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Illness appraisals and health-related quality of life in adolescents and young adults with allergies and asthma

Abstract: The current study sought to: 1) assess differences in levels of physical and mental health-related quality of life (HRQOL), illness uncertainty, and intrusiveness in adolescents and young adults (AYAs) with allergies and asthma, as well as 2) examine the effect of illness appraisals on HRQOL. Participants were undergraduate students with self-reported allergies ($n=74$) and asthma ($n=74$) who completed the Mishel Uncertainty in Illness Scale (MUIS), the Illness Intrusiveness Scale (IIS), and the SF-36 Health Survey Questionnaire. Paired t-tests indicated that AYAs with allergies reported higher levels of illness uncertainty and poorer mental HRQOL than AYAs with asthma; the groups did not differ on reported levels of illness intrusiveness or physical HRQOL. Hierarchical regressions were conducted to examine the relationship between illness appraisals and HRQOL. Results revealed that poorer mental HRQOL was associated with higher illness uncertainty in AYAs with allergies and higher illness intrusiveness in AYAs with asthma. Poorer physical HRQOL was associated with higher illness uncertainty in AYAs with asthma and higher illness intrusiveness in AYAs with allergies and asthma. The current examination suggests that illness appraisals may be differentially related to HRQOL in AYAs with allergies compared to those with asthma.

Keywords: adolescents; allergies; asthma; illness intrusiveness; illness uncertainty; quality of life; young adults.

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Introduction

Asthma and allergies are two of the most common chronic illnesses in the United States, affecting more than 20 and

50 million Americans, respectively (1, 2). Unfortunately, these illnesses have been shown to interfere with individuals' academic, occupational, and daily functioning (3–6). Specifically, Americans with asthma miss over 14 million workdays and 3 million school days, while those with allergies miss over 3.5 million workdays and 2 million school days each year due to their illness (4, 6). Furthermore, individuals with allergies have reported that severe allergic symptoms decreased their work productivity by 23% (5).

Adolescents and young adults (AYAs) are a critical population to examine in the context of a chronic illness, because they are navigating a number of complex challenges. As adolescents manage the transition to adulthood, they must learn to balance academic, occupational, social, familial, and romantic demands while developing their autonomy and meeting their personal goals. Notably, AYAs with a chronic illness must manage these demands while managing their illness symptoms, placing them at an increased risk of diminished quality of life (3, 7). In particular, several studies have demonstrated that individuals with asthma (8–12) and allergies (13–16) are at risk for experiencing poorer health-related quality of life (HRQOL) than comparison peers. To our knowledge, only one study has examined differences between physical and mental HRQOL in AYAs with asthma, allergies, and comparison peers. This study indicated that AYAs with both asthma and allergies experienced significantly lower physical HRQOL than their peers with allergies alone and healthy peers. AYAs with asthma and allergies were found to experience similar levels of mental HRQOL, but both illness groups were experiencing poorer mental HRQOL than comparison peers (11).

Given the psychosocial impact of asthma and allergies on HRQOL, the examination of specific psychological factors that predict HRQOL in AYAs is warranted. Two such illness-related cognitive appraisals that may be pertinent predictors of HRQOL in the context of asthma and allergies are illness uncertainty and illness intrusiveness. Both greater illness uncertainty and illness intrusiveness have been shown to be consistently related to poorer adjustment outcomes in a variety of chronic illness populations (3, 17–23).

Illness uncertainty is a cognitive experience elicited when the meaning of illness-related events is unclear and outcomes are unpredictable (24). Illness uncertainty has been found to significantly predict symptoms of depression and anxiety in AYAs with childhood-onset asthma (3, 18, 21) and mental HRQOL (9). Individuals with food allergies and their caregivers have also been found to experience uncertainty regarding the possibility of an anaphylactic reaction (25). Furthermore, uncertainty regarding administration of epinephrine auto-injectors has been identified as a barrier to adherence in adolescents with anaphylaxis (26).

