min periods)

A description of each stressor film and the announcement which preceded it follows:

Film 1: Asthmatic Children[2] *(14 min).* Announcement: "Today you will be viewing a film which portrays asthmatic children in a hospital setting." The film showed segments of four asthmatic children in hospital beds experiencing wheezing and labored breathing. The film was chosen as a stressor with considerable thematic relevance to asthmatics.

Film 2: Industrial Accident (12 min). Announcement: "Today you will be viewing a film which portrays the hazards of working with industrial equipment. I feel obligated to warn you that some people find this film to be very stressful." The film, "It Didn't Have to Happen," took place in a small factory and depicted three accidents of increasing seriousness (two finger amputations and the death of a worker by impalement). This film was chosen as a general stressor with no special relevance to asthmatics.

Film 3: Adoption (18 min). Announcement: "Today you will be viewing a film which portrays a young mother who must decide whether to put her baby up for adoption." The film, "I'll Never Get Her Back," followed the story of a woman as she gave birth and then gave the child up for adoption. It was chosen as a stressor which captured the theme of maternal separation, which is often cited in the psychoanalytic literature as being particularly relevant to asthmatics (20).

Statistical Methods

To enable comparisons among the three sessions, physiological data were analyzed for 18 periods from each session (two prefilm base lines, announcement, postannouncement, 12 film periods, and two postfilm base lines). Two film periods from the film about asthmatic children and six from the film on adoption were selected as being fairly neutral and were dropped from the analysis, thereby reducing those films to 12 periods in length.

Analysis of the seven physiological dependent measures (and standard deviations for IBI, ICI, and RT) was by analysis of variance (ANOVA) using an unweighted means solution to handle the unequal number of subjects in the asthmatic and normal groups. Two series of ANOVAs were computed: an individual period ANOVA, 2 × 3 × 18 (asthmatic or normal × film × period); and a major period analysis 2 × 3 × 5 (asthmatic or normal × film × major period). In this latter analysis the five major periods were the prefilm base line (mean of two prefilm periods), the announcement, the postannouncement, the film (mean of 12 film periods), and the postfilm base line (mean of two postfilm periods). Planned comparisons by *t* test (21) were carried out between period means to specify the nature of the differences in reactivity between asthmatics and normals and among the three films. These planned comparisons were performed using the harmonic mean number of subjects (16.98). Using this mean reduced the power of the design somewhat, but ensured that the same absolute difference for a given dependent measure would reach statistical significance for each group of subjects and within each film.

[2]A copy of this film was graciously provided by Dr. J. H. Weiss.

RESULTS[3]

Overall Analyses

Asthmatic and normal subjects did not differ significantly overall in any of the cardiac, activity, or ventilatory measures. Asthmatics overall did have significantly higher RT than normals (4.10 vs. 3.44 cm H_2O/LPS),[4] $F(1,39) = 5.032$, $p = 0.029$, and significantly higher RT standard deviation than normals (0.90 vs. 0.70 cm H_2O/LPS), $F(1,39) = 6.061$, $p = 0.017$.

To make a preliminary determination of whether there were differences in patterns of response for all subjects among the three films, the film × period interactions for the seven dependent variables were examined for significance. This interaction was significant only for IBI, $F(34,1241) = 5.019$, $p < 0.001$; and RT, $F(34,1234) = 1.609$, $p = 0.015$. On this basis IBI and RT data were selected for more detailed analysis.

A major concern of this investigation was how subjects would respond to different kinds of emotional stressors, thus the presentation of the remaining results will be organized by stressor film.

Asthmatic Children. Film 1:

Asthmatic and normal data for prefilm base lines, announcement, postannouncement, film, and postfilm base lines are presented in Table 1. Asthmatics had a significant increase in RT from base line in response to the announcement that they would be seeing a film portraying asthmatic children in a hospital ($t(292) = 2.44$, $p < 0.01$). In addition, their average RT throughout the 12-min film was significantly higher than base line ($t(292) = 4.08$, $p < 0.001$). Asthmatics' postfilm base line did not differ from their prefilm base line, $t(292) = 0.99$, $p > 0.05$. Their pattern of response was sustained elevation of RT during the film, as indicated by the finding that RT in each of the 12 1-min film periods was significantly higher than the prefilm base line. Asthmatics' reactivity to the film was almost completely specific to RT. There were no significant changes in IBI except for the 2nd min of the film, when IBI was significantly longer than base line ($t(1241) = 2.17$, $p < 0.05$).

