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Risk Perception in Smokers With Children With Asthma

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Abstract

Objective—No studies have examined the relationship between caregiver beliefs about the risks of smoking to their own health and caregiver beliefs about the effect of their smoking on their child's health. In the current study, we investigated our proposed *risk congruence hypothesis* among caregivers who smoke. Specifically, we investigated whether caregivers' self-perceived risk of smoking is directly associated with their perception of the risks of smoking to their child.

Method—The sample consisted of 271 regular smokers (≥3 cigarettes per day; M_{age} = 32.9 years; 214 women) who were caregivers of children with asthma (M_{age} = 4.9 years) who had a recent visit to the emergency room for their asthma. Three constructs of perceived risk were measured via self-report questionnaires assessing both caregiver perception of smoking risk to self and to child: Precaution Effectiveness, Optimistic Bias, and Perceived Vulnerability. Child asthma-related functional morbidity and home and child secondhand smoke exposure were also assessed.

Results—Consistent with our risk congruence hypothesis, self-perceived risk of smoking was significantly associated with perceived risk to child, over and above the child's secondhand smoke exposure and caregiver report of child's asthma symptoms (i.e., asthma-related functional morbidity).

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Conclusions—These findings should be considered in the design of clinical interventions seeking to influence risk of caregiver behavior on child health.

Keywords

risk perception; smoking; caregiver; asthma

Asthma is the most common pediatric chronic illness in the United States, affecting almost 7 million children under the age of 18 years (American Lung Association [ALA], 2003). It is a leading cause of hospitalizations, emergency department visits, school absences, and activity restriction for children and adolescents (ALA, 1999; Taylor & Newacheck, 1992). Parental smoking is associated with the development of asthma (McQuaid, Walders, & Borrelli, 2003) and more severe symptoms among children with asthma (Strachan & Cook, 1998). Despite this, smoking is prevalent in households that have children with asthma. For example, one large study found that 48% of inner city children with asthma were regularly exposed to cigarette smoke (Kattan et al., 1997).

High levels of self-perceived risk of smoking predict smoking cessation (Borrelli, Hayes, Dunsiger, & Fava, 2010). To our knowledge, no studies have examined whether smokers' self-perceived risk of smoking is related to their perception of risk regarding the effect of smoking on their child. The aim of the current article is to investigate the relationship between caregivers' beliefs regarding the risks that smoking poses to their own health and caregivers' beliefs regarding the risks that their smoking poses to their child's health. We hypothesized that caregivers' self-perceived risks of smoking (e.g., their own perceived risk of heart attack, cancer) would be directly related to their perceived risks for their child's health (e.g., exacerbating asthma symptoms). Thus, if a smoker believed that he/she was at lower (or higher) risk for a smoking-related disease, we hypothesized that he/she would believe that his/her child's asthma is less (or more) likely to be affected by secondhand smoke exposure.

This hypothesis is based on an analogous psychological phenomenon in the pediatric psychology literature. When caregivers are depressed, they often perceive depression in their child (Hood, 2009; Najman et al., 2000). We suggest that a similar phenomenon may extend to the variable of perceived risk (i.e., *risk congruence hypothesis*). That is, caregiver self-perceived risk of smoking may influence how caregivers perceive child risk, irrespective of the child's level of secondhand smoke exposure or asthma severity.

The purpose of the current study was to examine the applicability of the risk congruence hypothesis among caregivers who smoke and have children with asthma. Three constructs of perceived risk were measured in the current study (Borrelli et al., 2010): (a) Precaution Effectiveness (PE): extent to which smokers believe that risk to themselves and their child is attenuated by stopping smoking; (b) Optimistic Bias (OB): extent to which smokers believe that risk to themselves and to their child is less than that of others; and (c) Perceived Vulnerability (PV): extent to which smokers believe that they and their child are personally vulnerable to the health effects of smoking.

In particular, we sought to assess whether each construct of caregiver perceived risk to self (PE, OB, and PV) was more strongly associated with perceived risk to child (PE, OB, and PV) over and above asthma-related functional morbidity and the child's level of secondhand smoke exposure. Support for this hypothesis would indicate that caregivers who perceive low risk for themselves are likely to perceive low risk for the child in their care, a finding that could have significant clinical implications in how we treat smokers who are caregivers of children.

