

FACTORS ASSOCIATED WITH HEALTH CARE UTILIZATION AMONG CHILDREN
WITH NONCARDIAC CHEST PAIN AND INNOCENT HEART MURMURS

by

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(Under the Direction of RONALD L. BLOUNT)

ABSTRACT

Objective: To examine differences in factors related to health care utilization (HCU) among children diagnosed with Noncardiac Chest Pain (NCCP) or Innocent Heart Murmur (IHM). *Method:* Sixty-seven pediatric patients with NCCP and sixty-two with IHM and their parent/guardian completed paper-and-pencil measures of psychosocial functioning and HCU during an initial visit to the cardiologist's office. *Results:* Children with NCCP utilize significantly more health care services compared to their IHM counterparts. Several child and parent psychological factors were related to HCU for the NCCP group only. *Discussion:* Results identify possible child and parent psychological factors that may be the focus of interventions to reduce high rates of HCU among children with NCCP.

INDEX WORDS: Health care utilization, noncardiac chest pain, psychological functioning

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BS, Drexel University, 2006

A Thesis Submitted to the Graduate Faculty of The University of Georgia in Partial Fulfillment
of the Requirements for the Degree

MASTER OF SCIENCE

ATHENS, GEORGIA

2011

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ACKNOWLEDGEMENTS

I would like to express my gratitude to my major professor, Dr. Ronald Blount, for his guidance throughout the course of this project. I would also like to thank members of the Pediatric Psychology Research Laboratory for their support. I also would like to acknowledge the members of my committee, Dr. Cynthia Suveg and Dr. Anne Shaffer for their guidance and contribution to this project. Finally, I would like to thank the providers and patients of Sibley Heart Center Cardiology as this project would not have been possible without them.

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CHAPTER 1

INTRODUCTION

Chest pain among children is a common occurrence (Cava & Sayger, 2004).

While this symptom may indicate cardiac disease among adults, the cause of a child's chest pain is typically benign (Drossner et al., 2010; Eslick, 2010). In fact, less than 5% of pediatric chest pain cases are attributable to heart disease (Selbst, 1986), which is reflected in negative findings following diagnostic studies (Rowe, Dulberg, Peterson, Vlad, & Li, 1990). Despite this statistic, the complaint of chest pain is often associated with concern about cardiovascular health and is cause for alarm among parents. The potential of fatality from a serious heart condition, although improbable, lead parents to seek medical care for their child. Medical evaluation for chest pain is often extensive, and includes radiography, electrocardiography, and other expensive diagnostic studies (Thull-Freedman, 2010).

Following medical evaluation, possible explanations for chest pain are dichotomized into cardiac and noncardiac contributors, with the latter being predominant for pediatric patients (Cava & Sayger, 2004). If cardiac involvement (e.g., arrhythmia, structural abnormality) is identified, cardiologists may intervene with medication, surgery, or continued medical monitoring. However, there is not a clear treatment approach for children who are diagnosed with noncardiac chest pain (NCCP). In the absence of cardiac involvement, several other physiological mechanisms have been hypothesized to contribute to NCCP, including muscular, gastrointestinal, and respiratory systems (Kocis, 1999). Additionally, the origin of the pain may not be identified and is then labeled as idiopathic. Given the lack of a cardiac etiology to explain

the majority of pediatric chest pain cases, NCCP has been conceptualized as a disorder with both physical and psychosocial factors contributing to its development and maintenance (Gilleland et al., 2009).

NCCP in children is a persistent problem (Selbst, Ruddy, & Clark, 1990), as evidenced by its presence several years following diagnosis. The recurrent and chronic nature of NCCP contributes to ongoing health care utilization (HCU) and associated costs. In related areas of research, longitudinal investigations demonstrate that youth who experience pain have an increased risk of developing psychiatric disorders and additional physical symptoms during adulthood (Hotopf, Carr, Mayou, Wadsworth, & Wessely, 1998). Recurrent pain in children is also associated with additional somatic symptoms (Laurell, Larsson, & Eeg-Olofsson, 2005), as well as functional impairment (Kashikar-Zuck, Goldschneider, Powers, Vaught, & Hershey, 2001), which may manifest in school absences, decreased engagement in extra-curricular activities, and limited opportunities for peer interaction. Children who have been diagnosed with NCCP also experience higher rates of internalizing symptoms (Gilleland et al., 2009; Lipsitz et al., 2004). Specifically, children with NCCP experience more anxiety symptoms and greater anxiety sensitivity compared to children with benign heart murmurs (Lipsitz et al., 2004). Additionally, these patients are at increased risk for being diagnosed with a current anxiety disorder (Lipsitz et al., 2005). Elevated rates of psychopathology, particularly anxiety disorders, have been found among children and adolescents with chest pain regardless of the health care setting (e.g., Emergency Department, specialty clinic) to which they present (Lipsitz et al., 2010).

Some parents and families may experience relief upon learning that the cardiac evaluation was negative; however, other caregivers do not accept that there is not a biological or

medical explanation for their child's pain and continue to seek care from other medical specialty providers. Unfortunately, medical approaches to ameliorating NCCP symptoms are largely unsuccessful (Cava & Sayger, 2004). Substantial financial resources are expended to cover costs associated with health care visits and various diagnostic tests due to NCCP. In addition to direct costs associated with health care, parents may experience lost wages related to absence from work in order to address their child's pain symptoms (Ho et al., 2008).

