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Understanding the Cognitive and Affective Mechanisms that Underlie Proxy Risk Perceptions among Caregivers of Asthmatic Children

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Abstract

Objective. Medical decisions made on behalf of another person—particularly those made by adult caregivers for their minor children—are often informed by the decision maker’s beliefs about the treatment’s risks and benefits. However, we know little about the cognitive and affective mechanisms influencing such “proxy” risk perceptions and about how proxy risk perceptions are related to prominent judgment phenomena. **Methods.** Adult caregivers of minor children with asthma ($N = 132$) completed an online, cross-sectional survey assessing 1) cognitions and affects that form the basis of the availability, representativeness, and affect heuristics; 2) endorsement of the absent-exempt and the better-than-average effect; and 3) proxy perceived risk and unrealistic comparative optimism of an asthma exacerbation. We used the Pediatric Asthma Control and Communication Instrument (PACCI) to assess asthma severity. **Results.** Respondents with higher scores on availability, representativeness, and negative affect indicated higher proxy risk perceptions and (for representativeness only) lower unrealistic optimism, irrespective of asthma severity. Conversely, respondents who showed a stronger display of the better-than-average effect indicated lower proxy risk perceptions but did not differ in unrealistic optimism. The absent-exempt effect was unrelated to proxy risk perceptions and unrealistic optimism. **Conclusion.** Heuristic judgment processes appear to contribute to caregivers’ proxy risk perceptions of their child’s asthma exacerbation risk. Moreover, the display of other, possibly erroneous, judgment phenomena is associated with lower caregiver risk perceptions. Designing interventions that target these mechanisms may help caregivers work with their children to reduce exacerbation risk.

Keywords

affect, better-than-average effect, heuristics, perceived risk, unrealistic optimism

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Various health behavior theories¹⁻⁴ as well as meta-analyses of experimental research⁵ suggest that the higher people perceive their risk for an unfavorable health outcome, the more likely they are to engage in more healthy behavior. The influence of risk perceptions on health-related decisions and behavior potentially also occurs when people make health decisions on behalf of another who is dependent on them. Research shows that such proxy risk perceptions—that is, a caregiver’s perception of their child’s likelihood of experiencing a negative consequence from an action (such as side effects from a vaccination)—can influence the caregiver’s proxy health-related decisions (such as whether or not to vaccinate

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their child).⁶ Research also shows that caregivers of children with asthma who believe that exposure to second-hand smoke, dust, and other lung irritants can prompt breathing difficulties typically help their child avoid exposure to these “triggers.”^{7,8} Finally, research shows that providing caregivers with personalized feedback about their child’s risk of obesity prompts caregivers to engage in healthier feeding practices.^{9,i}

What shapes proxy risk perceptions? Research on judgment under uncertainty has identified several cognitive and affective short-cuts, so-called heuristics, that people recruit to assess the probability of events under conditions of limited knowledge, time, and computational resources.¹⁴ For example, when judging their likelihood of experiencing a health problem, people rely on the ease with which examples come to mind (the availability heuristic), how prototypical are their experiences or risk factors (the representativeness heuristic), and how they feel about the risk (the affect heuristic).¹⁵ Although useful in helping people make judgments under uncertainty, the heuristics occasionally lead to distorted judgments. Research that examines the influence of heuristics on risk perceptions and judgments can facilitate the development of interventions that help people make better health decisions.

Research on judgment under uncertainty has also identified several judgment phenomena that may be related to risk underestimation and may dissuade people from engaging in healthy behavior. For example, people sometimes (erroneously) conclude that the absence of previous experience of symptoms or risk factors means that they have negligible future risk of experiencing the symptoms or risk factors (the absent-exempt effect).¹⁶ People also tend to rate themselves more favorably than others on important attributes such as their ability to avoid disease (the better-than-average effect),¹⁷ and tend to think that they are less likely to experience unwanted health outcomes than the average person like them (unrealistic comparative optimism).¹⁸

Study Overview, Objectives, and Hypotheses

Our goal was to connect these insights from research on judgment under uncertainty and research on risk perception to gain understanding of the cognitive and affective mechanisms underlying caregiver proxy risk judgments. We focused on the risk of a child experiencing an asthma exacerbation, or “the escalation of symptoms to the point that the patient needs systemic corticosteroids (or increased systemic corticosteroids if patient is on a

maintenance course) to prevent a serious negative health outcome.”¹⁹ We identified childhood asthma exacerbation as a critical clinical outcome, because over 6.2 million youth in the US have asthma;²⁰ asthma and its negative effects disproportionately affect young people whose parents have limited incomes or who are members of racial/ethnic minority groups;^{21,22} and asthma exacerbations have pervasive and severe negative effects on patient health and quality of life.