Illness intrusiveness has been defined as the extent to which illness-related tasks are perceived to interfere in one's life (27), thus depriving them of reinforcement opportunities. As a way of exerting control over their asthma, AYAs may choose to avoid activities that they believe trigger asthmatic symptoms (28). Illness demands may also hinder adults with asthma in occupational, academic, and interpersonal domains (29, 30). To our knowledge, no studies have examined illness intrusiveness in individuals with allergies. However, comparable to asthma symptoms, allergy symptoms have been suggested to interfere with sleep, concentration, physical activities, daily tasks, and social, academic, and occupational demands (31, 32).

Rolland's psychosocial typology of chronic illness (33) was developed to classify chronic illnesses in order to examine the effect of various disease characteristics on psychosocial adjustment. Given that little work has been done to compare psychosocial adjustment of individuals with allergies to those with asthma, this model will serve as a framework for the current examination. Rolland's model suggests allergies and asthma have the same typology, with both conditions being characterized as having acute onset, an episodic course, a non-fatal outcome, and non-incapacitating diseases (34). Thus, AYAs with allergies and asthma are expected to experience similar patterns of cognitive appraisals regarding their illnesses; however, it is uncertain if these cognitive appraisals can be differentially associated with their HRQOL.

The current study sought to compare levels of physical and mental HRQOL as well as illness uncertainty and illness intrusiveness in AYAs with allergies and AYAs with asthma. The extant literature suggests that these individuals are at risk for poor HRQOL (8–16), but the differences across the illness groups have not been examined. It was hypothesized that AYAs with allergies would exhibit similar levels of HRQOL and each of the illness appraisal variables as AYAs with asthma. Additionally, the study sought to examine the relationship between illness appraisals and HRQOL in these illness groups. It was hypothesized that higher rates of illness uncertainty

and intrusiveness would be related to poorer physical and mental HRQOL in AYAs with allergies and asthma.

Materials and methods

Participants were undergraduate students with self-reported allergies ($n=74$) or with self-reported asthma ($n=74$). The AYAs completed the study questionnaires as part of two larger studies on psychosocial adjustment of AYAs with allergies and asthma. Participants in the two disease groups were matched by age, gender, and ethnicity. All participants were matched exactly on gender and ethnicity. When an exact match on age was not found, a participant with the closest age was chosen as the match. The ethnic breakdown of the current sample is consistent with the ethnic distribution of the university in which this study was conducted. Demographic characteristics for the current sample are listed in Table 1.

Participants with allergies reported the type of allergens (i.e., environmental, food, animal, or other) they were allergic to and the severity of their allergies on a five-point Likert scale, ranging from 1 (no reaction) to 5 (extremely severe). Participants with asthma reported the severity of their asthma symptoms on a seven-point Likert scale based on National Heart, Lung, and Blood Institute guidelines (35), ranging from 1 (mild) to 7 (respiratory failure). The respective illness characteristics of each disease group are listed in Tables 2 and 3. Those participants with allergies denied a history of asthma; however, those participants with asthma were not asked about their history of allergies.

Measures

Demographic questionnaire

Participants completed a demographic questionnaire to provide information regarding their demographic characteristics (including age, gender, ethnicity, education) and illness information (including age at diagnosis, illness duration, type of allergy, treatment, and frequency of visits to a physician for their illness).

Table 1 Demographic characteristics.

Age, years	
Allergies M ^a (SD) ^b	19.65 (1.64)
Asthma M ^a (SD) ^b	19.77 (1.60)
Range	18–25
Gender, % Female	62.2
Ethnicity, %	
Caucasian	68.9
African American	9.5
Hispanic	2.7
American Indian	12.2
Asian American	0.0
Multiracial	4.1
Other	2.7

^aM, Mean. ^bSD, standard deviation.

Table 2 Illness parameters for AYAs with allergies.