It is important to elucidate factors above and beyond the child's health status that contribute to care seeking. In fact, child health status (i.e., presence of pain) accounts for only a portion of the variance in the decision to seek health care services (Janicke, Finney, & Riley, 2001). These data point to the importance of examining additional child and familial factors which may contribute to HCU. Although past child HCU is the strongest predictor of future utilization, other factors play a role in determining presentation to the physician's office (Janicke et al., 2001). Specifically, one study found that youth with co-morbid asthma and internalizing disorders have higher rates of HCU when compared to asthmatic children without internalizing disorders (Richardson, Russo, Lozano, McCauley, & Katon, 2008).

In terms of parental factors, psychological functioning (e.g., negative affect, anxiety, neuroticism) and low self-efficacy related to parenting behavior are associated with higher child HCU (Moran & O'Hara, 2006). Also, among children presenting to health care settings, maternal depressive symptoms are associated with more visits to the Emergency Department (Bartlett et al., 2001; Flynn, Davis, Marcus, Cunningham, & Blow, 2004), and other outpatient providers (Sills, Shetterly, Xu, Magid, & Kempe, 2007) on behalf of their child. Parents of children with abdominal pain (Levy, Whitehead, Von Korff, & Feld, 2000; Levy et al., 2004) or other

functional pain disorders (Campo et al., 2007) also demonstrate higher rates of HCU themselves, compared to control groups.

One theoretical explanation for the onset and maintenance of pain and other somatic symptoms, as well as excessive healthcare utilization within families, is Social Learning Theory, which emphasizes modeling and reinforcement (Bandura, 1977). The broader literature on somatization demonstrates that exposure to illness models explains a significant portion of the variance in reports of physical symptoms, even after controlling for demographic and personality factors (Schwartz, Gramling, & Mancini, 1994). In fact, maternal and child experience of somatic symptoms are significantly correlated (Craig, Cox, & Klein, 2002; Gilleland et al., 2009; Walker & Greene, 1989). Additionally, parents may engage in excessive health care use, which could be viewed by their children as an acceptable reaction to pain symptoms. In addition to modeling, parent reactions to child's pain complaints may reinforce illness behavior (Hotopf et al., 1998). For example, children may experience secondary gain from reporting pain symptoms, including attention and being excused from school or other undesirable tasks. In terms of HCU, child report of pain symptoms may be reinforced via visits to health care providers (Fisak & Grills-Taquechel, 2007).

The current study examined selected child and parental factors, as they relate to health care utilization (HCU), among children with NCCP using theoretical guidance from Social Learning Theory (Bandura, 1977). These factors and their relationship with child HCU among children with NCCP was compared to children with innocent heart murmurs (IHM), a benign cardiac condition that also results in evaluation by a cardiologist upon detection of a murmur. Patients with IHM represent an ideal control group, given that they are also being evaluated by a cardiologist, are uncertain about their diagnosis until after the evaluation, and both groups are

eventually given a benign cardiac diagnosis. These patient groups differ, however, in that patients with IHM are told by a physician that they have a murmur and are referred for further evaluation, whereas children diagnosed with NCCP volunteer that they have chest pain symptoms, and their families initiate health care seeking. Children with NCCP and IHM undergo a similar evaluation process, including history, physical exam, and electrocardiogram to rule out serious cardiac etiologies for their symptoms (Swenson et al., 1997). The current study contributes to the literature by identifying factors that may differentiate these two groups of children who present for evaluation of a cardiac condition.

It was hypothesized that children with NCCP utilize higher rates of HCU compared to children with IHM. Also, parents of children with NCCP were expected to report greater internalizing (i.e., anxious, depressive, somatic) symptoms and more visits to health care providers for themselves, when compared to parents of children with IHM. Parents of children with NCCP were also expected to perceive more internalizing symptoms for their child in relation to control group parents. Given that caregivers initiate medical visits for their child, the parent's perception of more problematic child psychosocial functioning was expected to be associated with greater HCU for children with NCCP, but not for children with IHM. Consistent with Social Learning Theory, it was hypothesized that more symptomatic parental psychological functioning and higher parental HCU would be significantly associated with greater child HCU for the NCCP group only.

CHAPTER 2

METHOD

Participants

The final sample of participants included 129 pediatric patients, between the ages of 8 and 18 years old, diagnosed with either NCCP (M age = 12.6 years, SD = 2.6) or IHM (M age = 12.7 years, SD = 2.6) and their parent/guardian. All participants had public or private health insurance coverage. Characteristics of the sample are described in Table 1. Potential participants were excluded if their primary language was not English ($n = 1$), they were not accompanied to the appointment by a legal guardian ($n = 1$), evaluation did not result in a diagnosis of NCCP or IHM ($n = 6$) or they had a diagnosis that could account for physical symptoms and/or functional disability (e.g., cerebral palsy) or a dual diagnosis of NCCP and IHM ($n = 9$). Additionally, 12 potential participants did not complete all of the measures and were subsequently excluded from analyses. Eighteen (14%) families declined participation due to time demands or unknown reasons.