Caregivers of children with asthma are gatekeepers to strategies and resources that can decrease exacerbation risk. Caregivers who misperceive their child’s risk may misallocate exacerbation risk-reduction resources. However, we know little about the cognitive and affective mechanisms underlying caregivers’ perceptions about their child’s risk of asthma exacerbation. Research has demonstrated that measures of representativeness,²³ availability,^{23,24} and affect heuristics,²⁴ and the absent-exempt effect,²³ are related to personal risk perceptions. Nevertheless, none of that research has occurred in the context of asthma or in the context of caregivers’ proxy perceptions about their child’s risk. Furthermore, no study has examined the unique contribution of each of these factors, plus the better-than-average effect, in predicting proxy risk judgments.

We examined the extent to which measures of availability, representativeness, and affect, as well as the occurrence of judgment phenomena, are associated with caregivers’ proxy perceived risk and proxy unrealistic optimism about their child experiencing an asthma exacerbation. We predicted that availability, representativeness, and affect would correlate with higher proxy risk perceptions, indicating that the availability, representativeness, and affect heuristics are potential mechanisms underlying people’s judgments. We further predicted that greater display of the absent-exempt effect and the better-than-average effect would correspond with lower proxy risk perceptions. Finally, because both proxy risk perceptions and proxy unrealistic optimism represent forms of perceived risk, and consistent with previous studies,^{25,26} we predicted that the 2 perceptions would correlate highly. We did not make predictions about the relative contributions of each of these judgment processes in predicting proxy risk perceptions.

We further explored how the possible influence of measures of availability, representativeness, and affect, as well as the judgment phenomena on people’s proxy risk judgments, might depend on demographic factors (age,²⁷ education,²⁸ SES,²⁹ numeracy,²⁸ income,³⁰ and financial security³⁰) that other research has linked to

health behavior.^{29,30} Because these analyses were exploratory and conducted solely to provide descriptive information for future research, we did not have a priori hypotheses.

Methods

Sample

We recruited participants through the Survey Sampling International (SSI) internet-based survey panel. Eligible individuals were at least 18 y old, reported “hav[ing] any children” aged 0 to 17 y old, and reported that the child has asthma. Only respondents who selected asthma in the following question were eligible: “Has your child/children been diagnosed by a doctor with any of the following conditions? Please select all that apply [Chickenpox/Asthma/Pneumonia/Cancer/Diabetes/Allergies/None of the above]”. Participants received reward points after completing our anonymous, 68-item online survey.

We used the following approach to assess data quality.³¹ First, we asked caregivers to indicate whether their child currently had health insurance (1 = no; 2 = yes, public insurance; 3 = yes, private insurance) at the beginning and at the end of the survey. Although all caregivers were eligible to participate regardless of insurance status, we excluded any caregiver who provided inconsistent responses across the 2 items due to potentially poor data quality. Second, we excluded any caregiver who completed the survey in less than 4 min (i.e., 3.5 s per question). SSI provided replacement participants for caregivers who failed one or both data quality criteria. Our a priori targeted sample size ($N = 130$) was based on detecting a correlation of $r = 0.25$, $\alpha = 0.05$ with 80% power.

Of the 151 caregivers initially recruited, 4 did not consent, 13 failed one of the attentiveness checks (12 provided inconsistent responses to the same item, 1 completed the survey under 4 min), and 2 failed both attentiveness checks. Our final sample comprised 132 caregivers.

Materials and Measures

We limit our description of the materials and measures to the items analyzed for this article. The full survey is available in the supplemental material (available online).

The clinical definition of asthma exacerbation is complex.¹⁹ To facilitate caregiver understanding, we divided the definition into 2 parts: 1) asthma symptoms so bad that a quick relief inhaler did not completely stop the

child’s symptoms (inhaler inadequate), and 2) asthma symptoms so bad that the child needed to go to urgent care, go to the emergency room, or “take a pill version of a corticosteroid” (elevated care needed). We presented the items measuring the heuristic cues (ie, availability, representativeness, and affect) as well as the judgment phenomena twice, each time for a different asthma risk: once for inhaler inadequacy and once for elevated care.

Similar to studies that have used surveys to examine heuristics in other health contexts,^{23,24,32} we asked caregivers to complete items that measured the cognitions and affects that form the basis of the heuristics. The items we used were adapted for the asthma context from previous research.^{23,24,32} We then used caregivers’ responses to predict their perceptions of the likelihood that their child would experience an asthma exacerbation. These analyses allowed us to test the extent to which the availability, representativeness, and affect heuristic might be underlying people’s risk judgments.

Heuristic Cues. We measured the availability of asthma exacerbation with 4 items. The first 2 asked caregivers how easy it was for them to think of examples of their own child in which 1) the quick relief inhaler was inadequate, or 2) their child needed elevated care. The next 2 questions asked caregivers the same question, except that the target child was “other people’s children.” Response options were, 1 = not at all easy; 5 = extremely easy. We averaged these 4 items into a composite variable (Cronbach’s $\alpha = 0.74$).

