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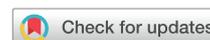
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Report of prenatal maternal demoralization and material hardship and infant rhinorrhea and watery eyes

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ABSTRACT

Background: Previously, we found that reported infant rhinorrhea and watery eyes without a cold (RWWC) predicted school age exercise-induced wheezing, emergency department visits, and respiratory-related hospitalizations for asthma. These findings appeared independent of infant wheezing and allergy. Overall, we theorize that prenatal material hardship and psychosocial distress can induce infant dysregulation in the autonomic nervous system leading to infant RWWC and school age exercise-induced wheezing.
Objective: To test the hypotheses that indicators of prenatal stress and measures of maternal demoralization, which can alter infant autonomic nervous system responses, would predict infant RWWC.
Methods: In a prospective birth cohort of urban children (n = 578), pregnant women were queried in the third trimester about material hardship and maternal demoralization using validated instruments. Child RWWC was queried every 3 months in infancy.
Results: Notably, 44% of the mothers reported not being able to afford at least one of the basic needs of daily living during pregnancy, and children of those mothers were more likely to have infant RWWC ($P < .001$). The children had an increased risk of RWWC with increasing maternal demoralization during pregnancy ($P < .001$). In models controlling for sex, race and ethnicity, maternal asthma, maternal allergy, smoker in the home (pre- or postnatal), prenatal pesticide exposure, and older siblings, RWWC was predicted by mother's report of material hardship (relative risk, 1.22; $P = .021$) and maternal demoralization (relative risk, 1.14; $P = .030$).
Conclusion: These results suggest an association between material hardship and psychological distress during pregnancy and RWWC in infancy, further supporting a link between infant autonomic dysregulation and RWWC.

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Introduction

In children, asthma is the leading cause for emergency department (ED) visits and the most frequent reason for preventable pediatric hospitalizations.[1] According to the most recent National Health Interview Survey, the United States Centers for Disease Control estimates that 25 million people, including 6 million children, had asthma with an associated 1.8 million ED visits and 189,000 hospitalizations.[2] Given this considerable burden of asthma-related health care, there is a need to better understand early-life causes of future wheezing and identify children who would potentially benefit from early intervention to prevent future ED visits and hospitalizations.

A mechanism involving the autonomic nervous system (ANS) may underlie a physiological pathway linking early-life symptoms to subsequent asthma-related consequences. The ANS functions as an integral part of airway function, and ANS dysregulation has been found in children with asthma.[3,4] Increased parasympathetic activity has also been associated with airway hyperreactivity and asthma morbidity.[5-8] In the Columbia Center for Children's Environmental Health (CCCEH) prospective birth cohort study, we found that rhinorrhea and watery eyes in the absence of a cold (RWWC) reported in infancy predicted school age exercise-induced wheezing, ED visits, and hospitalizations independent of allergic sensitization.[8] We also previously have found an association between high-frequency variation in heart rate, a measure of parasympathetic function, in the first month after birth and wheezing later in childhood, especially among girls.[9] Collectively, these findings suggest a connection between early-life ANS regulation and the development of subsequent asthma-related symptoms.

Psychosocial stress has been found to have an influential role in asthma and asthma morbidity.[10] This is particularly true for ethnic minorities and socioeconomically disadvantaged individuals, who experience a higher amount of chronic stress and are disproportionately affected by asthma.[11] For example, one study found a relationship in urban children between exposure to chronic stress during early childhood and a subsequent reduction in lung function at school age.[12] We also previously have found an association between a mother's report of demoralization in pregnancy and wheezing in preschool age children in the CCCEH.[13]

Psychological factors, including perinatal stress, have been proposed to be linked with alterations in interrelated physiological processes, including the ANS, which may in turn influence childhood lung structure and function.[14] There is substantial evidence, as illustrated by a recent meta-analysis, revealing a relationship between prenatal stress and childhood asthma.[15] However, to the best of our knowledge, there are no studies exploring the link between stress in the prenatal period and subsequent disruption of postnatal ANS associated with future wheezing. To address this gap in the literature, we hypothesized that maternal stress, including material hardship and demoralization, leads to a disruption in the prenatal ANS and subsequently disruption in postnatal ANS (ie, increased parasympathetic function) and manifests as RWWC symptoms in infancy, defined as the first year of life.