Measures

Demographic Questionnaire. The Demographic Questionnaire was completed by the participant's parent or guardian. It assessed child factors, including age, gender, and race. Parent and family factors were also assessed, including parent age, gender, race, relationship to the child participant, highest level of education attained, current marital status, and income.

Health Care Utilization Questionnaire. This 14-item, parent-completed questionnaire was developed specifically for this study to assess rates of child and parent health care utilization. Parents were asked to indicate the number of visits each parent and the child participant made to various health care settings, including primary care, specialists (e.g., cardiology), the emergency department, and inpatient hospitalizations during the past 12 months. Additionally, parents and children collaboratively reported on the number of visits the child made to the school nurse within the past 12 months. A composite variable for each child and parent participant was created by summing all visits within the past year to reflect overall HCU.

Symptom Checklist-90-R (SCL-90-R; Derogatis, 1977). The SCL-90-R is a self-report measure that assesses symptoms of psychological distress in adults. Participants were asked to rate the degree to which they were affected by and experienced distress from symptoms during the previous seven days. Responses to each question are rated on a five-point Likert scale, from 0 (“Not At All”) to 4 (“Extremely”). For the purpose of the present investigation, only the Anxiety, Depression, and Somatization subscales were administered to the participants’ parent or legal guardian. Subscale scores were converted to *T* scores based on parent sex, age, and clinical status. The SCL-90-R has been used to as a screening instrument to assess psychological functioning in community samples (Angst & Dobler-Mikola, 1984), and has been demonstrated to be valid (Peveler & Fairburn, 1990). In the current sample, Cronbach’s alpha for the Anxiety, Depression, and Somatization scales were .87, .96, and .84, respectively.

Behavior Assessment System for Children – Second Edition Parent Rating Scales (BASC-2 PRS; Reynolds & Kamphaus, 2004). The BASC-2 is parent-report measure of children’s psychological and behavioral functioning. Each item is rated according to frequency (Never, Sometimes, Often, Almost Always). The Child Form (PRS-C; 160 items) will be used

for children 8-11 years old and the Adolescent Form (PRS-A; 150 items) will be used for children ages 12-18 years old. For the purpose of the current study, only the three subscales that comprise the Internalizing composite (i.e., Depression, Anxiety, Somatization) will be examined. Subscale scales were converted *T* scores. The BASC-2 PRS has been found to be reliable and valid (Reynolds & Kamphaus, 2004). Additionally, the BASC-2 has been used to assess parent-reported child psychological and behavioral functioning among children with functional somatic symptoms (Hocking et al., 2010) with good internal consistency. In the current sample, Cronbach's alphas ranged between .72 - .94 for the child and adolescent versions.

Procedure

Prior to initiating data collection, Institutional Review Board approval was obtained from participating institutions. Participants were recruited from three cardiology clinics in the Southeastern United States. Patients were screened for eligibility (e.g., age, presenting problem) by research personnel prior to clinic appointments. Potentially eligible patients and their families were approached by a research assistant or trained nurse practitioner in the waiting area or examination room and provided a verbal description of the study and details about their involvement. Interested families provided consent, assent, and HIPAA authorization prior to measure completion. Patients and their caregivers completed self- and proxy-report paper-and-pencil measures while waiting to see the physician. All measures were completed by the participants prior to receiving feedback from the cardiologist about the results of the medical evaluation. Following the clinic visit, the patient's medical chart was accessed to collect information on medical history (for exclusion purposes), as well as cardiac diagnosis (if applicable).

Table 1

Participant Characteristics

Factor	NCCP (<i>n</i> = 67)		IHM (<i>n</i> = 62)	
	<i>n</i>	%	<i>n</i>	%
Child's Sex				
Male	39	58.2	39	62.9
Female	28	41.8	23	37.1
Child's Race				
Caucasian	46	68.6	31	50
African-American	17	25.4	22	35.5
Hispanic/Latino	4	6	1	1.6
Biracial	0	0	8	12.9
Parent Marital Status				
Single	5	7.5	10	16.1
Married/Committed Partnership	52	77.6	42	67.7
Separated/Divorced	9	13.4	8	12.9
Widowed	1	1.5	2	3.2
Family Income				
< \$20,000	5	8.3	8	13.6
\$20,000 – 34,999	9	15	9	15.3
\$35,000 – 54,999	8	13.3	9	15.3
\$55,000 – 74,999	13	21.7	6	10.2
> \$75,000	25	41.7	27	45.8

CHAPTER 3

RESULTS

Preliminary Analyses

Chi square analyses were conducted to determine if the two groups of interest, NCCP and IHM, differed on demographic variables. A significant difference was found in terms of racial composition of the groups, in that the NCCP group had significantly more Caucasian individuals, $\chi^2(3) = 13.19, p = .004$. Due to a relatively small number of individuals in each non-Caucasian category, race was dichotomized into Caucasian vs. Other. To determine the appropriateness of entering race as a covariate in subsequent analyses, one-way Analyses of Variance (ANOVA) were conducted. Within the NCCP group only, there was a significant effect of race on child HCU, in that Caucasians had significantly more health care visits ($M = 7.27, SD = 7.64$), compared to non-Caucasian participants ($M = 3.86, SD = 3.25$), $F(1, 125) = 4.99, p < .05$. Therefore, race was entered as a covariate for all subsequent analyses involving child HCU. No significant differences on any other demographic factors (e.g., age, sex, parent marital status, family income) emerged between the two groups.