Types of allergen, %	
Environmental	95.9
Animal	33.8
Food	20.3
Other	25.7
Seasonal, %	94.6
Number of allergens, %	
One	40.5
Two	44.6
Three	13.5
Four	1.4
Subjective illness severity, %	
No reaction	4.1
Mild	32.4
Moderate	52.7
Severe	10.8
Extremely severe	0.0
Frequency of physician visits, %	
0 times	36.5
1–2 times	48.6
3–5 times	10.8
5–10 times	2.7
More than 10 times	1.4

Mishel Uncertainty in Illness Scale (MUIS)

The MUIS (36) is a 23-item scale used to assess four components of illness uncertainty (i.e., ambiguity, uncertainty, lack of information, and unpredictability) in adults with chronic illnesses. Respondents were asked to rate their uncertainty on a five-point Likert scale ranging from 1 (very true) to 5 (very false). The MUIS yields a total score, with higher scores reflecting greater illness uncertainty. The MUIS has demonstrated adequate reliability and validity in a number of chronic illnesses (36, 37). Cronbach's α for the current sample was acceptable at 0.85.

Illness Intrusiveness Scale (IIS)

The IIS (38) is a 13-item scale used to assess for illness-induced interference with various life activities (i.e., health, diet, work, and recreation) in adults with chronic illnesses. Respondents were asked to rate illness intrusiveness on a seven-point Likert scale ranging from 1 (not

very much) to 7 (very much). The IIS yields a total score, with higher scores reflecting greater illness intrusiveness. The IIS has demonstrated good internal consistency (0.80–0.88). Cronbach's α for the current sample was acceptable at 0.85.

SF-36 Health Survey Questionnaire (SF-36)

The SF-36 (39) is an extensively utilized 36-item, self-report measure of HRQOL and general health status. The questionnaire asks participants to assess their health status over the previous 4 weeks across eight domains: physical functioning, role limitations due to physical health, bodily pain, general health perceptions, vitality, social functioning, role limitations due to emotional problems, and mental health. The SF-36 yields a Physical Component Summary Score (PCS), a Mental Component Summary Score (MCS), and eight subscale scores. Norm-based scoring was used for the current study, with scores ranging from 0 (poorest health status) to 100 (best health status). Internal consistency reliability estimates for the SF-36 have been shown to be high (0.91) (13). Cronbach's α for the current sample was moderate at 0.76.

Procedure

Participants were recruited through an online undergraduate participant pool at a large midwestern university. All participants self-identified as having been diagnosed with allergies or asthma. AYAs with asthma were recruited online and then completed the study procedures in a laboratory as part of a larger study on psychosocial adjustment in AYAs with asthma. AYAs with allergies were recruited and completed all of the study measures online as part of a larger study of AYAs with allergies. Both studies were IRB approved, and the procedures were conducted in compliance with the American Psychological Association (APA) ethical guidelines for research. Participants were compensated with research credit toward an undergraduate course.

Results

A series of bivariate correlations were first conducted on the allergy and asthma samples separately to determine if any demographic variables (i.e., age, gender, and ethnicity) or illness parameters (i.e., subjective illness severity and number of physician visits for their illness symptoms within the last year) were related to the outcome variables (i.e., SF-36 PCS and MCS). The results are depicted in Tables 4 and 5.

Primary analyses

Following matching procedures, paired t-tests were conducted to examine the difference in levels of physical

Table 3 Illness parameters for AYAs with asthma.

Subjective illness severity, %	
Mild	62.5
Moderate	26.4
Severe	8.3
Extremely severe	2.8
Respiratory failure	0.0
Frequency of physician visits	
M (SD)	2.85 (8.43)
Range	0–50

Table 4 Bivariate correlations for AYAs with allergies.

	1	2	3	4	5	6	7	8	9
1. Age	–	–0.134	0.033	0.061	0.240 ^a	0.036	0.110	–0.269 ^a	–0.047
2. Gender		–	0.079	0.457 ^b	0.151	0.145	0.225	–0.255 ^a	–0.226
3. Ethnicity			–	0.032	–0.102	–0.098	–0.162	–0.131	0.022
4. Subjective illness severity				–	0.287 ^a	0.110	0.186	–0.256	–0.175
5. Frequency of physician visits					–	0.066	0.252 ^a	–0.183	–0.200
6. MUIS						–	0.459 ^b	–0.319 ^b	–0.335 ^b
7. IIS							–	–0.279 ^a	–0.472 ^b
8. SF-36 MCS								–	0.205
9. SF-36 PCS									–

Note: MUIS, Mishel Uncertainty in Illness Scale Total Score; IIS, Illness Intrusiveness Scale Total Score; SF-36 MCS, SF-36 Health Survey Questionnaire Mental Component Summary Score; SF-36 PCS, SF-36 Health Survey Questionnaire Physical Component Summary Score.