Methods

Participants

The participants were part of the CCCEH prospective birth cohort study of urban children. Pregnant women aged 18 to 35 years, who were living in Northern Manhattan or the Bronx in New York City for at least the previous year and self-identified as African American or Dominican, were enrolled from 1998 to 2006.[8,16-18] The original study limited recruitment to mothers of African American race or Dominican ethnicity because these were the predominant ethnic and racial groups in the community that the CCCEH serves. The mothers gave written informed consent. The Columbia University's institutional review board approval was obtained.

Questionnaires

Questionnaires used in these analyses were administered to the mothers during the third trimester of pregnancy and every 3 months after child's birth until 12 months of age. Questions included information regarding the mother and child's environmental exposures and the mother and child's health. As previously described, queries about the child's symptoms included rhinorrhea without a cold ("Does your child ever get attacks of sneezing or runny nose other than from colds?") and watery eyes without a cold ("Does your child ever get attacks of runny or itchy eyes other than from colds?").[8] A child was considered to have RWWC if the mother reported at least 1 episode on 1 questionnaire during the first year of life.

Prenatal Material Hardship

Questionnaires specifically asked about living conditions during the current pregnancy, including a measure of material hardship, to assess the level of unmet basic needs.[19] Material hardship was defined as the level of unmet basic needs such as going without or having inadequate food, housing, or clothing at some point within the previous year, with each counting as 1 unmet basic need (0 = no unmet needs; 1 = one unmet need; 2 = 2 or more unmet needs).[17]

Prenatal Maternal Demoralization

Maternal demoralization, nonspecific psychological distress, and potential inability to cope with stressful situations, were measured using the Psychiatric Epidemiology Research Instrument Demoralization Scale, which contains 27 items.[13,18] The Psychiatric Epidemiology Research Instrument Demoralization Scale combines 8 domains, which include the following: perceived physical health, sadness, poor self-esteem, dread, anxiety, confused thinking, hopelessness or helplessness, and psychophysiological symptoms, which together comprise the concept of demoralization.[20,21] Each question was rated on a scale from 0 to 4 with higher scores indicating greater psychological distress and participants were queried about symptoms within the previous year.[13] The overall prenatal demoralization score is the average of the scores for the individual questions. In the exploratory analyses, the association between individual items on maternal demoralization was also tested for associations with RWWC (eTable 1).

Statistical Analysis

The analyses were limited to children who had at least 1 questionnaire completed during the first year of life and had data available on the primary independent variables (prenatal maternal demoralization and material hardship) and possible covariates and confounders (prenatal and infant environmental tobacco smoke [ETS] exposure, prenatal insecticide exposure). To test our hypothesis, maternal demoralization and material hardship were tested as predictors of RWWC. Relative risks (RR) and prevalence ratios with 95% confidence intervals (CIs) were calculated using binomial regressions in generalized estimating equations with multivariable models adjusting for potential confounders and covariates, including age, sex, race and ethnicity, maternal asthma, presence of smoker in the home (pre- or postnatal), and older siblings. The analyses were conducted using Statistical Package for the Social Sciences statistical software, version 23 (SPSS Inc, Chicago, Illinois) and visualized in R version 3.03.

Results

As previously described, most of the mothers in this study reported receiving Medicaid (demographics described in Table 1).[13] The ETS exposure in the home was also common during pregnancy (32%) and during the first year of life (33%). However, there was some discordance between ETS exposure at these time points, with 117 (20%), 139 (24%), and 322 (56%) of children exposed both prenatally and postnatally, only prenatally or postnatal, and at neither time point, respectively. The children included in the analyses (n = 578) did not differ in demographics from those recruited for the CCCEH study but not included in the analyses because of missing data or loss to follow-up (n = 149), except that ETS during pregnancy and infancy were more common among those children not included in the analyses than those included in the analyses (eTable 2). The frequency of reported material hardship was similar among children included in the analyses (251/578, 43.4%) and those on whom we had material hardship data but were excluded for other missing data (70/138, 50.7%) (P = .12). The maternal demoralization score medians were similar among those included and those with demoralization data but excluded (1.04 vs 1.15, respectively, P = .18).