To test assumptions required for Analysis of Variance (ANOVA), histogram plots, as well as skewness and kurtosis statistics, were examined to evaluate the distribution of each variable of interest. All variables of interest were positively skewed. Therefore, log transformations were conducted to normalize these variables.

Group Differences in HCU and Psychosocial Functioning

Differences in rates of child and parent HCU and scores on measures of psychosocial functioning were examined using analysis of covariance (ANCOVA), with race entered as a covariate. Children with NCCP utilized an average of 6.18 ($SD = 6.7$) visits, while children with IHM had, on average, 3.59 ($SD = 3.2$) visits to health care providers within the past 12 months, $F(1, 124) = 5.50, p = .02$. Children in both groups presented to various health care settings, with significant differences emerging for visits to the school nurse, with children with NCCP making significantly more visits than their IHM counterparts, $F(1, 124) = 5.26, p = .02$. The difference between visits to the Primary Care Physician (PCP) approached, but did not reach, statistical significance. Rates of hospitalizations, emergency department admissions, or visits to medical specialists were low for both groups, and no significant differences were found for these aspects of HCU. Rates of HCU by provider are presented in Table 2. No significant difference emerged between rates of parental HCU.

In terms of child psychosocial factors, parents perceived children with NCCP ($M = 53, SD = 12.8$) as having greater difficulties with internalizing symptoms, compared to children with IHM ($M = 48, SD = 10.9$), $F(1, 120) = 6.46, p = .01$. Parents also reported that children with NCCP ($M = 56.6, SD = 11.8$) experienced significantly more somatic symptoms than their IHM counterparts ($M = 48.8, SD = 9.3$), $F(1, 120) = 18.07, p < .001$. Rates of child anxiety or depressive symptoms, as reported by parents, did not significantly differ between the two groups. Tests of differences between parent psychosocial functioning revealed that parents of children with NCCP ($M = 49.7, SD = 12.1$) report experiencing significantly more anxious symptoms than parents of children with IHM ($M = 44.2, SD = 10.6$), $F(1, 116) = 7.49, p < .01$. There were no significant differences reported on levels of depressive and somatic symptoms between the

two groups. Group differences in child and parent psychological functioning are presented in Table 3.

Associations between Parental and Child Factors and Child HCU

To further explore how child and parental psychosocial factors were associated with child HCU, correlations were conducted. Given that race significantly influenced rates of HCU within the NCCP sample, partial correlations were calculated to control for variance accounted for by race. For the IHM sample, Pearson product moment correlations were calculated given that race was not significantly associated with HCU within this sample. Correlations are presented in Table 4.

Within the NCCP sample, several child and parent factors were related to child HCU. With regard to the child's emotional functioning, child HCU was positively associated with overall internalizing symptoms ($r = .40, p < .01$), as well as anxious ($r = .36, p < .01$), depressive ($r = .31, p = .02$), and somatic ($r = .30, p = .03$) symptoms. In terms of parental factors, child HCU was positively related to parent HCU ($r = .33, p = .02$) and parental depressive symptoms ($r = .29, p = .03$). No significant associations were found between child and parental factors and child HCU within the IHM sample.

Fisher's r -to- z transformations were calculated to compare correlation coefficients between the NCCP and IHM groups, and to determine if significant differences between pairs of correlations coefficients existed (Fisher, 1932). Significant differences between the groups' correlation coefficients were found for each of the factors correlated with child HCU: child internalizing symptoms ($z = 8.20, p < .001$), anxious ($z = 5.43, p < .001$), depressive ($z = 7.06, p < .001$), and somatic ($z = 6.69, p < .001$) symptoms; parent HCU ($z = 3.95, p < .001$), and parent anxious ($z = 12.39, p < .001$), depressive ($z = 11.29, p < .001$), and somatic ($z = 6.93, p < .001$)

symptoms. In all cases, correlations were positive and stronger within the NCCP group than within the IHM group.

Table 2

Rates of Health Care Utilization (HCU) by Group

Component of HCU	NCCP (<i>n</i> = 67)			IHM (<i>n</i> = 62)			<i>p</i>
	<i>M</i>	<i>SD</i>	<i>Range</i>	<i>M</i>	<i>SD</i>	<i>Range</i>	
Total HCU visits	6.2	6.7	0 – 36	3.6	3.2	0 – 18	.02*
Primary care provider	3.1	2.3	0 – 12	2.3	2.0	0 – 14	.06
Specialty clinic	0.4	0.8	0 – 4	0.5	1.3	0 – 8	.75
Emergency department	0.6	1.1	0 – 6	0.3	0.6	0 – 2	.22
Hospital admissions	0.1	0.4	0 – 3	0	0	-	.25
School nurse visits	2.1	4.6	0 – 20	0.5	1.1	0 – 5	.02*
Parent total HCU visits	2.6	3.0	0 – 16	2.5	2.0	0 – 8	.52