Method

Participants

The sample consisted of 271 regular smokers (≥3 cigarettes per day for the last year) who were caregivers of children with asthma. Table 1 displays participant demographics and smoking behavior. The present study used baseline data from a randomized, controlled trial (National Heart, Lung, and Blood Institute, R01 62165-05; Belinda Borrelli, principal investigator) in which smokers received home-based asthma education for their child and were randomized to one of two different behavioral smoking cessation treatments. Participants did not have to want to quit smoking to be in the study but could receive the nicotine patch at no cost if they were ready to quit smoking. Participants were eligible for the study if they (a) were primary caregivers of a child 3–17 years of age; (b) were current, regular smokers (≥3 cigarettes per day for the past year); (c) were not currently or planning to become pregnant; (d) spoke and understood English; (e) had a telephone; (f) were not enrolled in a smoking cessation program or smoking cessation pharmaceutical aids to help them quit smoking; and (g) had a child who had an asthma exacerbation in the past 2 months necessitating an emergency room visit or hospitalization.

Asthma Measures

Asthma Assessment Form (AAF)—The AAF measures functional morbidity due to asthma, such as general activity limitations and decreased school attendance and sports participation (Rosier et al., 1994). The scale has been shown to be reliable and valid (McQuaid et al., 2007; Rosier et al., 1994). The mean AAF score for our sample was 1.49 (SD = 0.94), indicating mild to moderate functional impairment.

Objective Measure of Environmental Tobacco Smoke (ETS)

ETS was assessed with two passive nicotine monitors, with one placed in the room where the child spends the most time (Home-ETS) and one worn by the child (Child-ETS) for 7 days (Borrelli et al., 2010). This form of detection of ETS has been determined to be valid and reliable for home use in detecting levels of nicotine (Caka et al., 1990; Leaderer & Hammond, 1991).

Caregiver Reported Perception of Child Risk Measures

See Table 2 for scale items, descriptive statistics, and internal reliability.

PV-child—Five items were used to assess caregiver degree of PV regarding the effects of his/her smoking on the child's asthma. Higher scores indicate greater PV.

PE-child—Five items were used to assess whether the smoker perceived that quitting smoking would have a beneficial effect on the child's asthma. Higher scores indicate greater perceived PE.

OB-child—Four items were used to assess caregiver degree of OB for the risk of smoking around the child compared with parents of children with asthma who do not smoke. Responses were coded as "optimistically biased" (coded as 1) if caregivers reported much lower, lower, or about average risk and were coded as "not biased" (coded as 0) if they reported higher than or much higher than average. Responses to all items were then summed.

Parent Self-Reported Risk Perception Measures

See Table 2 for scale items, descriptive statistics, and internal reliability.

PV-self—Caregiver perceived personal vulnerability to smoking-related illnesses was assessed with three items, each asking beliefs of personal risk of developing cancer, coronary heart disease, and chronic lung disease if they continue to smoke (Borrelli et al., 2010; Lee, 1989). Higher scores indicate greater PV.

PE-self—Caregiver belief that quitting smoking will lead to improved health for him-/herself was assessed with three items (Borrelli et al., 2010; Lee, 1989). Higher scores indicate greater PE.

OB-self—Caregiver belief regarding his/her personal risk due to smoking compared with the typical smoker was assessed with three items (Borrelli et al., 2010). Responses were dichotomized into "biased" (coded as 1) if caregivers reported a lot lower or a little lower and into "not biased" (coded as 0) if they reported about the same as a typical smoker, a little higher, or a lot higher. Responses to all items were then summed.

Procedure

A trained research assistant traveled to the homes of eligible participants to obtain written informed consent and to administer the baseline questionnaire. Treatment condition had not yet been assigned at this point. This study received approval from our institution's human participants review board.

Data Analysis

All data are from the baseline assessment. The dependent variables were caregiver-reported indices of PV-child, PE-child, and OB-child. Three hierarchical multiple regression analyses were performed to test whether each construct of perceived risk to self (PV-self, PE-self and OB-self) was associated with perceived risk to child (PV-child, PE-child, and OB-child) above and beyond child asthma-related functional morbidity, home and child secondhand smoke exposure (Home-ETS and Child-ETS), and other theoretically relevant covariates. Covariates were child age and parent self-reported asthma status (coded as 0 = no asthma, and 1 = asthma), which were simultaneously entered in Step 1. Asthma morbidity and level

of secondhand smoke exposure were entered in Step 2, and PV-self, PE-self, and OB-self were all simultaneously entered in Step 3.