Mothers reporting material hardship had higher prenatal demoralization scores (Table 2, P < .001). Material hardship was more common among mothers of Dominican ethnicity than those of African American race, but material hardship was not associated with other demographic variables (Table 2). Mothers of Dominican ethnicity and with allergy symptoms had higher maternal demoralization scores (Table 2). Maternal demoralization scores were higher among homes with prenatal or postnatal ETS. Median material demoralization among mothers who reported that they smoked during the child's infancy was not significantly higher than those who did not smoke (1.15 vs 1.00, P = .073) (smoking during pregnancy was an exclusion criterion in the CCCEH study).

Rhinorrhea without a cold and watery eyes without a cold were both common, at 38% and 33%, respectively. Half of the children (50%) had a report of either rhinorrhea or watery eyes without a cold (RWWC). Children with a report of material hardship prenatally were more likely to have a report of RWWC in infancy (P_{trend} < .001, Fig 1). There was an increasing risk of RWWC in infancy with increasing prenatal maternal demoralization score (P_{trend} < .001, Fig 2). In a multivariable model controlling for potential confounders/covariates, infant RWWC was independently predicted by prenatal material hardship (relative risk [RR] = 1.21; 95% CI = 1.03-1.44; P = .021) and by prenatal maternal demoralization (RR = 1.14; 95% CI = 1.01-1.29; P = .012) (Fig 3). In addition, when the children in the lowest quartile of prenatal maternal demoralization were examined alone (adjusting for the same variables), there was still a statistically significant association between prenatal demoralization and infant RWWC (RR = 3.61; 95% CI = 1.02-12.8; P = .047). Statistically significant differences were not observed among other quartiles.

The RWWC was also more common among children with an older sibling, prenatal pesticide exposure, and a mother reporting that she had allergy symptoms. In a model without the variable for an older sibling, the effect estimates for prenatal material hardship (RR = 1.24; 95% CI = 1.05-1.46; P = .013) and prenatal maternal demoralization (RR = 1.15; 95% CI = 1.02-1.29; P = .024) were similar to the model with the older sibling variable included, suggesting independence of these associations from birth order (a possible surrogate for infection exposure). The RWWC was more common among the children of Dominican ethnicity as compared with those of African American race.

Total immunoglobulin E (IgE) data were available on n = 380 women during pregnancy. Among the subset of children born to these mothers, report of maternal allergy was associated with infant RWWC in the same multivariable model with a similar magnitude to that observed in the larger cohort (RR 1.43 [1.18-1.73], P < .001). However, in a similar model, total IgE in the highest quartile (≥123 IU/mL) for mothers was not associated with infant RWWC (RR 1.09 [0.89-1.34], P = .41).

Table 1
Demographics of Study Participants at Birth (n = 578)

Characteristics	
Male sex, n (%)	275 (47.6)
Mother's age, mean (SD)	25.0 (4.9)
Mother's race/ethnicity	
African American, n (%)[a]	203 (35.1)
Dominican, n (%)[a]	375 (64.9)
Mother's self-reported health	
Asthma, n (%)[b]	133 (23.0)
Allergy, n (%)[c]	241 (41.7)
Sociodemographic	
No high school degree, n (%)[d]	207 (36.1)
Receiving Medicaid, n (%)	522 (90.3)
Domestic environment	
Smoker at home, n (%)[e]	189 (31.3)
Older sibling, n (%)[f]	308 (53.3)
Prenatal insecticide exposure, n (%)[g]	187 (32.4)

[a]The mother self-identifying as being of either African American race or Dominican Republic ethnicity was an inclusion criterion.
[b]Mother reported either during pregnancy or on a questionnaire 3 months after the child was born that she had asthma.
[c]Mother replied "yes" to a question about having allergies asked during the first year after the child was born.
[d]A total of 5 of the mothers did not report whether they had completed high school.
[e]The mother smoking during pregnancy was an exclusion criterion.
[f]Child has at least 1 older sibling.
[g]Mother reported exposure to insecticide during pregnancy.