^a $p < 0.05$, ^b $p < 0.01$.

and mental HRQOL experienced by AYAs with allergies and AYAs with asthma. Results revealed that no difference between AYAs with asthma ($M=52.23$, $SD=6.77$) and AYAs with allergies ($M=53.26$, $SD=6.90$) on physical HRQOL, $t(72)=0.944$, $p>0.05$. AYAs with asthma ($M=48.26$, $SD=8.85$) differed significantly from those with allergies ($M=44.28$, $SD=11.59$) on mental HRQOL, $t(72)=-2.202$, $p=0.031$, such that AYAs with allergies are experiencing poorer mental HRQOL than those with asthma.

Paired t-tests were conducted to examine the difference in illness uncertainty and illness intrusiveness experienced by AYAs with allergies and those with asthma. Results revealed that AYAs with asthma ($M=48.70$, $SD=12.61$) differed significantly from those with allergies ($M=55.49$, $SD=12.48$) on illness uncertainty, $t(73)=-3.209$, $p=0.002$, such that AYAs with allergies are experiencing greater illness uncertainty than those with asthma. No difference was observed between AYAs with asthma ($M=24.49$, $SD=9.44$) and those with allergies ($M=25.18$, $SD=10.70$) on illness intrusiveness, $t(73)=-0.471$, $p>0.05$.

To examine the relationship between the illness-related cognitive appraisal variables (i.e., illness uncertainty and illness intrusiveness) and physical and mental HRQOL, hierarchical regressions were conducted within each disease group. For all regressions, demographic and illness parameters identified in the preliminary analyses by significant bivariate correlations were used as covariates (see Tables 4 and 5).

SF-36 Physical Component Summary Score Regression – Participants with Allergies

The MUIS and IIS Total Scores were entered simultaneously on Step 1 of the regression, and the SF-36 PCS served as the dependent variable. The overall model was significant, $F(2, 72)=11.053$, $p=0.000$, and explained 24.0% of the variance in the SF-36 PCS for AYAs with allergies. Further, illness intrusiveness emerged as a significant predictor of SF-36 PCS, $t(72)=-3.435$, $\beta=-0.403$, $p=0.001$. As such,

Table 5 Bivariate correlations for AYAs with asthma.

	1	2	3	4	5	6	7	8	9
1. Age	–	0.045	0.101	0.168	0.063	0.136	0.247 ^a	–0.021	–0.132
2. Gender		–	0.079	0.303 ^b	0.167	0.244 ^a	0.311 ^b	–0.183	–0.389 ^b
3. Ethnicity			–	–0.109	–0.068	0.040	0.062	–0.182	0.077
4. Subjective illness severity				–	0.358 ^a	0.479 ^b	0.565 ^b	–0.325 ^b	–0.432 ^b
5. Frequency of physician visits					–	0.278	0.195	–0.050	–0.012
6. MUIS						–	0.463 ^b	–0.349 ^b	–0.534 ^b
7. IIS							–	–0.395 ^b	–0.710 ^b
8. SF-36 MCS								–	0.139
9. SF-36 PCS									–

Note: MUIS, Mishel Uncertainty in Illness Scale Total Score; IIS, Illness Intrusiveness Scale Total Score; SF-36 MCS, SF-36 Health Survey Questionnaire Mental Component Summary Score; SF-36 PCS, SF-36 Health Survey Questionnaire Physical Component Summary Score.

^a $p < 0.05$, ^b $p < 0.01$.

greater illness intrusiveness was related to poorer physical HRQOL in AYAs with allergies. Illness uncertainty did not emerge as a significant predictor.

