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Personal Factors and Environmental Influences Within the Family as Predictors of Adolescent Asthma Self-Management

Jennifer S. Dolgoff, BSN[1]
Mona Wicks, PhD, RN, FAAN[2]
Elizabeth A. Tolley, PhD[3]
Christie Michael, MD[4]
J. Carolyn Graff, PhD[5]
Shaquita A. Starks, PhD[1]
Loretta Alexia Williams, PhD[1]
Hyekyun Rhee, PhD, RN, FAAN[6]
(1)College of Nursing, University of Tennessee Health Science Center, Memphis, TN, USA
(2)College of Nursing, The University of Tennessee Health Science Center, Memphis, TN, USA
(3)Department of Preventive Medicine, University of Tennessee Health Science Center, Memphis, TN, USA
(4)Department of Pediatrics, University of Tennessee Health Science Center, Memphis, TN, USA
(5)College of Nursing, Department of Health Promotion and Disease Prevention, University of Tennessee Health Science Center, Memphis, TN, USA
(6)School of Nursing, University of Rochester, Rochester, NY, USA

Introduction: Asthma, a leading cause of childhood chronic disease, affects over 2.4 million adolescents and their families in the United States (National Center for Health Statistics [NCHS], 2015). Non-Hispanic black adolescents have disproportionately higher asthma prevalence rates and worse asthma morbidity and mortality rates compared with adolescents of other races and ethnicities (Akinbami, Moorman, Simon, & Schoendorf, 2014). While asthma is currently an incurable disease, asthma symptoms can be controlled, asthma-related morbidity and mortality reduced, and quality of life improved by following current asthma care guidelines. These guidelines include recommendations for individual, family, and provider collaboration as well as effective self-management support (National Heart, Lung, and Blood Institute [NHLBI], 2007; Szefler, Gergen, Mitchell, & Morgan, 2010). Effective asthma self-management is essential for the health, quality of life, and economic well-being of adolescents with asthma and their families. Most studies about adolescents with asthma have focused on medication adherence, a concept related to self-management, rather than on the specific preventive and relief behaviors involved in asthma self-management (Bruzzese et al., 2012; Holley et al., 2016). Many factors have been identified as correlates of adolescent asthma self-management behaviors and medication adherence (Gray et al., 2018; Holley et al., 2016). Consistent with Bandura's Social Cognitive Theory, these correlates reflect two categories: personal factors of the adolescent (hereafter referred to as adolescent personal factors) and environmental influences within the family (hereafter referred to as family environmental influences) of adolescents with asthma. Social Cognitive Theory provides a useful framework for understanding, explaining, predicting, and controlling factors influencing adolescent asthma self-management (Bandura, 1997). Adolescent personal factors reported to significantly predict adolescent asthma self-management behaviors include age, sex, and self-efficacy (Bruzzese et al., 2012; Gray et al., 2018; Mosnaim et al., 2014; Sleath et al., 2012). Family environmental influences that have been significantly associated with adolescent asthma self-management behaviors include family history of asthma, family socioeconomic status, and perceived family support (Gray et al., 2018; Sheikh, Pitts, Ryan-Wenger, McCoy, & Hayes, 2016; Yang, Sylva, & Lunt, 2010). While these adolescent personal factors and family environmental influences have been examined separately, adolescents' sex, self-efficacy, family history of asthma, family socioeconomic status, and perceived family support have not been examined together as predictors of adolescent asthma self-management preventive and relief behaviors. Further, no published studies were found comparing adolescent asthma self-management preventive and relief behaviors across age subgroups (i.e., early, middle, and late adolescence). Moreover, no studies were found examining the potential differential influence of adolescent personal factors and family environmental

influences on adolescent asthma self-management preventive and relief behaviors across stages of adolescence. Studies of adolescents with diabetes and their families have indicated that relationships among adolescent personal factors, family environmental influences, and adolescent diabetes self-management behaviors evolve as adolescents mature (Keough, Sullivan-Bolyai, Crawford, Schilling, & Dixon, 2011; King, Berg, Butner, Butler, & Wiebe, 2014; Markowitz, Garvey, & Laffel, 2015; Wiebe et al., 2014). Additionally, findings in the chronic disease self-management literature have suggested that adolescents and their families share common experiences, concerns, developmental considerations, and behavioral patterns across chronic diseases such as diabetes and persistent asthma (Hanghoj & Boisen, 2014; Heath, Farre, & Shaw, 2017; Martire & Helgeson, 2017). Given the commonalities between diabetes and persistent asthma for adolescents and their families and the dramatic developmental changes that occur during adolescence, asthma self-management preventive and relief behaviors likely vary across age subgroups. Moreover, similar to the findings from studies of adolescents with diabetes and their families, an evolving interplay of adolescent personal factors, family environmental influences, and asthma self-management preventive and relief behaviors is likely to be found for adolescents with asthma and their families.

Aims: The specific aims of this study of adolescents with persistent asthma are (a) to determine how asthma self-management preventive and relief behaviors differ by age subgroups (i.e., early, middle, and late adolescence); and (b) to determine the extent to which adolescent personal factors (e.g., sex and asthma self-management self-efficacy) and family environmental influences (e.g., family history of asthma, family socioeconomic status, and perceived family support) predict asthma self-management preventive and relief behaviors across age subgroups.