Table 2
Demographic Characteristics, Frequency of Material Hardship, and Mean Prenatal Maternal Demoralization Score

	Material hardship (%)	Maternal demoralization median
Material hardship		
No	-	0.85
Yes	-	1.25[a]
Mother's age (median)		
Younger	39.5	1.04
Older	47.5	1.04
Mother's race/ethnicity		
African American	34.4	0.93
Dominican	48.3[b]	1.11[c]
Maternal asthma		
No	43.4	1.04
Yes	43.6	1.04
Maternal allergy		
No	43.0	0.96
Yes	44.0	1.11[b]
Mother completed high school		
No	41.1	1.11
Yes	44.3	1.00
Smoker at home prenatal		
No	47.8	1.00
Yes	41.4	1.09[c]
Smoker at home postnatal		
No	42.7	1.00
Yes	45.0	1.07[c]
Older sibling		
No	40.4	1.04
Yes	46.1	1.04
Prenatal insecticide exposure		
No	44.0	1.04
Yes	42.2	1.04

[a]P < .001 (Mann—Whitney comparison of medians).
[b]P < .01 (Mann—Whitney comparison of medians).
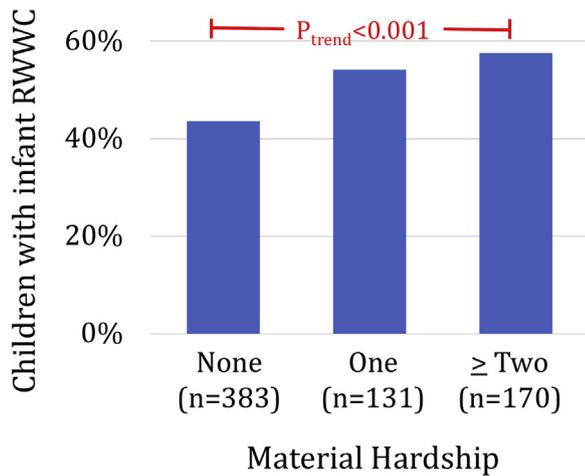[c]P < .05 (Mann—Whitney comparison of medians).

Figure 1. Frequency of infant rhinorrhea and/or watery eyes without cold among children with and without prenatal material hardship.

Effect modification by sex was tested using multiplicative interaction terms in models with RWWC as the dependent variable. There was neither a significant interaction between material hardship and sex ($P_{interaction}$ = .90) nor maternal demoralization and sex ($P_{interaction}$ = .86).

In the exploratory analyses, individual items on the material hardship score were tested for associations with RWWC (eTable 3). The most often reported item, "could not afford clothing," was the only statistically significantly associated with RWWC (P = .035). The individual items on the maternal demoralization were also explored (eTable 1). The most significant trends were observed for the mother reporting more frequent "ailments in different parts of the body" (P = .007), "feelings of sadness or depression" (P < .001), "feeling lonely" (P = .009), "feeling restless" (P = .003), "bothered by cold sweats" (P = .009), "appetite poor" (P = .002), "headaches and other pains when angry" (P < .001), "fears of being alone" (P = .003), and "bothered by nervousness" (P = .003), and more strongly disagreeing with "feeling much to be proud of" (P = .005).