Note. * $p \leq .05$, ** $p \leq .01$

Table 3

Group Differences in Child and Parent Psychological Functioning

Factor	NCCP (<i>n</i> = 67)		IHM (<i>n</i> = 62)		<i>p</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
BASC-2: Internalizing Composite	53.00	12.83	48.02	10.91	.03**
BASC-2: Anxiety	48.62	10.00	48.38	10.93	.84
BASC-2: Depression	51.97	14.52	48.02	12.18	.16
BASC-2: Somatization	56.58	11.84	48.78	9.26	< .001***
SCL-90-R: Anxiety	49.70	12.10	44.21	10.60	.01**
SCL-90-R: Depression	50.54	12.09	48.12	11.23	.38
SCL-90-R: Somatization	52.54	10.98	49.63	11.59	.12

Note. * $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$; All means and SDs for BASC-2 and SCL-90-R

variables are displayed as *T*-scores.

Table 4

Correlations with Child HCU for both Groups and Differences between Correlations

Factor	Pearson Correlations		Z Score Difference Between Correlations	<i>p</i>
	NCCP ^a	IHM		
BASC-2: Internalizing	.40*	.19	8.20	< .001***
Composite				
BASC-2: Anxiety	.36**	.21	5.43	< .001***
BASC-2: Depression	.31*	.12	7.06	< .001***
BASC-2: Somatization	.30*	.12	6.69	< .001***
Parent HCU	.33*	.22	3.95	< .001***
SCL-90-R: Anxiety	.22	-.11	12.39	< .001***
SCL-90-R: Depression	.29*	-.01	11.29	< .001***
SCL-90-R: Somatization	.18	-.01	6.93	< .001***

Note. * $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$; ^a Associations between factors and child HCU are displayed as partial correlations

CHAPTER 4

DISCUSSION

The present study investigated the relationship between parental and child factors and HCU among a sample of children and adolescents with NCCP. These factors and their associations with child HCU were evaluated against an IHM control group. Results revealed that children with NCCP utilize health care services at a greater rate when compared to another group also presenting for evaluation by a cardiologist. Additionally, several child and parent factors were significantly associated with HCU for the NCCP group only, suggesting that parents have a strong influence on how often these children present for medical care. These findings are consistent with, but also extend, past research by comparing factors that may relate to HCU to a sample of children also presenting to specialty health care providers. Additionally, results from this study provide some support for a social learning process contributing to HCU for children with NCCP.

As hypothesized, children with NCCP utilized a greater rate of health care services when compared to children with IHM. In terms of visits to specific providers, children with NCCP made significantly more visits to the school nurse in relation to their IHM counterparts. While it appears that school nurse visits are initiated by the child, parents may be influencing children's decisions to seek medical treatment at school. For instance, parents may encourage their children to visit the school nurse if they experience pain or other physical symptoms. Also, parents may relay the message that it is appropriate to seek health care services for minor physical symptoms

and model this by bringing their child to the physician. Parents of children with NCCP also reported more visits to their children's PCPs; however, this difference did not reach statistical significance. It is unclear if differences in HCU were related to complaints of chest pain or other symptoms. No differences were found in visits to medical specialists, emergency room visits, or hospital admissions, with rates for these aspects of HCU being low for both groups. Thus, the differences and trends in HCU that emerged for these samples of participants were in more readily accessible components of medical care, seeing their school nurses, as well as a trend toward seeing their PCPs, more often.

In terms of child psychological functioning, parents of children with NCCP reported that their children experience significantly more internalizing symptoms compared to children with IHM, which has been reported previously (Lipsitz et al., 2004). Examination of the specific components that comprise the internalizing dimension of the BASC-2 revealed that this group discrepancy is driven by differences in rates of somatic symptoms, rather than anxious or depressive symptoms. This finding that children with NCCP experience additional somatic symptoms is consistent with previous literature (Lipsitz et al., 2004). There appears to be a reliable co-occurrence of various physical symptoms among children, suggesting that some children experience a larger constellation of somatic symptoms, which may contribute to ongoing HCU.

The hypothesis related to differences in parent psychological functioning between the two groups was partially supported. As hypothesized, parents in the NCCP group experienced significantly more anxious symptoms than parents of children with IHM. This finding may reflect a greater level of distress experienced by parents who have a child with potentially serious, unexplained chest pain. Conversely, parents who are more anxious may be more likely

to have children who experience psychological and physiological (i.e, pain, somatic symptoms) distress. Contrary to expectation, parents of children with NCCP did not report more depressive or somatic symptoms in relation to their IHM counterparts. Failure to find these between group differences may be related to relatively low endorsement of these symptoms among parents in the present sample.