We measured perceived representativeness with 2 items that asked caregivers how similar their child was to the typical child with asthma symptoms so bad that 1) the quick relief inhaler was inadequate, and 2) the child needed elevated care (1 = not at all similar; 5 = extremely similar). We averaged these 2 items into a composite variable (Cronbach’s $\alpha = 0.67$).

We measured affect with 2 items that asked caregivers 1) how much dread, and 2) how frightened they felt, when thinking about their child’s asthma (1 = no dread/no fear; 5 = a huge amount of dread/fear). We averaged these 4 items into a composite variable (Cronbach’s $\alpha = 0.89$).

Judgment Phenomena. We measured the absent-exempt effect with 2 items that asked caregivers the extent to which they agreed that a child with asthma who reaches their child’s age without having symptoms so bad that 1) a quick relief inhaler was inadequate, 2) needed elevated care, will probably avoid such problems in the future

(1 = disagree a lot; 4 = agree a lot). We averaged these 2 items into a composite variable (Cronbach's $\alpha = 0.71$).

We measured the better-than-average effect with a single item that asked caregivers to rate how well their child's asthma was controlled compared with other children with asthma (1 = much less controlled; 3 = about as well controlled; 5 = much more controlled).

Proxy Risk Perceptions. We assessed proxy risk perceptions with 4 items. Caregivers estimated the chances that, within the next 3 and 12 mo, 1) their child's quick relief inhaler would be inadequate, and 2) their child would require elevated care (1 = very low; 5 = very high). Because the items were highly correlated within the 2 time-periods, we averaged them to form an index of 3-mo risk (Cronbach's $\alpha = 0.83$) and 12-mo risk (Cronbach's $\alpha = 0.73$), respectively. The 3-mo follow-up represents the standard of care for outpatient subspecialty care in pediatric asthma, and 12 mo is a common reference period in diagnosing asthma, evaluating asthma control and medication adherence, and in evaluating the effects of asthma educational interventions.³³

Unrealistic Comparative Optimism. We measured unrealistic comparative optimism with 2 items. Caregivers reported how likely in the next 3 mo their child, compared with other children with asthma of the same age and sex as their child, would have symptoms so bad that 1) their quick relief inhaler would be inadequate, and 2) their child would need elevated care. Caregivers responded using a 5-step scale (1 = much less likely; 3 = about as likely; 5 = much more likely). We reverse-coded these items so that higher values reflected greater unrealistic comparative optimism. We averaged responses to the 2 items to create a single index of unrealistic comparative optimism (Cronbach's $\alpha = 0.70$).

Demographic Measures. We assessed socio-economic status using the McArthur Scale²⁹, in which caregivers report on a 10-step ladder where they compare with other people in terms of money, education, and respected jobs. We assessed financial security with a 2-item scale that taps the ability to pay bills and make ends meet: Which of these statements best describes your present financial status? (1 = I really can't make ends meet, 2 = I manage to get by, 3 = I have enough to manage plus some extra; 4 = Money is not a problem; I can buy about whatever I want); If you were faced with an unexpected \$500 medical bill that was not covered by insurance, how would

you best describe your situation (1 = not able to pay; 2 = able to pay, but with difficulty; 3 = able to pay comfortably).³⁴ We assessed numeracy with a single item³⁵ that asked which number represents the biggest chance of getting a disease (1/10, 1/100, 1/1000). We also assessed age, sex, education, income, race, ethnicity, and health insurance status.

Asthma Severity. We measured asthma severity using the PACCI, an 11-item measure designed to be completed by caregivers of children with asthma.³⁶ Sample items include, "Over the past week, how many days has your child had asthma symptoms?" and "Over the past week, how many days have you had to give your child medicine to quickly relieve asthma symptoms?" (1 = 0 d; 2 = 1 to 2 d; 3 = 3 to 6 d; 4 = every day; 5 = every day, all day long). The higher the score, the more uncontrolled and serious the child's asthma. Scores on the PACCI ranged from 0 to 19 (Cronbach's $\alpha = 0.90$; M[SD] 4.42 [4.25]).

Results

We present participant characteristics in Table 1. Overall, the sample was relatively young ($M_{\text{age}} = 37.5$) and primarily non-Hispanic white, female, well-educated, insured, and financially secure. Most provided responses about a child aged 11 y or younger. Responses to the PACCI revealed the child's asthma was controlled (36.2%, scores of 0 to 4) or partially controlled (47.6%, scores of 5 to 9), with only a small minority reporting uncontrolled or poorly controlled asthma (12.1%, scores of 10 to 19).ⁱⁱ

Table 2 presents the average responses to the measures of availability, representativeness, and affect, as well as the number and percentage of people who marked one of the 2 highest response options on the scale for those items. To evaluate the better-than-average effect and unrealistic comparative optimism, we compared the mean caregiver response to the scale midpoint of 3.0 (i.e., "about as well controlled" or "about as likely" for better-than-average and unrealistic comparative optimism, respectively).¹⁸ Caregivers on average reported that their child's asthma was better controlled than the asthma of other children with asthma, $t(129) = 5.68$, $P < 0.001$. Caregivers also on average reported that their child was significantly less likely than the average child with asthma to have an asthma exacerbation so bad that 1) their quick relief inhaler was inadequate ($t(131) = -2.86$, $P < 0.01$), or 2) that they would need elevated care ($t(130) = -3.58$, $P < 0.001$) in the next 3 mo.