Discussion

Although prenatal stress has been associated with subsequent postnatal asthma, the underlying mechanisms have been unclear. We have hypothesized that there is an identifiable ANS pathway connecting prenatal stress exposures, early-life symptoms, such as RWWC, and future wheezing. We investigated this association in a
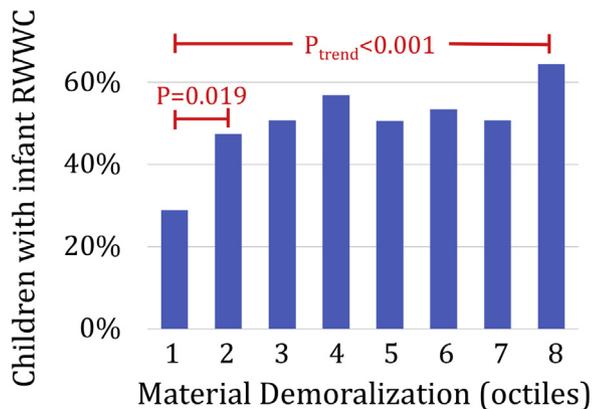

Figure 2. Frequency of rhinorrhea and/or watery eyes without cold by octiles of prenatal demoralization score. Octile #1 = 0-0.44, #2 = 0.46-0.67, #3 = 0.70-0.81, #4 = 0.85-1.00, #5 = 1.04-1.22, #6 = 1.26-1.56, #7 = 1.59-1.85, #8 = 1.89-3.30.
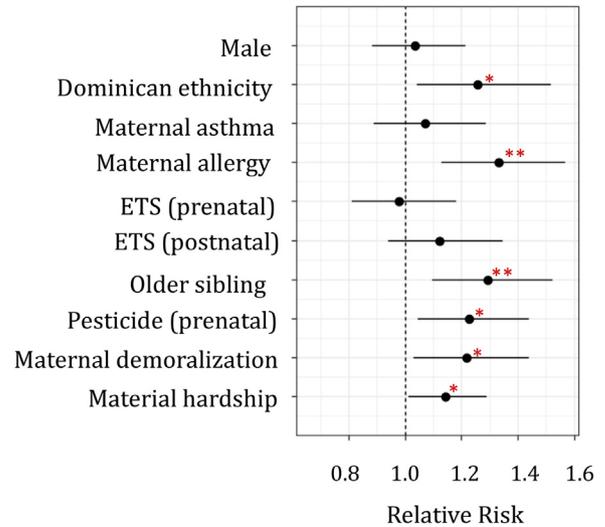

Figure 3. Multivariable model predicting infant rhinorrhea and/or watery eyes without cold. *P < .05, **P < .01.

well-characterized prospective birth cohort with the goal of providing further support of this pathway by connecting prenatal exposures with symptoms in infancy that have been connected with subsequent disease. Our findings suggest an association between maternal stress and perception of stress during pregnancy and RWWC in infancy. We believe that these findings further raise the possibility of a link between infant autonomic dysregulation and RWWC; however, future research, including the use of more direct measures of autonomic dysregulation, is needed to confirm this mechanism.

We found that with increasing maternal demoralization during pregnancy, children had increased risk of RWWC in infancy. In addition, we observed an effect at the very lowest levels of demoralization (among children in the lowest quartile), suggesting an effect even at low levels of demoralization. When we explored the individual items on the demoralization scale, we found trends with mothers reporting more frequent "feelings of sadness or depression." It is known that inner-city, African American and Hispanic populations face multiple and cumulative stressors that may contribute to depression.[22,23] Interestingly, although limited, there is some evidence to suggest that depression during pregnancy is associated with altered ANS reactivity in children.[24] There is also limited research examining maternal stress and future asthma in the disadvantaged groups. However, we have also previously reported in this cohort that maternal demoralization was associated with the development of preschool age wheezing, but not allergen-specific IgE.[13] The link with wheezing, but not seroatopy, is also in keeping with a nonallergic, potentially ANS—related mechanism.