Correlational relationships were also examined to assess the differential association of child and parent factors on child HCU for the two groups. As expected, child HCU was significantly and positively related to several child and parent factors. Specifically, parental use of health care services was associated with the frequency with which they brought their child with NCCP to various health care providers, lending partial support to the existence of a social learning effect. Additionally, parents' reports of their children's internalizing (i.e., anxious, depressive, somatic) symptoms, as well as their own depressive symptoms, were positively related to child HCU for the NCCP group only. It is possible that parents who perceive their child to have both pain and internalizing symptoms may be increasingly likely to seek medical care for their child. This indicates that not all children with NCCP utilize high rates of health care, suggesting that a combination of chest pain symptoms and heightened child or parent psychological distress are associated with increased HCU. Further, high HCU may be part of an internalizing pattern of behavior. There were no significant associations found between child and parent factors in the control group, suggesting that these relationships are unique to children with NCCP. Additionally, the lack of significant correlations between these child and parental factors and child HCU for the IHM group indicates that decisions to visit health care providers do not appear to be influenced by parent or child psychological functioning for children with IHM.

Interestingly, a significant difference between the racial composition of the NCCP and IHM groups was found. Specifically, there were significantly more Caucasian participants in the NCCP when compared to the IHM group. Given that racial composition was not reported in previous research comparing children with NCCP and IHM (Lipsitz et al., 2004), it is unclear if racial differences are unique to the current sample. One previous study of children with NCCP (Lipsitz et al., 2005) consisted of a predominantly Caucasian sample. In terms of the relationship of race with outcome variables, race was differentially related to child HCU according to group. Specifically, Caucasian children with NCCP utilized more health care services in relation to non-Caucasian children with NCCP. It is unclear why race contributed to child HCU for the NCCP sample in the present study. Past research suggests that access to health care coverage contributes to HCU (Newacheck, Stoddard, Hughes, & Pearl, 1998); however, in the present study, all participants had public or private health insurance coverage. It has also been documented that non-Caucasians have a greater risk of not utilizing health care services compared to Caucasians (Flores & Tomany-Korman, 2008), though this discrepancy appears to be related to lack of insurance coverage and access to services (Ngui & Flores, 2007). It can also be speculated that the discrepancy in child health care visits with the NCCP group is related to family income. Caucasian children with NCCP were more likely to come from high income families compared to non-Caucasian children. This suggests that family income differences, rather than race specifically, contributed to higher HCU. Further research is needed to replicate this finding, as well as identify mechanisms that may underlie the relationship between race and child HCU.

Findings from the present investigation must be considered within the context of limitations of the study design. First, the cross-sectional nature of this study prohibits the

identification of causal relationships between factors. Specifically, it is unclear whether child and parent psychosocial functioning influenced, was influenced by, or merely co-varied with rates of child HCU. Future research in this area should utilize longitudinal designs to identify modifiable predictors of future HCU. Second, although retrospective self-report of HCU is commonly employed, it is possible that parents in both groups inaccurately estimated the number of visits made to health care providers for themselves and their child within the past year (Bhandari & Wagner, 2006). However, the same assessment methodology was used for both groups; therefore systematic bias was not introduced. Further, specific details regarding the reason for medical visits among children and parents within the past year were not collected. Although children were excluded from analyses if another chronic medical condition was documented to co-occur with NCCP or IHM, visits to primary or specialty providers may have been warranted from a medical standpoint. In future research, investigators may also assess the reason for visit and the medical findings or diagnoses from those visits. This additional information may elucidate the appropriateness of visits made to medical settings. Third, given the interest in parent perception of children's emotional functioning and how it relates to initiation of medical visits, only parent report was examined. However, parents may lack insight regarding their child's experience with internalizing symptoms. Child self-report measures of their emotional functioning may be included in future research. Finally, a Social Learning Theory perspective was adopted to identify potential factors that would be associated with child HCU, as well as help explain relationships between child and parent psychological functioning. In addition to learning, the effects of child and parent genetic contributions to these relationships cannot be ruled out. Future research is needed to determine if children with NCCP observe their parents to experience reinforcement from parents' own complaints of pain and physical symptoms.

Overall, results from this study suggest that parent and child emotional functioning are important correlates of initiating visits to health care providers for children with NCCP. Parents' perception of their children's internalizing symptoms, as well as their own HCU and depressive symptoms, were significantly associated with greater HCU in the past year. Future research should address the impact of parental education regarding the relationship between somatic symptoms and psychological factors, and the impact of this intervention on HCU. Also, providing direct intervention to children and parents for psychological symptoms that co-occur with HCU may result in a reduction in visits to health care providers. Findings from this study point to the importance of conducting a comprehensive assessment of family psychosocial functioning when children present to health care settings with complaints of chest pain.