Normal subjects were completely nonreactive to the film.

Film 2: Industrial Accident

Asthmatic and normal data for prefilm base lines, announcement, postannouncement, film, and postfilm base lines are presented in Table 2. Asthmatics had a significant increase in RT from base line in response to the announcement that they would be seeing a film about industrial accidents which might be stressful ($t(292) = 4.17$, $p < 0.001$). Their average RT during the 12-min film was also higher than base line, $t(292) = 2.62$, $p < 0.05$. The consistency of elevation of RT was not quite as striking as was the case with the asthma film, with RT significantly higher than base line in 8 of the 12 film periods. Included in these eight periods were the minutes in which the first amputation occurred ($t(1234) = 2.21$, $p < 0.05$); the second amputation occurred ($t(1234) = 2.39$, $p < 0.05$); and impalement of the worker occurred ($t(1234) = 3.45$, $p < 0.001$). The postfilm base line did not differ from the prefilm base line, $t(292) = 0.96$, $p > 0.05$. Asthmatics also showed a pattern of reactivity in IBI, with longer IBIs in the period

[3]The 0.05 level is used as the rejection level unless otherwise indicated. All significance levels for t tests are two-tailed.

[4]LPS = liters per second.

TABLE 1. RT and IBI Means and Standard Deviations (in parentheses) for Film 1: Asthmatic Children

Subjects	Measure	Prefilm base line	Announcement	Post-announcement	Film	Postfilm base line
Asthmatics $N = 29$	RT(cm H_2O/LPS)	3.77 (1.10)	4.12 [a] (1.39)	4.06 [a] (1.31)	4.35 [a] (1.40)	3.92 (1.23)
	IBI (ms)	764 (100)	761 (104)	771 (113)	773 (108)	771 (109)
Normals $N = 12$	RT	3.35 (0.84)	3.43 (0.96)	3.42 (0.88)	3.50 (0.79)	3.38 (0.82)
	IBI	834 (108)	842 (98)	837 (100)	851 (100)	847 (105)

[a] Significantly different from prefilm base line ($p < 0.05$).

following the first amputation compared to the period with the first amputation ($t(1241) = 3.67$, $p < 0.001$); and longer IBIs in the period *following* the impalement compared to the period with the impalement ($t(1241) = 3.19$, $p < 0.01$).

Normal subjects showed no reactivity in RT data. They showed a pattern in IBI data similar to that of the asthmatics. Average IBI during the 12-min film was significantly longer than base line ($t(295) = 4.40$, $p < 0.001$). In addition, IBIs in the period after the first amputation were longer than in the period with the amputation ($t(1241) = 2.86$, $p < 0.01$). The same pattern was found for the period after the second amputation ($t(1241) = 2.37$, $p < 0.05$); and the period after the impalement ($t(1241) = 3.68$, $p < 0.001$).

Film 3: Adoption

Asthmatic and normal data for prefilm base lines, announcement, post-announcement, film, and postfilm base lines are presented in Table 3. Asthmatic reactivity to this film was limited in comparison to the other films. RT was higher than base line in only one period of the film, during which the mother officially

TABLE 2. RT and IBI Means and Standard Deviations (in parentheses) for Film 2: Industrial Accident

Subjects	Measure	Prefilm base line	Announcement	Post-announcement	Film	Postfilm base line
Asthmatics $N = 29$	RT(cm H_2O/LPS)	3.66 (1.00)	4.25 [a] (1.37)	3.91 [a] (1.46)	4.03 [a] (1.13)	3.80 (1.21)
	IBI (ms)	794 (136)	780 (131)	794 (127)	806 (139)	77 (121)
Normals $N = 12$	RT	3.49 (0.90)	3.70 (1.25)	3.37 (0.83)	3.68 (1.08)	3.60 (1.06)
	IBI	847 (91)	848 (95)	868 [a] (122)	882 [a] (109)	837 (96)

[a] Significantly different from prefilm base line ($p < 0.05$).

relinquished her child ($t(1234) = 3.24, p < 0.001$). IBI data were variable, with IBIs significantly longer than base line in 5 min of the 12-min film.