Table 1 Sample Characteristics

	<i>n</i>	%
Sex		
Male	41	31.1%
Female	91	68.9%
Race		
White	101	75.9%
Black /African American	15	11.3%
Asian	6	4.5%
Hawaiian/Alaskan Native	2	1.5%
Multiracial	8	6.0%
Ethnicity		
Non-Hispanic	101	76.5%
Hispanic	31	23.5%
Education		
Less than high school	2	1.5%
12 y or completed high school	21	15.9%
GED or high school equivalent	10	7.6%
Vocational, trade, or technical school	17	12.9%
Associate degree	28	21.2%
Bachelor degree	34	25.8%
Post-graduate degree	20	15.2%
Household Income		
\$25,000 or less	27	20.5%
\$25,001 to \$50,000	31	23.5%
\$50,001 to \$75,000	34	25.8%
\$75,001 or more	40	30.3%
Health Insurance Status ^a		
No Insurance	3	2.2%
Public Insurance (e.g., Medicaid or the Children's Health Insurance Program)	69	50.0%
Private Insurance	62	47.8%
Numeracy		
Incorrect	70	53.0%
Correct	61	46.2%
Missing	1	0.8%
McArthur SES Ladder		
10 – top / most advantaged	4	3.0%
9	5	3.8%
8	18	13.6%
7	19	14.4%
6	24	18.2%
5	20	15.1%
4	15	11.4%
3	13	9.8%
2	8	6.1%
1 – bottom / least advantaged	6	4.6%
	<i>M</i>	<i>SD</i>
McArthur SES Ladder	5.51	2.22
Age	37.56	9.22
Financial Security ^b	0.97	0.56
Asthma Severity	4.42	4.25

GED, general equivalency diploma; SES, socioeconomic status.

^aCaregivers could select multiple responses.

^bWe computed as the average of two standardized items.³⁴

Finally, Table 2 presents the descriptive information about caregivers' proxy perceived risks of exacerbation at 3 and 12 mo. Between 15.9% and 22.1% of participants reported that it was likely or very likely that their child would have an exacerbation in which a quick relief inhaler was ineffective or their child required elevated care in the next 3 and 12 mo, respectively.

Because we included a measure of asthma severity, we could examine unrealistic optimism at an individual rather than group level.³⁸ To do so, we separated caregivers into 3 groups based on how they rated their child's exacerbation risk on the 2 unrealistic optimism items as below average ($n = 55$), average ($n = 39$), or above average ($n = 31$). We then used the PACCI to classify children as below average in risk (a PACCI score of 0 or 1; $n = 44$), average in risk (2 to 5; $n = 35$), or high in risk (6 or higher; $n = 46$). We crossed the 2 classifications,³⁹ allowing us to classify participants' proxy risk perceptions as unrealistically pessimistic, accurate, or unrealistically optimistic. As evident in Table 3, 45 caregivers (36%) were unrealistically optimistic, 55 (44%) were accurate, and 25 (20%) were unrealistically pessimistic.

What Predicts Proxy Risk Perceptions and Proxy Unrealistic Optimism?

As shown in Table 4 (which shows the zero-order correlation among all predictors and risk perceptions), greater availability, representativeness, and negative affect were associated with less proxy unrealistic comparative optimism and higher 3- and 12-mo proxy risk estimates. The correlations between the 2 judgment phenomena (better-than-average, absent-exempt) and the proxy risk perceptions and unrealistic optimism were weaker and mixed. Not surprisingly, given that both represent risk judgments, proxy risk perceptions and unrealistic optimism were highly correlated.

Our main question was to what extent our measures of availability, representativeness, and affect, as well as the display of 2 judgment phenomena, predicted caregiver proxy risk perceptions and unrealistic comparative optimism. We conducted a linear regression entering all predictors simultaneously to predict the 3-mo risk perceptions, 12-mo risk perceptions, and unrealistic comparative optimism. Although Table 4 revealed significant zero-order correlations among several of the predictors, none of the variance inflation factors exceeded 1.8 (VIFs not shown). As evident under Step 1 of Table 5, all predictors except the absent-exempt effect were linked to 3-mo risk estimates. The more caregivers indicated that