Our study also found that RWWC was predicted by the mother's report of material hardship. Close to half of the mothers in our study reported not being able to afford at least one of the basic needs of daily living during pregnancy and the children of those mothers were more likely to have RWWC in infancy. Although it is well-known that children in socioeconomic disadvantaged homes experience a wide range of health disparities, including a higher prevalence of asthma, there is sparse research examining the link between material hardship during pregnancy and future autonomic dysregulation. However, one study found that socioeconomic disadvantage early in life was associated with increased risk of neurologic abnormalities, including those related to ANS development.[25] This may suggest that material hardship during pregnancy influences postnatal ANS development and possible dysregulation.
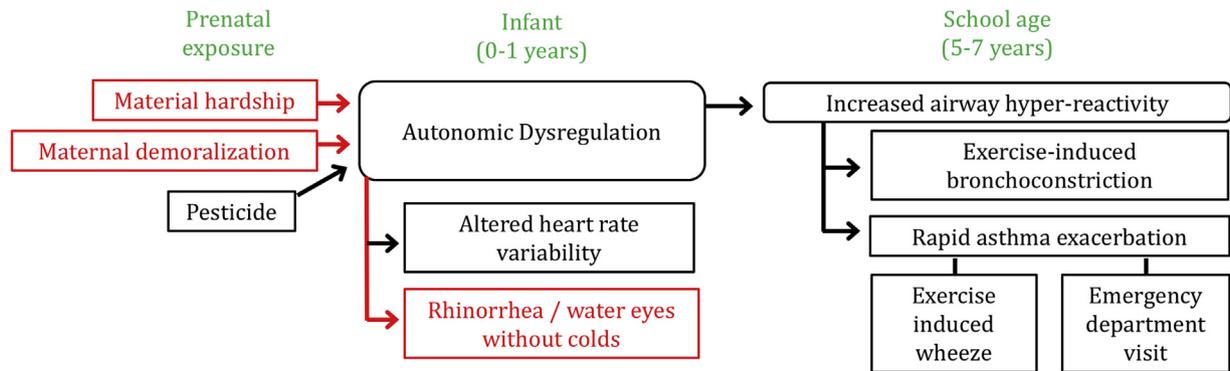
Figure 4. Proposed connection between prenatal exposures, infant RWWC and school age exercise-induced wheeze. Components tested in this analysis are in red. RWWC = rhinorrhea and watery eyes without a cold.

In our multivariable model controlling for potential confounders, infant RWWC was predicted by prenatal material hardship and maternal demoralization. It is important to note that these risk factors were independent predictors of RWWC, potentially suggesting multiple "exposures" acting to dysregulate the ANS and lead to RWWC. This link between multiple exposures acting on the ANS is further supported by the independent association we observed between prenatal pesticide exposure and RWWC, which we describe in greater detail elsewhere.[26] The association with prenatal pesticide was observed during a time when organophosphate pesticides, which are acetylcholinesterase inhibitors (ie, upregulate the parasympathetic nervous system), were often used as domestic pesticides.

There were other important variables that were included in the model predicting RWWC. Having an older sibling, which serves as an indicator of increased risk of exposure to viruses in infancy, predicted RWWC. It seems likely that this is owing to increased infection, which could lead to infection-caused symptoms even when the parent believes the child does not currently have an infection. Although this would indicate some misclassification of RWWC (ie, not "without a cold"), it is important to note that for the findings of this article, we have controlled the associations between material hardship and maternal demoralization and RWWC for older siblings to attempt to remove bias related to misclassification of RWWC. Interestingly, we found that RWWC was more common among children of Dominican ethnicity, as compared with those of African American descent, although the mechanism is unclear. We revealed that RWWC was also more common in children of mothers reporting they had allergy symptoms. Remarkably, total IgE did not seem to be a strong predictor, which serves as further evidence that these findings are likely related to a nonallergic pathway.