Normals were completely nonreactive in RT. Their IBI means were significantly longer than base line during 3 min of the 12-min film.

DISCUSSION

The results of this investigation are indicative of the multidimensional nature of psychosomatic research. Differential results in terms of patterns of responding and nonresponding for physiological response measures, asthmatic vs. normal subjects, and the several emotional stimuli characterize the findings. Each of these dimensions will be addressed in this discussion.

The exclusivity of physiological response to the measures of cardiac period and respiratory resistance was not surprising. Ventilatory variables such as respiratory period, inspiration period, and expiration period have generally not proven useful in stress research. The general activity measure used in the present study gives an indication of gross muscular activity. A more specific measure, such as the electromyogram from an individual muscle group, might have been more sensitive to the stress manipulations. Respiratory resistance proved to be an "ideal" response measure for the asthmatic subjects insofar as it increased monophasically in response to the stress manipulations, evidenced in response to different stimuli both phasic and tonic elevation, and returned to original base-line levels after the termination of stress. Further, it successfully differentiated the two subject groups, with asthmatics having higher levels of resistance (reflecting their disorder) and greater variability (reflecting greater lability in their airway systems) than their normal counterparts. It is this greater lability which can be considered the more important finding as basal levels can be confounded by a number of factors including smoking, medication, and to an extent, lung volume.

Cardiac period (IBI) was a less ideal measure. Using a 1-min measurement period, the pattern of results was for significant increase in IBI in the minute following the stimulus onset. This is probably indicative of the complex nature of cardiac period response which may include an anticipatory response, a phasic response to stimulus onset (which may involve an IBI

TABLE 3. RT and IBI Means and Standard Deviations (in parentheses) for Film 3: Adoption

Subjects	Measure	Prefilm base line	Announcement	Post-announcement	Film	Postfilm base line
Asthmatics $N = 29$	RT(cm H_2O/LPS)	4.06 (1.11)	4.29 (1.43)	4.02 (1.20)	4.24 (1.12)	3.93 (1.10)
	IBI (ms)	768 (118)	771 (115)	775 (119)	788 (126)	769 (124)
Normals $N = 12$	RT	3.16 (0.84)	3.20 (0.78)	3.24 (0.68)	3.25 (0.70)	3.30 (0.86)
	IBI	834 (147)	830 (148)	832 (144)	850 (137)	830 (129)

increase, decrease, or both) and a poststimulus rebound in which IBI increases beyond prestimulus levels. In the present study, IBI increases in the minute following the stimulus probably reflected this latter response. A measure of IBI which examined shorter than 1-min intervals may have revealed the nature of the phasic changes which probably occurred immediately after stimulus onset.

In discussing the results in terms of the subject populations and stimulus types it will be necessary to invoke two separate models: (1) symptom specificity and (2) stimulus-response specificity. This is necessitated by the lack of a single theory of psychosomatic disorders which allows for simultaneous handling of subject and stimulus factors. Prior to this, however, some mention should be made of the *a priori* classification of stimuli.

