Daily Psychosocial Factors Predict Levels and Diurnal Cycles of Asthma Symptomatology and Peak Flow

Joshua M. Smyth,1,6 Michelle H. Soefer,2 Adam Hurewitz,3 Alexandra Kliment,4 and Arthur A. Stone5

Accepted for publication: September 19, 1998

This study examines the relationship among psychosocial factors, asthma symptoms, and peak expiratory flow rate (PEFR) in the natural environment. Twenty adult asthmatics wore preprogrammed wristwatches that prompted them to assess PEFR, asthma symptoms, and psychosocial factors five times a day for 10 days. Psychosocial variables (activities, locations, social contacts, mood, and stressors) were strongly related to PEFR and asthma symptoms, suggesting that they may play a more important role in disease expression than has been previously thought. Diurnal cycles of asthma symptoms and PEFR were observed. However, statistically controlling for psychosocial factors eliminated diurnal cycles for PEFR or asthma symptoms, indicating that psychosocial factors are a major contributor to the observed diurnal cycle in PEFR and symptoms. These relationships underscore the need to include psychosocial factors in future asthma research.

KEY WORDS: asthma; diurnal cycle; psychosocial; environment; stress.

1 Department of Psychology, Minard Hall 115H, North Dakota State University, Fargo, North Dakota 58105. e-mail: Smyth@prairie.NoDak.edu.
2 Fisher Institute for Wellness, Ball State University.
3 Pulmonary Medicine, State University of New York School of Medicine.
4 Department of Psychology, University of Trier, Trier, Germany.
5 Department of Psychiatry, State University of New York at Stony Brook.
6 To whom correspondence should be addressed.
INTRODUCTION

Asthma is a lung disease associated with airway inflammation, airflow obstruction, and hyperresponsiveness to bronchoconstrictive stimuli. Typical symptoms include coughing, wheezing, and shortness of breath. Symptoms of asthma can be reversed through treatment and may also improve spontaneously [National Asthma Education Program (NAEP), 1991; National Heart, Lung and Blood Institute (NHLBI), 1995]. There is great interindividual variability in the frequency and severity of asthma symptoms. Recurrence is also variable: some asthmatics have daily symptoms, whereas others have intermittent attacks at weekly or monthly intervals. The reasons for this within-subject and between-subject variability are only partly known, but there is evidence that it is related to both environmental and biological factors.

Laboratory and field studies have revealed that asthma symptomatology is sensitive to both the physical and the psychological environment. Specific physical environmental influences on asthma include factors such as caffeine (Henderson et al., 1992), physical exercise (Forero et al., 1996), and sleeping in a warm, humidified environment (Martin, 1992). Allergens such as those from cats, cockroaches, and dust mites can precipitate asthma symptoms and/or attacks (Platts-Miller, 1993), as can air pollution (LeSon and Gershwin, 1995) and smoking (Forero et al., 1996). Specific psychological factors can also affect asthma symptomatology. Anxiety, depression, and limited social support (Kolbe et al., 1994) are associated with worse symptomatology. Stress and emotional factors have been shown to worsen asthma (Beggs and Curson, 1995, Brantley and Jones, 1993; Busse et al., 1994; Isenberg et al., 1992; Goreczny et al., 1988). Participants, for example, report significantly more coughing, wheezing, activity restriction, and interference with daily routine on high-stress days compared to low-stress days (Brantley and Jones, 1993). Kang (1993) observed high correlations between psychosocial perceptions (e.g., stress, negative emotions, and psychosocial support) and asthma symptoms. Perceptions of the psychosocial environment were found to account for a significant portion of total variance of asthma symptoms. Psychosocial factors, including loneliness, living alone, and unemployment, have been shown to predict the frequency of asthma-related visits to the emergency room, with social networks playing a primary role (Andren and Rosenqvist, 1987). Other studies have revealed associations between mood and peak expiratory flow rate (PEFR) among asthmatic patients (Steptoe and Holmes, 1985; Hyland, 1990); for instance, positive mood was associated with a higher PEFR (Hyland, 1990). All these findings point to the role of psychosocial factors in the course and variability of asthma. Despite this accumulating support for the view that psychosocial factors can both positively and negatively impact asthma symptomatology, little is known about how more general psy-