Our results offer further evidence in a proposed complex physiological pathway, in which prenatal exposures may subsequently affect the biological pathways of ANS regulation in infancy, ultimately predicting future exercise-induced wheezing, ED visits, and hospitalizations for asthma in lower income, urban communities (Fig 4). Studies addressing the influence of prenatal stress on subsequent childhood lung function are limited, although asthma prevalence in inner-city children, in whom psychosocial stress is prevalent, is well established.[27,28] We put forth a possible mechanism to link prenatal stress with future exercise-induced wheezing mediated by ANS. We have previously revealed an association between ANS dysregulation in the first month of life and childhood wheezing.[9]

There are several limitations to acknowledge in this study. First, RWWC was assessed by maternal report through a questionnaire. Infectious testing for viral or bacterial etiologies or physician assessment by physical examination to validate absence of cold was not performed, which could have resulted in RWWC being overreported. However, associations between material hardship and maternal demoralization and RWWC were found in models controlling for the presence of older siblings. Infants with older siblings served as a proxy for risk of viral exposure as these children would be more likely to have exposure to viral illnesses and upper respiratory tract infections. Another possible etiology of RWWC may be a type of chronic rhinitis known as nonallergic rhinitis (NAR), which is a heterogeneous disease that is poorly defined, especially among the pediatric population, and is usually diagnosed once allergic rhinitis has been excluded.[29,30] The pathophysiology of NAR is not well understood. NAR subtypes include idiopathic or vasomotor rhinitis. Although there are scarce data on NAR in infancy, a clinic-based study from Singapore reported that most infant patients with rhinitis were nonallergic.[31] Interestingly, in idiopathic or vasomotor rhinitis, it has been suggested that there may be an imbalance of the sympathetic and parasympathetic nervous system (ie, parasympathetic hyperactivity and sympathetic hypoactivity) resulting in rhinorrhea.[32]

Another limitation was that maternal demoralization may affect a mother's ability to cope with her child's health and potentially lead to overreport of illness, including RWWC. In addition, maternal stress was not measured using a biomarker, such as cortisol levels. Our study used an epidemiologic approach to evaluate a connection between prenatal stress and symptoms of RWWC in infancy as an indicator of ANS function; however, our study did not reveal mechanistic data to address this link.

To the best of our knowledge, this is the first study to reveal a link between stress in the prenatal period and postnatal RWWC. Together with our other findings, these results are supportive of prenatal exposures altering ANS response manifesting as RWWC in infancy, which predicts future risk of exacerbation-prone individuals with asthma in lower income, African American, and Hispanic communities. Additional studies, preferably with objective measures of the ANS response (eg, heart rate variability), are needed to confirm these findings and to further explore the underlying physiological mechanisms. Our proposed pathway may serve to identify risk factors for autonomic dysregulation and potential future wheezing in offspring, which in turn would allow for early intervention and reduction in subsequent asthma morbidity.

Supplementary Data

Supplementary data related to this article can be found at https://doi.org/10.1016/j.anai.2020.07.016.

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Supplementary Data

eTable 1
Prevalence of Infant RWWC With Mother Report of Individual Items on Maternal Demoralization Score

	Never (%)	Almost never (%)	Sometimes (%)	Fairly often (%)	Very often (%)	P_{trend}
Ailments in different parts of the body	42	45	57	56	55	.007
Feelings of sadness/depression	37	50	49	61	60	<.001
Attacks of sudden fear	47	51	56	67	58	.046
Felt confident	51	46	53	47	46	.99
Felt lonely	47	39	53	60	59	.009
Feelings of restlessness	45	45	48	66	60	.003
Felt useless	48	50	57	63	57	.063
Feared going crazy	49	58	48	64	56	.35
Felt anxious	47	47	49	55	60	.061
Feared something terrible	49	50	54	45	57	.46
Felt confused/trouble thinking	48	49	53	46	62	.13
Trouble concentrating	50	44	56	46	54	.54
Felt nothing turns out for you	46	48	51	50	62	.038
Felt completely hopeless	48	45	57	61	66	.015
Felt completely helpless	48	44	57	63	58	.097
Wondered anything worthwhile	49	43	55	46	73	.098
Been bothered by cold sweats	47	56	71	46	62	.009
Headaches	44	48	50	56	57	.034
Appetite poor	44	49	52	62	64	.002

	Very satisfied (%)	Somewhat satisfied (%)	Somewhat dissatisfied (%)	Very dissatisfied (%)		P_{trend}
Satisfied with yourself	46	51	64	53		.048