Table 2 Mean and SD for Heuristic Cues, Judgment Phenomena, and Risk Perceptions

Measure	<i>M</i>	<i>SD</i>	<i>n</i> ^a	%
Availability (ease of imagining an asthma exacerbation: 1 = not at all easy; 5 = extremely easy) Cronbach's $\alpha = 0.74$.				
Own child: Quick relief inhaler ineffective	2.86	1.20	38	28.8%
Other children: Quick relief inhaler ineffective	2.80	1.11	31	23.5%
Own child: Needs elevated care	2.63	1.12	28	21.4%
Other children: Needs elevated care	2.63	1.09	30	22.9%
Representativeness (similarity of own child to the typical child experiencing the symptoms of asthma exacerbation: 1 = not at similar; 5 = extremely similar) Cronbach's $\alpha = 0.67$.				
Quick relief inhaler ineffective	2.66	1.03	26	19.7%
Needs elevated care	2.65	1.09	28	21.5%
Affect (emotions experience when think of own child's asthma) Cronbach's $\alpha = 0.89$.				
Dread (1 = no dread at all; 5 = a huge amount of dread)	3.11	1.17	52	39.4%
Fright (1 = no fear at all; 5 = a huge amount of fear)	3.03	1.17	47	35.6%
Absent-exempt effect (agree that a child without the experience in the past will probably not experience it in the future: 1 = disagree a lot; 4 = agree a lot)				
Quick relief inhaler ineffective	2.64	0.87	82	62.1%
Needs elevated care	2.65	0.85	81	61.8%
Better-than-average effect (your child's control over asthma compared with the control of other children: 1 = much less controlled; 5 = much more controlled)				
	3.48	0.96	59	45.4%
Unrealistic comparative optimism (risk of each event in the next 3 mo compared with the average of a child with asthma of the same age and sex: 1 = much less likely; 5 = much more likely) ^b Cronbach's $\alpha = 0.70$.				
Quick relief inhaler ineffective	3.28	1.13	54	40.9%
Needs elevated care	3.31	1.00	49	37.4%
Three-month risk perceptions (1 = very low; 5 = very high)				
Quick relief inhaler ineffective	2.61	1.11	28	21.4%
Needs elevated care	2.53	1.07	26	19.7%
Twelve-month risk perceptions (1 = very low; 5 = very high)				
Quick relief inhaler ineffective	2.74	1.09	29	22.1%
Needs elevated care	2.51	1.10	21	15.9%

^aThe frequency and percent of caregivers who marked one of the 2 highest response options on the scale (i.e., either 4 or 5 on a 5-point scale, or 3 or 4 on a 4-point scale). For unrealistic optimism, we calculated the number and percent of caregivers who marked one of the 2 lowest response options (i.e., either 1 or 2).

^bWe reverse-coded these items so that higher numbers indicated greater unrealistic optimism.

they could easily retrieve an example of an asthma exacerbation (availability), that their child was similar to the typical child with severe asthma (representativeness), and that they experienced negative affect about their child's asthma (affect), the higher they perceived their child's chances of experiencing an asthma exacerbation in the next 3 mo. Conversely, the more caregivers displayed the better-than-average effect, the lower they perceived their child's chances of experiencing an exacerbation in the next 3 mo. We found similar results for 12-mo risk estimates, with the exception that availability was no longer a statistically significant predictor (see Table 5). Only representativeness predicted the level of unrealistic comparative optimism. Consistent with previous research,^{25,40} the more caregivers reported their child was similar to the typical child with severe asthma, the less they

displayed unrealistic comparative optimism in their risk perceptions.

To explore the possibility that the severity of a child's asthma might influence the relationship of the heuristic cues and the judgment phenomena with the proxy risk perceptions, we conducted sensitivity analyses to examine whether adding the PACCI score to the model changed the predictive power of the variables in the model (see Step 2 in Table 5). Across our 3 outcomes, the only change we observed between Step 1 and Step 2 is that availability became a statistically significant predictor of 12-mo risk perceptions. (Most children were low in asthma severity, which raises the possibility that 1) the relationship we observed between asthma severity and risk perceptions is true only for children low in asthma severity, or 2) that the relationship is not linear. Two findings argue against this latter possibility. First,

Table 3 Categorizing Scheme to Identify Group Status^a

Caregiver Risk Perceptions	Objective Risk (PAACI)		
	Below Average	Average	Above Average
Below average	Realistic 29 (23.2%)	Unreal. Opt. 17 (13.6%)	Unreal. Opt. 9 (7.2%)
Average	Unreal. Pess. 12 (9.6%)	Realistic 8 (6.4%)	Unreal. Opt. 19 (15.2%)
Above average	Unreal. Pess. 3 (2.4%)	Unreal. Pess. 10 (8.0%)	Realistic 18 (14.4%)

Unreal. Opt., unrealistically optimistic; Unreal. Pess., unrealistically pessimistic.

^aThe numbers represent the number and percentage of participants classified in each cell.

scatterplots demonstrated that the relationship between severity and each of the measures of risk perception were clearly linear and not non-linear [see Appendix for the plots]. Second, when entered into the model, the quadratic term in the models was not statistically significant [for all 3 models: $F < 1.05$, $P > 0.30$.]