SF-36 Mental Component Summary Score Regression – Participants with Allergies

Age, gender, and illness severity were entered as covariates on Step 1, and the MUIS and IIS Total Scores were entered simultaneously on Step 2. The SF-36 MCS served as the dependent variable. The overall model was significant, $F(5, 72)=4.367$, $p=0.002$, and explained 24.6% of the variance in the SF-36 MCS for AYAs with allergies. Further, there was a trend for illness uncertainty to predict SF-36 MCS, $t(72)=-1.956$, $\beta=-0.234$, $p=0.055$, with greater illness uncertainty related to poorer mental HRQOL in AYAs with allergies. Illness intrusiveness did not emerge as a significant predictor.

SF-36 Physical Component Summary Score Regression – Participants with Asthma

Gender and illness severity were entered as covariates on Step 1, and the MUIS and IIS Total Scores were entered simultaneously on Step 2. The SF-36 PCS served as the dependent variable. The overall model was significant, $F(4, 71)=24.438$, $p=0.000$, and explained 59.3% of the variance in the SF-36 PCS for AYAs with asthma. Further, illness intrusiveness emerged as a significant predictor of SF-36 PCS, $t(71)=-5.970$, $\beta=-0.596$, $p<0.001$. Additionally, illness uncertainty emerged as a significant predictor of SF-36 PCS, $t(71)=-2.644$, $\beta=-0.245$, $p=0.010$. As such, greater illness uncertainty and greater illness intrusiveness were related to poorer physical HRQOL in AYAs with asthma.

SF-36 Mental Component Summary Score Regression – Participants with Asthma

Illness severity was entered on Step 1, and the MUIS and IIS Total Scores were entered simultaneously on Step 2. The SF-36 MCS served as the dependent variable. The overall model was significant, $F(3, 71)=5.516$, $p=0.002$, and explained 19.6% of the variance in the SF-36 MCS for AYAs with asthma. Further, there was a trend for illness intrusiveness to predict SF-36 MCS, $t(71)=-1.956$, $\beta=-0.269$, $p=0.055$. As such, greater illness intrusiveness was related to poorer mental HRQOL in AYAs with

asthma. Illness uncertainty did not emerge as a significant predictor.

Exploratory analyses

Exploratory paired t-tests were conducted to examine differences between AYAs with allergies and asthma on each of the SF-36 subscales. Results indicated a significant difference between the illness groups on social functioning, $t(73)=-2.647$, $p=0.010$, such that AYAs with allergies ($M=46.91$, $SD=10.36$) were experiencing poorer social functioning than those with asthma ($M=51.10$, $SD=7.10$).

Discussion

The current study evaluated two primary hypotheses. First, it was hypothesized that AYAs with asthma and allergies would experience similar levels of physical and mental HRQOL and illness uncertainty and intrusiveness, because the illness groups have similar psychosocial illness typologies (34). Contrary to expectations, the results suggest that AYAs with allergies are experiencing more uncertainty regarding their illness and poorer mental HRQOL than AYAs with asthma. Previous research has suggested that adolescents with food allergies may be at risk for experiencing uncertainty regarding their illness symptoms and treatment (25, 26). The current results suggest that AYAs with other types of allergies are also experiencing uncertainty regarding their illness. A number of explanations might account for this finding. Whereas AYAs with asthma are more likely to have specific treatment regimens outlined by their physician (i.e., action plans) (40), those with allergies are more likely to take their medication on an as needed basis with no definitive treatment regimen. They may also be uncertain regarding the possibility of exposure to particular allergens at any given time (e.g., environmental allergens such as grass and tree pollen) and how severe their allergic reaction will be should they be exposed (26). AYAs with allergies are also reporting poorer mental HRQOL and poorer social functioning than their peers with asthma. Indeed, the AYAs with allergies in the current sample are experiencing poorer mental HRQOL than previous population-based examinations of AYAs with allergies (11). It may be that participants with allergies in the current study are having more difficulty coping with their illness symptoms in the context of college than their peers with asthma. The increased

demands placed on AYAs in college, combined with the burden of managing their independence and illness symptoms, may create emotional strain and hinder their social functioning.