Results

Table 3 presents a summary of the three hierarchical regression analyses. Neither asthma-related functional morbidity nor secondhand smoke exposure (home or child) was significantly associated with any of the three child perceived risk variables (PV-child, PE-child, and OB-child) in the full model.

PV-self and child's age were the only variables to be significantly associated with PV-child, such that greater PV-self and younger child age were associated with greater PV-child. These two variables accounted for a majority of the explained variance (13.7%) in PV-child.

When PE-child was the dependent variable, PV-self and child's age were the only significant correlates, such that greater PV-self and younger child's age were associated with greater PE-child (belief that quitting smoking could help the child's asthma). PV-self and child age accounted for a majority of the explained variance (12.5%) in PE-child.

PV-self was significantly associated with OB-child, over and above the other variables in the equation, such that higher levels of PV-self was associated with lower OB-child. PV-self accounted for a majority of the explained variance (11.9%) in OB-child.

Discussion

The findings from the current study suggest support for the risk congruence hypothesis, as caregivers' perception of risk of their smoking on their child, either lower or higher, was found to be only associated with their own perceived level of risk and not influenced by what most would consider more objective information—child asthma morbidity and level of smoke exposure. Specifically, asthma-related functional morbidity and child smoke exposure were not associated with any of the three subscales of caregiver perceived risk of smoking to child. However, greater caregivers' perceived personal vulnerability was significantly associated with greater perceived vulnerability and lower optimistic bias regarding the risks of smoking to the child and with greater caregivers' perception of the health benefits that would result in their child's asthma symptoms as a result of their quitting (precaution effectiveness). We also tested post hoc the possibility that child asthma severity and child secondhand smoke exposure served as a moderators of the relationship between risk to self and risk to child but found no moderation.

We argue that risk congruence exists due to an individual's need to achieve consistent relationships among his/her cognitions. That is, holding both the belief that "smoking is harmful to my child" and "smoking is not harmful to me" and vice-versa creates psychological tension (i.e., cognitive dissonance) that the individual must resolve by achieving cognitive balance. This could be done in several ways: (a) holding the belief that "smoking is harmful to me and my child"; (b) holding the belief that "smoking is not harmful to me or my child"; or (c) holding a belief somewhere in between. This hypothesis is consistent with and is an extension of balance theory (Heider, 1946).

Balance theory, however, cannot explain why caregivers, especially those with lower levels of risk perception, do not incorporate more objective measures of their child's risk when formulating their perception of their child's risk (i.e., asthma morbidity and secondhand smoke exposure). For parents with lower levels of perceptions of risk of smoking to their child, we hypothesize that parents' self-esteem and self-image as a caregiver would likely be threatened if they viewed their behavior as having a significant impact on their own or their child's health. This conceptualization is consistent with other proposals of bias in risk perception (e.g., Weinstein, 1988). For parents with higher levels of perceived risk to child, we postulate that they are either responding accurately if their child has many risk factors (i.e., severe asthma morbidity and/or high levels of smoke exposure) or are possibly sensitive to perceptions of risk if their child is showing very few risk factors.

Child age was also significantly associated with both caregivers perceived child vulnerability and precaution effectiveness. Specifically, caregivers with younger children had greater perceived vulnerability for the effect of smoking on the child's health and greater beliefs that quitting smoking will be effective in reducing the risk for health effects on the child. This may reflect caregiver perception that younger children are more vulnerable to secondhand smoke given that they may spend more time with the caregiver and less time outside the home, such as at school or daycare. Further, caregivers may see an additive adverse effect of smoking on the health of the child, such that the earlier they quit smoking the longer the child will experience the benefit of a nonsmoking environment. This finding suggests that parents of young children may be receptive to intervention efforts, which could ultimately result in reduced lifetime exposure to secondhand smoke among children with asthma.

We believe that the lack of an association between the three subscales of caregiver perceived risk of smoking to child and self-perceived precaution effectiveness is likely because caregivers have been exposed to the negative side effects of smoking for a much longer period of time than their children, and as such the congruence is smaller and not providing a significant amount of unique variance. That is, parents may believe that their health will not be improved as much as their child's if they quit smoking. Regarding the lack of a significant association with optimistic bias in the final model, we argue that this is due to the differences in the scale-item stems for OB-self and OB-child. For self, the stem asks the caregivers to compare themselves with the "typical smoker," whereas the item stem for child asks the caregivers to compare themselves with a parent who "doesn't smoke." A better comparison would be a "nonsmoker" for self.