Associations with Demographic Variables

We also explored the extent to which availability, representativeness, affect, and the 2 judgment phenomena were related to the demographic variables (i.e., age, education, socio-economic status, income, financial security, numeracy). As seen in Table 4, we observed 2 statistically significant relationships: compared with younger caregivers, older caregivers reported less negative affect and were more likely to display the better-than-average effect.

Discussion

This research is the first to seek to improve the understanding of the cognitive and affective processes that may be associated with caregivers' perceptions of their child's risk of having an asthma exacerbation. Several findings emerged. First, over half of our participants erred in their evaluations of their child's risk of asthma exacerbation (Table 3). Most who erred underestimated their child's risk (64.3%) but a sizeable proportion also overestimated their child's risk (35.7%). Most important clinically may be the caregivers who displayed unrealistic optimism by underestimating their child's risk. They may not recognize the need to take appropriate preventive action (e.g., reducing trigger exposure, ensuring the child is adherent to medication regimens). Testing this possibility requires research that assesses caregiver's risk-reducing behavior, but if supported, caregivers who display unrealistic optimism may benefit most from additional education about their child's exacerbation risk.

Second, the 3 heuristic cues predicted risk perceptions and unrealistic optimism. Specifically, 1) showing greater ease in recalling instances of children having exacerbations, 2) perceiving that one's child resembles the typical child with severe asthma, and 3) displaying greater negative affect about asthma were correlated with higher caregiver estimates of their child's chances of experiencing an asthma exacerbation in the next 3 and 12 mo, and lower unrealistic optimism relative to the average child with asthma. Although we cannot assert causality, these findings suggest the availability, representativeness, and affect heuristics as possible cognitive and affective mechanisms underlying proxy-risk judgments. Potential reasons for the variability in reliance on the heuristic processes include having recent experience with a relevant instance (which might predict reliance on availability), and general willingness to engage in analytical processes when making judgments.⁴¹

Third, caregivers who rated their child's asthma as better controlled than the asthma of another child (i.e., the better-than-average effect) viewed their child as less likely to experience an asthma exacerbation. This finding is sensible given the link between asthma control and the experience of an exacerbation. Perhaps surprisingly, the better-than-average effect was unrelated to unrealistic optimism. Both represent comparative judgments—caregivers comparing their child to other children with asthma—and thus one might expect the 2 to correlate positively. Moreover, it would seem to follow that caregivers who rated asthma as better controlled in their child than other children would also estimate that their child was less likely than other children to experience an exacerbation. Such caregivers may need education about the link between asthma control and exacerbations. Nevertheless, this null finding needs further exploration.

Fourth, the absent-exempt effect showed weak to no correlations with the other measures in this study, suggesting that the absent-exempt effect may play little to

Table 4 Zero-order Correlations for Heuristic Cues, Judgment Phenomena, Risk Perceptions, and Demographic Characteristics

Items	Avail.	Repr.	Affect	Absent-Exempt Effect	Better than Ave. Effect	3-mo Risk Est.	12-mo Risk Est.	Unreal. Optimism	Asthma Severity	Fin. Security	Numr. Educ.	SES	Income
Representativeness	0.51 ^b												
Affect	0.29 ^b	0.39 ^b											
Absent-Exempt	0.19 ^a	0.15	-0.03										
Better-than-Average Effect	-0.02	-0.19 ^a	-0.24 ^b	0.27 ^b									
3-mo Risk Estimate	0.46 ^b	0.61 ^b	0.56 ^b	0.07	-0.33 ^b								
12-mo Risk Estimate	0.45 ^b	0.65 ^b	0.50 ^b	0.09	-0.35 ^b	0.88 ^b							
Unrealistic Optimism	-0.44 ^b	-0.71 ^b	-0.40 ^b	-0.19 ^a	0.15	-0.71 ^b	-0.68 ^b						
Asthma Severity	0.17	0.46 ^b	0.38 ^b	0.07	-0.34 ^b	0.56 ^b	0.49 ^b	-0.46 ^b					
Financial Security	0.05	0.05	-0.04	0.15	0.02	-0.03	-0.02	-0.16	0.08				
Numeracy	-0.02	-0.06	-0.00	-0.07	0.17	-0.07	-0.09	0.08	-0.20 ^a	-0.10			
Education	0.05	0.12	-0.04	0.07	0.11	-0.01	0.02	-0.11	0.04	0.55 ^b	-0.03		
SES	0.04	0.08	-0.10	0.05	-0.09	0.03	0.02	-0.13	-0.11	0.65 ^b	0.15	0.48 ^b	
Income	0.13	-0.01	-0.02	0.08	0.13	0.03	0.08	-0.07	-0.04	0.63 ^b	-0.06	0.58 ^b	0.51 ^b
Age	-0.04	-0.08	-0.19 ^a	0.07	0.32 ^b	-0.20 ^a	-0.18 ^a	0.15	-0.29 ^b	-0.10	0.08	0.06	-0.04

Avail., availability; Ave., average; Educ., education; Est., estimate; Fin., financial security; Numr, numeracy; Repr., representativeness
^a*P* < 0.05; ^b*P* < 0.01. For ease of interpretation, we reverse-coded the items assessing unrealistic optimism so that higher values indicated greater unrealistic optimism.

no role in caregiver risk perceptions. Importantly, our items asked about a child with asthma rather than about a child with a similar degree of asthma severity, which may explain why the absent-exempt effect did not predict risk judgments in our sample.