In contrast, the current study suggests that AYAs with asthma and allergies experience similar levels of illness intrusiveness and physical HRQOL. Overall, participants endorse physical HRQOL levels consistent with those observed in other examinations of college students with asthma (9); however, these rates appear higher than those observed by researchers examining physical HRQOL in adults with asthma (41, 42) and a population-based examination of AYAs with asthma and allergies (11). This difference may be due to college students having better physical HRQOL than adults on the whole, suggesting that college students with asthma and allergies are coping better with their illness symptoms than their adult counterparts.

The second hypothesis examined the relationship between physical and mental HRQOL and illness appraisals within each disease group. Physical HRQOL was found to be negatively associated with illness intrusiveness for both disease groups, with more intrusiveness being related to poorer physical HRQOL. For both AYAs with allergies and asthma, their illness symptoms may be interfering with their physical HRQOL in that they may not be participating in as many physical activities (e.g., running, playing sports, taking the stairs). Further, AYAs with asthma and allergies may feel that their illness symptoms hinder their ability to accomplish daily tasks or may require them to exert more effort to complete these tasks. Poorer physical HRQOL was also related to higher illness uncertainty in AYAs with asthma. It may be that AYAs with asthma are avoiding activities, in which they are uncertain if they will have an asthma attack, or those in which they have had asthma attacks in the past. Therefore, they may also be limiting their physical activities due to the unpredictability of their asthma symptoms.

Mental HRQOL was found to be negatively associated with illness intrusiveness for AYAs with asthma and with illness uncertainty for AYAs with allergies. For AYAs with asthma, the effect of their illness demands and symptoms on their academics, relationships, and daily activities may be sufficiently distressing, such that they are experiencing depressive and anxious symptoms and lower mental HRQOL. They may be avoiding pleasurable activities (e.g., exercise, spending time with friends, dating) due to their asthma symptoms, which may lead to depressive symptoms. On the other hand, for AYAs with allergies, their perceived uncertainty regarding their illness symptoms

and treatment may also be causing them distress, fatigue, and depressive symptoms. These college students may feel helpless regarding their ability to control their illness symptoms.

Certain limitations must be acknowledged in the current study. First, AYAs with allergies and asthma were identified through self-report, and the diagnosis and severity of illness symptoms were not verified by a medical professional. Whereas individuals with allergies denied having asthma, those with asthma were not asked about having allergies. All the participants were also currently enrolled in college and, therefore, may not be representative of the larger population of AYAs. Further, as many participants self-identified as Caucasian, the results may not generalize to individuals of other ethnicities. This may be particularly important for AYAs with asthma in those ethnic groups given that Puerto Ricans, non-Hispanic Blacks, and non-Hispanic American Indians have the highest national asthma prevalence rates (43).

However, several strengths should be acknowledged. The current study is the first to examine differences between AYAs with asthma and allergies on specific illness appraisal variables. Additionally, the study examines young adulthood, a particularly challenging developmental period, in which the psychosocial affects of chronic illness symptoms have been understudied.

Future studies would benefit from examining illness appraisals in a clinical sample of individuals with asthma and allergies, with independent medical corroboration of diagnosis and illness severity. In addition, future studies should examine the relationship between these illness appraisal variables and more discrete aspects of psychosocial adjustment, including depression, anxiety, and interpersonal relationship factors.

The results of the current study indicate that illness appraisal mechanisms are salient variables that can be used in examining the context of HRQOL in individuals with asthma and allergies. Thus, health professionals should be educated about the importance of illness appraisals in this population and discuss these concerns with their young adult patients. Individuals with maladaptive appraisals of their illness may benefit from cognitive-behavioral interventions targeted at uncertainty and intrusiveness. University health clinics may help AYAs with asthma and allergies by having educational workshops to teach them coping skills, which can assist them in managing the challenges of college life and their illness demands simultaneously.

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