In selecting stimuli for this investigation, films were chosen because of their inherently replicable nature. Most of the direct stress and symbolic representation studies cited earlier used idiosyncratic stimuli which although effective, would be nearly impossible to reproduce. Films have been used in general stress research and in several studies with asthmatics (7, 11) but no standards exist for classifying film stressors. The three films in the present study were selected to present a range of emotional stimuli. A dimension of general stressor vs. thematically relevant stressor was postulated to classify the films. The widely used Industrial Accident film was classified as a general stressor as it was undeniably stressful and had no direct connection with asthma or asthmatics. The Asthmatic Children film was classified as a thematically relevant film for asthmatics because it dealt directly with the suffering associated with their disorder. The Adoption film was more difficult to classify as it did not deal directly with asthma, was melodramatic and sad in tone, and was not as obviously stressful as the other two films. Nonetheless, it was classified as being thematically relevant as it allowed an empirical test of the notion that asthmatics would be uniquely predisposed to respond to the theme of separation. Finally, each film was preceded by an announcement which was also viewed as a potential stressor.

Symptom Specificity. In the Malmo et al. model of symptom specificity (22), a psychosomatic population exposed to a range of stressful stimuli should exhibit maximal responsivity in a symptom-related function. Thus, asthmatics would be expected to respond to different varieties of stimuli with increased bronchial constriction. In the present investigation, this is precisely what happened. Asthmatic subjects manifested significant increases in RT in response to a general stressor (Industrial Accident film) and to two thematically relevant stressors (Asthmatic Children and Adoption films). In addition, they evidenced significant bronchial response to the announcements preceding two of the three films (on the order of 9% increase in RT for the Asthmatic Children film and a 16% increase for the Industrial Accident film). It is important to note that the patterns of response differed for these various stimuli both in terms of whether: (1) the response was sustained (e.g. Asthmatic Children film) or short term (e.g. Adoption film); and (2) whether the response was limited to RT (e.g. Asthmatic Children film and the announcements) or included IBI (e.g. Industrial Accident film). Nonetheless, in all cases where asthmatics had significant physiological reactions to a stimulus, RT was part of that response.

The case for symptom specificity is further supported by the responses of nonasthmatic subjects. At no time did these subjects evidence significant changes in RT in response to the films or announcements. Related to this lack of responsivity in RT, they evidenced lower RT variability than their asthmatic counterparts. These findings were not unexpected. The existence of a psychosomatic disorder, such as bronchial asthma, indicates a relaxing of the homeostatic constraints on the lability of at least one physiological system. Thus, when asthmatic subjects evidence considerably greater lability and reactivity than nonasthmatics in a system concerned with bronchial constriction, it is but an empirical confirmation of the intuitively obvious fact that in asthma the mechanisms responsible for damping the lability of the bronchial system are not operating properly. This was further indicated during the Asthmatic Children film, when asthmatics maintained elevated RT in response to an emotional stimulus for 12 min and still functioned below the threshold for experiencing an asthma attack. Laboratory responding to subtle stimuli of this nature in nonpsychosomatic populations is virtually unknown. With the possible exception of extremely violent stress manipulations, subject's physiological response to laboratory stimuli rarely last more than a minute or so.

Stimulus-Response Specificity. The model of stimulus-response specificity derives from work attempting to associate different patterns of physiological responding with stimuli designed to produce different emotional states (23–25). In this discussion, the model is taken to simply indicate those situations in which a given stimulus produces the same pattern of responding by all subjects. This model is applicable to the results of the present investigation concerned with IBI responding insofar as both asthmatic and nonasthmatic subjects had similar patterns of IBI responding throughout the experiment. IBI results can be adequately summarized entirely in terms of the different stimuli: (1) all subjects were nonresponsive in IBI to the film announcements; (2) all subjects were essentially nonresponsive in IBI to the Asthmatic Children film; (3) all subjects showed some periods of IBI increase during the Adoption film; and (4) all subjects showed IBI increase following the discrete accidents during the Industrial Accident film. As IBI data are so readily accountable for in terms of the stimuli, and as no substantial differences between asthmatic and nonasthmatic subjects were observed, these data are well suited for interpretation in terms of stimulus-response specificity. RT data, on the other hand, could *only* be accounted for in terms of differences between asthmatic and nonasthmatic subjects and therefore required explication using a model such as symptom specificity which places emphasis on subject variables to account for differences in response. The necessity of invoking separate models for the IBI and RT data is indicative of the need to evolve a more comprehensive theory of specificity pertaining to psychosomatic disorders which incorporates explanations of differential response attributable to stimuli, individuals, and disorder. Graham (26) has observed that there are a number of different kinds of specificity relationships possible in psychosomatic and psychophysiological research. These relationships, to the extent to which they can be reliably reproduced with different

psychosomatic populations, will determine the nature of such a comprehensive theory.