	Excellent (%)	Good (%)	Average (%)	Below average (%)	A lot below average (%)	P_{trend}
Grade past year	46	51	53	48	50	.47

	Strongly agree (%)	Somewhat agree (%)	Neither agree/disagree (%)	Somewhat disagree (%)	Strongly disagree (%)	P_{trend}
Feels much to be proud of	46	49	63	65	64	.005

	Strongly disagree (%)	Somewhat disagree (%)	Neither agree/disagree (%)	Somewhat agree (%)	Strongly agree (%)	P_{trend}
Worrying type	50	29	56	46	57	.031
Feels a failure in life	51	50	45	39	59	.37

	Never (%)	Almost never (%)	Sometimes (%)	Fairly often (%)	Very often (%)	P_{trend}
When angry/headaches or other pains	43	48	58	53	66	<.001
Fears being left alone	45	59	59	52	65	.003
Bothered by nervousness	45	51	50	72	63	.003

Abbreviation: RWWC, rhinorrhea and watery eyes without a cold.

eTable 2
Demographics of Study Participants at Birth Among Those Included in the Analyses (n = 578) and Those Recruited Who Were Excluded Because of Missing Data (n = 149)

	Included in the analyses	Not included in the analyses	*P* value
Male sex, n (%)	275/578 (47.6)	76/149 (51.0)	.46
Mother's age, mean (SD)	25.0 (4.9)	25.5 (5.0)	.25
Mother's race or ethnicity			
African American, n (%)[a]	203/578 (35.1)	51/149 (34.2)	
Dominican, n (%)[a]	375/578 (64.9)	98/149 (65.8)	.84
Mother's self-reported health			
Asthma, n (%)[b]	133/578 (23.0)	30/149 (20.1)	.45
Allergy, n (%)[c]	241/578 (41.7)	46/108 (42.6)	.86
Sociodemographic			
No high school degree, n (%)	366/573 (63.9)	90/140 (64.3)	.93
Receiving Medicaid, n (%)	522/578 (90.3)	10/145 (6.9)	.30
Domestic environment			
Smoker in home prenatal, n (%)[d]	184/578 (31.8)	62/139 (44.6)	.004
Smoker in home in infancy, n (%)	189/578 (32.7)	45/79 (57.0)	<.001
Older sibling, n (%)[e]	308/578 (53.3)	75/119 (63.0)	.052
Prenatal insecticide, n (%)[f]	187/578 (32.4)	39/140 (27.9)	.30

[a]Mother self-identifying as being of either African American race or Dominican Republic ethnicity was an inclusion criterion.
[b]Mother reported either during pregnancy or on a questionnaire 3 months after the child was born that she had asthma.
[c]Mother replied "yes" to a question about having allergies asked during the first year after the child was born.
[d]The mother smoking during pregnancy was an exclusion criterion.
[e]Child has at least 1 older sibling.
[f]Mother reported exposure to insecticide during pregnancy.

eTable 3
Relative Risk for Infant RWWC With Mother Report of Individual Items on the Material Hardship Score

	Frequency of hardship (%)	Relative risk for RWWC[a]
Could not afford to buy food	17	1.14 (0.94-1.38); *P* = .20
Could not afford place to stay	22	1.04 (0.86-1.25); *P* = .69
Could not afford gas/electricity	7.8	1.12 (0.87-1.45); *P* = .39
Could not afford clothing	29	1.20 (1.01-1.41); *P* = .035
Could not afford medical treatment	10	1.08 (0.86-1.36); *P* = .53
At least one material hardship	43	1.22 (1.03-1.44); *P* = .021

Abbreviations: ETS, environmental tobacco smoke; RWWC, rhinorrhea and watery eyes without a cold.
[a]Relative risk with 95% confidence interval for model adjusted for sex, race/ethnicity, maternal asthma, maternal allergy symptoms, prenatal or postnatal ETS, older siblings, prenatal pesticide, and maternal demoralization.