REFERENCES

- Angst, J., & Dobler-Mikola, A. (1984). The Zurich study: The continuum from normal to pathological depressive mood swings. *European Archives of Psychiatry & Neurological Sciences*, 234, 21-29. doi: 10.1007/BF00432879
- Bandura, A. (1977). *Social learning theory*. Englewood Cliffs, NJ: Prentice Hall.
- Bartlett, S. J., Kolodner, K., Butz, A. M., Eggleston, P., Malveaux, F. J., & Rand, C. S. (2001). Maternal depressive symptoms and emergency department use among inner-city children with asthma. *Archives of Pediatric and Adolescent Medicine*, 155(3), 347-353. Retrieved from <http://archpedi.ama-assn.org/>
- Bhandari, A., & Wagner, T. (2006). Self-reported utilization of health care services: Improving measurement and accuracy. *Medical Care Research and Review*, 63, 217-235. doi: 10.1177/1077558705285298
- Campo, J. V., Bridge, J., Lucas, A., Savorelli, S., Walker, L., Di Lorenzo, C., ... Brent, D. A. (2007). Physical and emotional health of mothers of youth with functional abdominal pain. *Archives of Pediatric and Adolescent Medicine*, 161(2), 131-137. Retrieved from <http://archpedi.ama-assn.org/>
- Cava, J. R. & Sayger, P. L. (2004). Chest pain in children and adolescents. *Pediatric Clinics of North America*, 51, 1553-1568. doi: 10.1016/j.pcl.2004.07.002
- Craig, T. K. J., Cox, A. D., & Klein, K. (2002). Intergenerational transmission of somatization behaviour: A study of chronic somatizers and their children. *Psychological Medicine*, 32,

805-816. doi: 10.1017/S0033291702005846

Derogatis, L. (1977). *Administration, scoring, and procedures for the SCL-90-R*. Baltimore, MD: Clinical Psychometrics Research.

Drossner, D. M., Hirsh, D. A., Sturm, J. J., Mahle, W. T., Goo, D. J., Massey R., ... Simon, H. K. (2010). Cardiac disease in pediatric patients presenting to the pediatric ED with chest pain. *American Journal of Emergency Medicine*. Advance online publication. doi: 10.1016/j.ajem.2010.01.011

Eslick, G. D. (2010). Epidemiology and risk factors of pediatric chest pain: A systematic review. *Pediatric Clinics of North America*, 57, 1211-1219. doi: 10.1016/j.pcl.2010.09.013

Fisak, B. Jr., & Grills-Taquechel, A. E. (2007). Parental modeling, reinforcement, and information transfer: Risk factors in the development of child anxiety? *Clinical Child and Family Psychology*, 10, 213-231. doi: 10.1007/s10567-007-0020-x

Fisher, R. A. (1932). *Statistical methods for research workers*. London, UK: Oliver and Boyd.

Flores, G., & Tomany-Korman, S. C. (2008). Racial and ethnic disparities in medical and dental health, access to care, and use of services in US children. *Pediatrics*, 121, 286-298. doi: 10.1542/peds.2007-1243

Flynn, H. A., Davis, M., Marcus, S. M., Cunningham, R., & Blow, F. C. (2004). Rates of maternal depression in pediatric emergency department and relationship to child service utilization. *General Hospital Psychiatry*, 26, 316-322. doi: 10.1016/j.genhosppsy.2004.03.009

Gilleland, J., Blount, R. L., Campbell, R. M., Johnson, G. L., Dooley, K. J., & Simpson, P. (2009). Brief report: Psychosocial factors and pediatric noncardiac chest pain. *Journal of Pediatric Psychology*, 34, 1170-1174. doi: 10.1093/jpepsy/jsp020

- Ho, I. K., Goldschneider, K. R., Kashikar-Zuck, S., Kotagal, U., Tessman, C., & Jones, B. (2008). Healthcare utilization and indirect burden among families of pediatric patients with chronic pain. *Journal of Musculoskeletal Pain, 16*, 155-164. doi: 10.1080/10582450802161853
- Hocking, M. C., Barnes, M., Shaw, C., Lochman, J. E., Madan-Swain, A., & Saeed, S. (2010). Executive function and attention regulation as predictors of coping success in youth with functional abdominal pain. *Journal of Pediatric Psychology, 36*, 64-73. doi: 10.1093/jpepsy/jsq056
- Hotopf, M., Carr, S., Mayou, R., Wadsworth, M., & Wessely, S. (1998). Why do children have chronic abdominal pain, and what happens to them when they grow up? Population based cohort study. *British Medical Journal, 316*(7139), 1196-1200. Retrieved from <http://www.bmj.com/>
- Janicke, D. M., Finney, J. W., & Riley, A. W. (2001). Children's health care use: A prospective investigation of factors related to care-seeking. *Medical Care, 39*(9), 990-1001. Retrieved from <http://journals.lww.com/lww-medicalcare/pages/default.aspx>
- Kashikar-Zuck, S., Goldschneider, K. R., Powers, S. W., Vaught, M. H., & Hershey, A. D. (2001). Depression and functional disability in chronic pediatric pain. *Clinical Journal of Pain, 17*(4), 341-349. Retrieved from <http://journals.lww.com/clinicalpain/pages/default.aspx>
- Kocis, K. C. (1999). Chest pain in pediatrics. *Pediatric Clinics of North America, 46*(2), 189-203. Retrieved from <http://www.pediatric.theclinics.com/>
- Laurell, K., Larsson, B., & Eeg-Olofsson, O. (2005). Headache in schoolchildren: Association with other pain, family history and psychosocial factor. *Pain, 119*, 150-158. doi:

10.1016/j.pain.2005.09.030

Levy, R. L., Whitehead, W. E., Von Korff, M. R., & Feld, A. D. (2000). Intergenerational transmission of gastrointestinal illness behavior. *The American Journal of Gastroenterology*, *95*, 451-456. doi: 10.1016/S0002-9270(99)00825-4