One limitation of the current study is the lack of prospective analyses. As such, it is unclear whether self-perceived risk increases caregiver perception of risk to child or whether caregiver perception of risk to child increases self-perceived risk. An additional limitation of this study is that we relied on caregiver report for the child's asthma functional morbidity. Future investigations of risk congruence would benefit from even more objective measures of risk (e.g., child pulmonary functioning). This limitation might be offset by the fact that all of the children in our sample were recruited after an acute asthma exacerbation that required either emergency management or inpatient hospitalization.

The current study is the first investigation that has examined the relationship between perception of risk to self and to child. Other studies have typically focused only on caregiver risk. Another strength of the current study is that it consisted of low-income, ethnically diverse caregivers and children. Among urban children from low-income families, asthma prevalence is as high as 14.3% (Crain et al., 1994) compared with a 6% overall prevalence rate for children (ALA, 1999). Smoking is a key factor in the increased asthma-related morbidity for this disadvantaged and underserved population (McQuaid et al., 2003). Therefore, identifying specific variables, such as caregiver risk perception, that may increase the efficacy of smoking interventions for caregivers of children with asthma would serve a significant clinical and public health need. Additionally, results from the present study can be used to generate hypotheses for future research investigating risk perception and clinical interventions for smoking caregivers of children with asthma. Current findings suggest that practitioners should be aware that smoking caregivers' perception of risk to self and child are related. As such, utilizing interventions that increase either child- or self-risk will likely increase the possibility of cessation. Moreover, though currently not well understood, it may be that augmenting one domain of risk (e.g., risk to child vs. risk to self) is easier than the other and therefore a better clinical target for interventions.

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Table 1

Caregiver and Child Demographics and Caregiver Smoking Behavior (N = 271)

Variable	*M*	*SD*	%
Child age (years)	4.9	4.5	
Caregiver age (years)	33.0	9.8	
% female (caregiver)			79
Smoking rate (cigarettes per day)	14.9	11.2	
Fagerström score[a]	4.2	2.4	
% employed (full- or part-time)			45.4
% ≤high school graduate/GED			60.9
Asthma morbidity score (AAF)	1.49	0.94	
% caregiver with asthma			34.7
Home secondhand smoke exposure (μg/m^3)	1.97	4.11	
Child secondhand smoke exposure (μg/m^3)	1.18	2.49	
Receive public assistance for healthcare			70.8
Ethnicity/race			
White/Caucasian			53.5
Black/African American			21.8
Hispanic/Latino(a)			13.3
Other (Asian, Native American, etc.)			11.4
Did not specify			<1

Note. GED = General Equivalency Diploma; AAF = Asthma Assessment Form.

[a]Fagerström Test of Nicotine Dependence (Heatherton, Kozlowski, Frecker, & Fagerström, 1991).