Thematically Relevant and General Stressors. The results of the present investigation indicated stimulus type to be an important determinant of the kind of reactivity patterns asthmatics manifested in response to stress. The stressors which were characterized as being thematically relevant were those which directly pertained to asthma and the asthmatic experience (i.e., the Asthmatic Children film and, to some extent, the Adoption film). These stressors produced a response unique to asthmatics and unique to a measure of bronchial constriction. As such, these thematically relevant stressors show promise of being more useful than a typical general stressor such as the Industrial Accident film, which produced responses in both nonasthmatic and asthmatic subjects and responses in both IBI and RT in asthmatics. In addition, in the case of Asthmatic Children film, a pattern was seen of sustained bronchial constriction which was unlike the more phasic responses to the Industrial Accident film. This sustained constriction in response to an aspect of the asthmatic experience seems highly relevant to the mechanism of development of an asthma attack. The brief increases in RT in response to the somewhat irrelevant amputation scenes seem much less useful for understanding the dynamics of asthma.

A final note should be made of the responses to the announcements preceding the films. Significant increases in RT were found for the announcements preceding the Asthmatic Children film (which included the words, "asthmatic" and "hospital") and the Industrial Accident film (which was deliberately phrased as a warning). It is interesting to note that significant reactivity to announcements was only observed in asthmatic subjects and only in the RT measure. Reactivity of this sort has been observed in our laboratory before in response to warnings of imminent stress. Although further confirmation is certainly required, it seems reasonable to assume that asthmatics are fully capable of experiencing substantial increases in bronchial constriction in response to phenomenological *anticipation* of stressful events and that this anticipation response could be very significant in triggering asthma attacks.

SUMMARY

The effects of three stressor films on physiological response were investigated using 29 mild asthmatics and 12 nonasthmatics. Each subject viewed the films over three experimental sessions, which consisted of a prefilm base line, an announcement as to the nature of the film, the film, (divided into 12 1-min periods), and a postfilm base line. Data were obtained on heart period, a number of ventilatory variables, and RT. The data were analyzed in terms of differences in reactivity between asthmatics and nonasthmatics, and among the three films.

Results indicated that the ventilatory variables were not sensitive to the differences of interest; however, heart period (IBI) and RT were. The first film depicted asthmatic children in a hospital setting. Asthmatic children responded to this film with significantly elevated RT throughout the entire film. In addition, they responded to the announcement preceding the film

with increased RT. Normals were completely nonreactive.

The second film depicted three industrial accidents involving amputation and impalement. Both asthmatic and nonasthmatic subjects exhibited a pattern of response in which IBI increased in the periods after the accidents compared to the periods with the accidents. In addition, asthmatics responded to the accidents with increased RT; as well as to the announcement which preceded the film.

The third film depicted a mother who was giving her baby up for adoption. Asthmatics responded to the official relinquishing of the baby with an increase in RT. Nonasthmatics were nonreactive in RT.

The results were seen as supporting the strategy of using stressors which are thematically relevant to asthmatics and measuring symptom-relevant response. The Asthmatic Children film, with its obvious thematic relevance, was productive of reactivity which was unique to asthmatics and unique to the symptom-relevant response (i.e. RT). The Industrial Accident film, with no special thematic relevance to asthmatics, was productive of similar patterning of IBI responding in both asthmatics and normals, and response in both symptom-relevant (i.e. RT) and symptom-unrelated (i.e. IBI) measures in asthmatics.

Results from all three films could not be accounted for by either symptom specificity or stimulus-response specificity theories. It can be argued that a comprehensive theory of psychosomatic reactivity would have to reflect the interaction dynamics among factors of disorder, person, and environment.

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