Fifth, when we entered all measures simultaneously into a regression model, availability, representativeness, affect, and the occurrence of the better-than-average effect each explained unique variance in perceived risk of having an exacerbation at 3 and 12 mo, particularly after controlling for the severity of the child's asthma. Interestingly, only representativeness predicted unique variance in unrealistic comparative optimism. Representativeness, a cognitive process, emerged as the dominant predictor among the 3 judgment processes in our study, which is consistent with theorizing about the central, causal role that representativeness plays in comparative risk judgments.³⁸ However, whether people primarily rely on affect or cognition in risk judgments, their risk judgments are more likely to depend on several factors, such as whether the risk judgment refers to an individual v. the aggregate.²⁴

Finally, except for age, demographic characteristics showed no or only weak associations with measures of availability, representativeness, and affect and the various judgment phenomena. However, we urge caution in interpreting these findings due to their exploratory nature.

Limitations and Future Directions

Our study has 6 notable limitations. First, because we focused on proxy risk perceptions of caregivers of asthmatic children, we did not assess behavioral outcomes. However, the path from judgment processes and phenomena to behavioral outcomes is documented in other domains,⁴² and research⁵ and theory (e.g., the Health Belief Model)⁴³ indicate that people engage in healthy behavior only insofar as they perceive themselves at risk. Except for the absent-exempt effect, all measures of heuristic cues and judgment phenomena we examined predicted 3- and 12-mo risk perceptions. We speculate that greater reliance on the availability, representativeness, and affect heuristics (and less display of the better-than-average effect) among caregivers will correspond with higher proxy risk perceptions and more protective actions to reduce the risk of exacerbation in one's child.

Second, our group-level measure of unrealistic comparative optimism only allows us to say that our overall sample was unrealistically optimistic; we cannot say which specific caregivers were or were not unrealistically optimistic.⁴² On the other hand, an alternative measure of

Table 5 Predictors of 3-mo and 12-mo Proxy Risk Perceptions^a

3-mo Risk Perceptions	Step 1				Step 2			
	<i>b</i>	<i>t</i>	<i>P</i>	<i>r_p</i> (CI _{95%})	<i>b</i>	<i>t</i>	<i>P</i>	<i>r_p</i> (CI _{95%})
Availability	0.21	2.44	0.016	0.22 (0.04 to 0.39)	0.24	3.04	0.003	0.28 (0.10 to 0.43)
Representativeness	0.41	4.88	0.000	0.42 (0.26 to 0.55)	0.30	3.65	0.000	0.32 (0.15 to 0.48)
Affect	0.26	3.94	0.000	0.35 (0.18 to 0.50)	0.19	2.95	0.004	0.27 (0.09 to 0.43)
Absent-exempt effect	0.07	0.76	0.449	0.07 (−0.11 to 0.25)	0.03	0.36	0.719	0.03 (−0.15 to 0.21)
Better-than-average effect	−0.23	−3.20	0.002	−0.29 (−0.44 to −0.11)	−0.16	−2.37	0.020	−0.22 (−0.38 to −0.04)
Asthma severity	-	-	-		0.07	4.17	0.000	0.37 (0.20 to 0.51)
12-mo Risk Perceptions								
Availability	0.15	1.78	0.077	0.17 (−0.02 to 0.34)	0.17	1.99	0.049	0.18 (0.00 to 0.35)
Representativeness	0.47	5.58	0.000	0.46 (0.31 to 0.59)	0.41	4.63	0.000	0.40 (0.24 to 0.54)
Affect	0.20	3.08	0.003	0.28 (0.10 to 0.44)	0.17	2.56	0.012	0.23 (0.06 to 0.40)
Absent-exempt effect	0.09	1.02	0.309	0.10 (−0.09 to 0.27)	0.08	0.88	0.383	0.08 (−0.10 to 0.26)
Better-than-average effect	−0.24	−3.26	0.001	−0.29 (−0.45 to −0.12)	−0.21	−2.85	0.005	−0.26 (−0.42 to −0.08)
Asthma severity	-	-	-		0.04	1.95	0.053	0.18 (0.00 to 0.35)
Unrealistic Optimism								
Availability	−0.07	−0.90	0.370	−0.08 (−0.26 to 0.10)	−0.09	−1.14	0.258	−0.11 (−0.28 to 0.07)
Representativeness	−0.61	−7.88	0.000	−0.59 (−0.70 to −0.46)	−0.55	−6.83	0.000	−0.54 (−0.65 to −0.40)
Affect	−0.10	−1.60	0.112	−0.15 (−0.32 to 0.03)	−0.06	−1.06	0.294	−0.10 (−0.27 to 0.08)
Absent-exempt effect	−0.13	−1.57	0.119	−0.15 (−0.32 to 0.04)	−0.11	−1.39	0.169	−0.13 (−0.30 to 0.05)
Better-than-average effect	0.04	0.54	0.590	0.05 (−0.13 to 0.23)	0.00	0.06	0.952	0.01 (−0.17 to 0.19)
Asthma severity	-	-	-		−0.04	−2.14	0.034	−0.20 (−0.36 to −0.02)