Levy, R. L., Whitehead, W. E., Walker, L. S., Von Korff, M., Feld, A. D., Garner, M., ... Christie, D. (2004). Increased somatic complaints and health-care utilization in children: Effects of parent IBS status and parent response to gastrointestinal symptoms. *American Journal of Gastroenterology*, *99*, 2442-2451. doi: 10.1111/j.1572-0241.2004.40478.x

Lipsitz, J. D., Gur, M., Sonnet, F. M., Dayan, P. S., Miller, S. Z., Brown, C., ... Sherman, B. (2010). Psychopathology and disability in children with unexplained chest pain presenting the pediatric emergency department. *Pediatric Emergency Care*, *26*, 830-836. doi: 10.1097/PEC.0b013e3181fb0e23

Lipsitz, J. D., Masia, C., Apfel, H., Marans, Z., Gur, M., Dent, H., ... Fyer, A. J. (2005). Noncardiac chest pain and psychopathology in children and adolescents. *Journal of Psychosomatic Research*, *59*, 185-188. doi: 10.1016/j.jpsychores.2005.05.004

Lipsitz, J. D., Masia-Warner, C., Apfel, H., Marans, Z., Hellstern, B., Forand, N., ... Fyer, A. J.. (2004). Anxiety and depressive symptoms and anxiety sensitivity in youngsters with noncardiac chest pain and benign heart murmurs. *Journal of Pediatric Psychology*, *29*, 607-612. doi: 10.1093/jpepsy/jsh062

Moran, T. E. & O'Hara, M. W. (2006). Maternal psychosocial predictors of pediatric health care use: Use of the common sense model of health and illness behaviors to extend beyond the usual suspects. *Clinical Effectiveness in Nursing*, *952*, 171-180. doi: 10.1016/j.cein.2006.10.010

- Newacheck, P. W., Stoddard, J. J., Hughes, D. C., & Pearl, M. (1998). Health insurance and access to primary care for children. *The New England Journal of Medicine*, *338*, 513-519. Retrieved from <http://www.nejm.org/>
- Ngui, E. M., & Flores, G. (2007). Unmet needs for specialty, dental, mental, and allied health care among children with special health care needs: Are there racial/ethnic disparities? *Journal of Health Care for the Poor and Underserved*, *18*, 931-949. doi: 10.1353/hpu.2007.0102
- Peveler, R. C., & Fairburn, C. G. (1990). Measurement of neurotic symptoms by self-report questionnaire: Validity of the SCL-90-R. *Psychological Medicine*, *20*, 873-879. doi: 10.1017/S0033291700036576
- Reynolds, C. R. & Kamphaus, R. W. (2004). *Behavior Assessment System for Children* (2nd ed.). Circle Pine, MN: American Guidance Service.
- Richardson, L. P., Russo, J. E., Lozano, P., McCauley, E., & Katon, W. (2008). The effect of comorbid anxiety and depressive disorders on health care utilization and costs among adolescents with asthma. *General Hospital Psychiatry*, *30*, 398-406. doi: 10.1016/j.genhosppsy.2008.06.004
- Rowe, B. H., Dulberg, C. S., Peterson, R. G., Vlad, P., & Li, M. M. (1990). Characteristics of children presenting with chest pain to a pediatric emergency department. *Canadian Medical Association Journal*, *143*, 388-394. doi: 10.1177/000992280404300304
- Schwartz, S. M., Gramling, S. E., & Mancini, T. (1994). The influence of life stress, personality, and learning history on illness behavior. *Journal of Behavior Therapy and Experimental Psychiatry*, *25*, 135-142. doi: 10.1016/0005-7916(94)90006-X
- Selbst, S. M. (1986). Evaluation of chest pain in children. *Pediatric Review*, *8*, 56-62. doi:

10.1542/pir.8-2-56

Selbst, S. M., Ruddy, R., & Clark, B. J. (1990). Chest pain in children: Follow-up of patients previously reported. *Clinical Pediatrics*, *29*, 374-377. doi:

10.1177/000992289002900702

Sills, M. R., Shetterly, S., Xu, S., Magid, D., & Kempe, A. (2007). Association between parental depression and children's health care use. *Pediatrics*, *119*, 829-836. doi:

10.1542/peds.2006-2399

Swenson, J. M., Fischer, D. R., Miller, S. A., Boyle, G. J., Ettetdgui, J. A., & Beerman, L. B. (1997). Are chest radiographs and electrocardiograms still valuable in evaluating new pediatric patients with heart murmurs or chest pain? *Pediatrics*, *99*, 1-3. doi:

10.1542/peds.99.1.1

Thull-Freedman, J. (2010). Evaluation of chest pain in the pediatric patient. *Medical Clinics of North America*, *94*, 327-347. doi: 10.1016/j.mcna.2010.01.004

Walker, L. S. & Greene, J. W. (1989). Children with recurrent abdominal pain and their parents: More somatic complaints, anxiety, and depression than other patient families? *Journal of Pediatric Psychology*, *14*, 231-243. doi: 10.1093/jpepsy/14.2.231