Table 2

Risk Perception Items, Descriptive Statistics, and Reliability

Scale/item	*M* ± *SD*
PV-child total score (Cronbach's α = .86)	14.71 ± 4.08
How concerned are you that smoking will make your child's asthma worse? (1 = *not at all*, 4 = *very much*)	
How much do you believe that your smoking is related to your child's asthma symptoms? (1 = *not at all*, 4 = *very much*)	
How much do you believe that your smoking increases the frequency of your child's asthma attacks? (1 = *not at all*, 4 = *very much*)	
How much do you believe that your smoking affects how bad your child's asthma is? (1 = *not at all*, 4 = *very much*)	
How much do you believe that your smoking increases the chance that your child will have to go to the emergency room or be hospitalized for an asthma attack? (1 = *not at all*, 4 = *very much*)	
PE-child total score (Cronbach's α = .94)	14.74 ± 4.49
If you stop smoking, how much do you think that would make your child's asthma symptoms better? (1 = *not at all*, 4 = *very much*)	
If you stop smoking, how much do you think that would decrease the how often your child has asthma symptoms? (1 = *not at all*, 4 = *very much*)	
If you stopped smoking how much do you think that would decrease how bad your child's asthma symptoms are? (1 = *not at all*, 4 = *very much*)	
If you stopped smoking, what are the chances that your child's asthma would get better? (1 = *not at all*, 4 = *very much*)	
If you stopped smoking how much do you think that would decrease the chance that your child will have to go to the emergency room or be hospitalized for an asthma attack? (1 = *not at all*, 4 = *very much*)	
OB-child total score (Cronbach's α = .90)	2.72 ± 1.64
Compared to other children with asthma whose parents don't smoke, what are the chances that your child will have an asthma attack? (1 = *much lower than average*, 5 = *much higher than average*)	
Compared to other children with asthma whose parents don't smoke, what are the chances of your child's asthma symptoms getting worse? (1 = *much lower than average*, 5 = *much higher than average*)	
Compared to other children with asthma whose parents don't smoke, what are the chances that your child will have to visit the emergency room for an asthma attack? (1 = *much lower than average*, 5 = *much higher than average*)	
Compared to other children with asthma whose parents don't smoke, what are the chances that your child will have to visit a doctor because of worsening asthma? (1 = *much lower than average*, 5 = *much higher than average*)	
PV-self total score (Cronbach's α = .90)	15.81 ± 3.65
If you continue to smoke, how likely is it that you will develop lung cancer? (1 = *no chance*, 7 = *certain to happen*)	
If you continue to smoke, how likely is it that you will develop other lung diseases, like emphysema? (1 = *no chance*, 7 = *certain to happen*)	
If you continue to smoke, how likely is it that you will develop heart disease? (1 = *no chance*, 7 = *certain to happen*)	
PE-self total score (Cronbach's α = .90)	10.15 ± 2.41
If you stop smoking how much do you think that would reduce your risk for developing lung cancer? (1 = *no decrease in risk*, 5 = *complete elimination of risk*)	
If you stop smoking how much do you think that would reduce your risk for developing other lung disease, like emphysema? (1 = *no decrease in risk*, 5 = *complete elimination of risk*)	
If you stop smoking how much do you think that would reduce your risk for developing heart disease? (1 = *no decrease in risk*, 5 = *complete elimination of risk*)	
OB-self total score (Cronbach's α = .92)	0.50 ± 1.04
Compared to the typical smoker would you say your risk for developing lung cancer is: (1 = *a lot lower*, 5 = *a lot higher*)	
Compared to the typical smoker would you say your risk for developing other lung diseases, like emphysema is: (1 = *a lot lower*, 5 = *a lot higher*)	

Scale/item	*M* ± *SD*
Compared to the typical smoker would you say your risk for developing heart disease is: (1 = *a lot lower*, 5 = *a lot higher*)	

Note. PV = Perceived Vulnerability; PE = Precaution Effectiveness; OB = Optimistic Bias.

Table 3

Summary of Hierarchical Regression Analysis of Parent-Proxy Report of Three Dimensions of Child Risk on Covariates, Asthma-Related Functional Morbidity, and Parent Self-Perceived Risk

Variable	PV-child (*n* = 240)					PE-child (*n* = 239)					OB-child (*n* = 234)				
	R^2_{total}	ΔR^2	Δ*F*	*df*s	β	R^2_{total}	ΔR^2	Δ*F*	*df*s	β	R^2_{total}	ΔR^2	Δ*F*	*df*s	β
Step 1	.023	.023	2.73	2, 229		.041	.041	4.89**	3, 229		.006	.006	0.67	2, 224	
Child age					−.148*					−.202**					−.013
Parent asthma					−.036					.011					−.076
Step 2	.062	.038	3.07*	3, 226		.080	.039	3.21*	3, 226		.043	.037	2.85*	3, 221	
Child age					−.182**					−.221***					.022
Parent asthma					−.046					.017					−.059
Child asthma-related functional morbidity					.056					−.056					−.076
Home secondhand smoke exposure					.098					.145					−.021
Child secondhand smoke exposure					.114					.077					−.165*
Step 3	.137	.075	6.46***	3, 223		.125	.045	3.85**	3, 232		.119	.076	6.27***	3, 218	
Child age					−.176**					−.215**					−.005
Parent asthma					−.067					.003					−.048
Child asthma-related functional morbidity					.028					−.075					−.064
Home secondhand smoke exposure					.071					.124					.003
Child secondhand smoke exposure					.097					.064					−.142
PV-self					.295***					.229***					−.254***
PE-self					−.046					−.025					−.109
OB-self					.076					.067					−.100

Note. PV = Perceived Vulnerability; PE = Precaution Effectiveness; OB = Optimistic Bias.

* $p < .05$.

** $p \leq .01$.

*** $p \leq .001$.