^a*r_p* is a partial correlation that represents the association of the predictor while controlling for all other predictors in the regression model. As illustrated in Step 2, adding asthma severity to the model contributed significantly to the model's predictive ability: For 3-mo events, R^2 change = 0.06, F -change = 17.39, $P < 0.001$; for 12-mo events, R^2 change = 0.02, F -change = 3.81, $P < 0.053$; for unrealistic optimism, $R^2 = 0.02$, F -change = 4.59, $P < 0.05$.

unrealistic optimism (assessed at the individual rather than group level) showed that most participants were inaccurate in their proxy risk perceptions, with the greatest inaccuracy stemming from unrealistic optimism. In addition, the better-than-average effect and unrealistic optimism share conceptual overlap yet were unrelated in our study. This finding is intriguing and deserves attention in future research. Third, our study was cross-sectional and correlational, which restricts our ability to assert that the judgment processes and phenomena we examined were responsible for the proxy risk perceptions and not the reverse. However, prior studies have found that priming people to see themselves as similar or dissimilar to a high-risk person, manipulating the availability of an outcome in memory, and inducing more v. less negative affect about an outcome produce predictable variations in risk perceptions.^{15,44,45} Nevertheless, we lack research that tests the causal relationships between the judgment processes and effects we examined, and caregivers' proxy risk perceptions.

Fourth, it is possible that some non-eligible respondents slipped into our sample. However, this problem is common to all research that relies on self-reported data.

Relatedly, the online format precluded us from obtaining clinical or biomedical verification of an asthma diagnosis. Future research might address these limitations by recruiting caregivers from the waiting rooms of a pediatric asthma clinic. Fifth, because asthma is disproportionately a problem for children from households with limited incomes or who are members of racial/ethnic minority groups, we urge future researchers to strive, perhaps through oversampling, for an adequate representation of these groups in their sample.

Finally, our study focused on a rather unique issue—caregiver proxy risk perceptions on behalf their children with asthma. Whether our findings also hold for risk perceptions in the context of other “surrogates” rather than children (e.g., friends, other family members, patients) or surrogate decision making in other health domains (e.g., end of life, emergency care) awaits further research.

Conclusion

Caregivers play a central role in preventing and responding to the experience of exacerbation among their

asthmatic children, particularly when their children are young. We identified several cognitive and affective mechanisms that might underlie caregivers' perceptions of their child's asthma risk and unrealistic optimism in those risk perceptions. Although caregivers appeared to rely on the judgment processes in evaluating their child's exacerbation risk, this apparent reliance does not mean that their risk evaluations were biased. However, to the extent that using judgment processes leads caregivers to overestimate or underestimate their child's exacerbation risk and that misperception can result in poor future health outcomes, the cognitive and affective processes we examined may be problematic. Identifying the cognitive and affective processes that caregivers rely on when judging risks suggests new avenues for interventions to help caregivers manage their child's asthma. Such interventions might entail health education messages that target the psychological processes that may lead to overestimation or underestimation of risk. The purpose of these messages would be to encourage or discourage heuristic thinking (as appropriate) and could be disseminated by clinicians, asthma advocacy groups, or even mobile health applications. Such interventions, when developed and tested for efficacy, may improve caregivers' judgment and decision making and result in better outcomes for children with asthma.

Notes

- i. Surrogate decision making research indicates that people may make different judgments for others than they would make for themselves^{10–11} (but see¹²). Surrogates may also underestimate the risk of negative outcomes for the people on behalf of whom they make decisions.¹³ However, an extensive review of the surrogate decision making literature is beyond the scope of this research.
- ii. Asthma severity/controllability can be quite variable across time and depends on factors such as exposure to triggers. Asthma severity was positively skewed in our sample, but this is typical for the scale,³⁶ and the number of children classified as having severe asthma in our sample (3.2%) is similar to the prevalence of severe asthma in the United States (4.4%).³⁷

Supplementary Material

Supplementary material for this article is available on the *Medical Decision Making* Web site at <http://journals.sagepub.com/home/mdm>.

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