Methods: The proposed study is a secondary analysis of data using a descriptive-correlational design to characterize the study sample of 373 predominately non-Hispanic black adolescents (ages 12 – 20 years) with persistent asthma and address the study aims. Specifically, we will examine baseline survey data for associations among adolescent personal factors (e.g., sex and asthma self-management self-efficacy), family environmental influences (e.g., family history of asthma, family socioeconomic status, and perceived family support), and asthma self-management preventive and relief behaviors. Data were derived from participants previously enrolled in an adolescent asthma self-management intervention trial conducted in three large metropolitan cities. Adolescent age and sex, and family socioeconomic status (e.g., parent education level, parent relationship status, estimated annual household income, number of people living in the home with the teen, and health insurance type) were assessed using parent responses on a Demographic Information Form. Family history of asthma was assessed using parent self-report data from an Asthma Information Form. Asthma self-management self-efficacy, asthma self-management preventive behaviors, and asthma self-management relief behaviors were measured in the intervention trial using scores calculated from adolescent responses on each of the three scales of the Asthma Self-management Indices, respectively. The Asthma Self-management Indices is a self-report instrument comprised of three subscales, the 11-item Asthma Prevention Index, the 9-item Asthma Management Index, and the 14-item Asthma Management Self-efficacy Index (Bruzzese, Evans, and Mellins, 2011). Perceived family support was measured by adolescent self-report using the 20-item Perceived Social Support-Family Measure (Procidano & Heller, 1983). We will also estimate associations among adolescent personal factors (e.g., sex and asthma self-management self-efficacy), family environmental influences (e.g., family history of asthma, family socioeconomic status, and perceived family support), and asthma self-management preventive and relief behaviors for the entire sample and by age subgroups (i.e., early, middle, and late adolescence). Descriptive statistics will be used to summarize demographic data, asthma self-management self-efficacy, family history of asthma, family socioeconomic status, perceived family support, asthma self-management preventive behaviors, and asthma self-management relief behaviors. We will estimate Cronbach alpha coefficients for each study instrument as appropriate. Associations between variables will be examined by estimating Pearson's or Spearman's correlation coefficients. Multiple linear regression will be used to determine the extent to which adolescent personal factors and family environmental influences predict asthma self-management preventive and relief behaviors. Further, we will determine the extent to which these predictive

relationships differ across age subgroups. An a priori alpha significance level of $p \leq .05$ will be used for all statistical tests.

Results/Discussion: Study findings could inform clinical practice and the care of adolescents with asthma and their families. Findings could also be used to design more tailored and developmentally-appropriate asthma self-management interventions for adolescents and their families. Because 97% of the participants included in this sample are non-Hispanic black adolescents, this theory-guided study could better inform the care of an understudied population disproportionately affected by asthma and adverse health outcomes. Thus, findings could also determine the utility of Social Cognitive Theory in explaining outcomes and informing solutions in this population experiencing significant health disparities.

Title:

Personal Factors and Environmental Influences Within the Family as Predictors of Adolescent Asthma Self-Management

Keywords:

adolescent, asthma and self-management

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Abstract Summary:

This secondary data analysis will examine adolescent personal factors (e.g., sex and self-efficacy) and family environmental influences (e.g., family history of asthma, family socioeconomic status, and perceived family support) together as predictors of adolescent asthma self-management preventive and relief behaviors across age subgroups (i.e., early, middle, and late adolescence).

Content Outline:

I. Introduction

A. Discuss adolescent asthma prevalence, morbidity, mortality

B. General discussion of asthma self-management and importance for adolescents and their families

C. Review literature and discuss findings using theoretical framework (Social Cognitive Theory)

1. Discuss study findings on correlates of adolescent self-management behaviors

a. Adolescent personal factors

b. Family environmental influences

D. Discuss gaps in the adolescent asthma self-management literature

E. Discuss relevant study findings from the adolescent chronic disease self-management literature and present rationale for current study

II. Aims

A. Specific aim 1

B. Specific aim 2

III. Methods

A. Study design

B. Study sample

C. Variables of interest

D. Data Sources

E. Study Instruments

F. Data analysis plan and statistical tests

IV. Results/Discussion

A. Discuss potential clinical applications of study findings

B. Discuss potential research implications of study findings

First Primary Presenting Author

Primary Presenting Author

Jennifer S. Dolgoff, BSN
University of Tennessee Health Science Center
College of Nursing
Graduate Research Assistant
Memphis TN
USA

Professional Experience: Research Assistant, Peer-Led Asthma Self-Management for Adolescents Study, University of Tennessee Health Science Center, Memphis, Tennessee, 2015-2018 Registered Nurse, Diabetes Prevention Program Outcomes Study, University of Tennessee Health Science Center, Memphis, Tennessee, 2009-2015 Certified Wound, Ostomy, Continence Nurse, Methodist Lebonheur Healthcare, Memphis, Tennessee, 2005-2009 Staff Nurse, Cardiovascular Stepdown Unit, Methodist Lebonheur Healthcare-Germantown Hospital, Germantown, Tennessee, 2004-2005 Staff Nurse, Medical/Surgical/Oncology/Pediatrics Floor, Methodist Lebonheur Healthcare- North Hospital, 2003-2004 Staff Nurse, Emergency Department, Methodist Lebonheur Healthcare-North Hospital, 2002- 2003
Author Summary: Jennifer Dolgoff is currently a full-time Nursing Science PhD student and is also working as a graduate research assistant in the capacity of project director at one site of a multi-site, NIH-funded adolescent asthma self-management intervention study under the mentorship of the study site PI, Dr. Mona Wicks.

Second Secondary Presenting Author

Corresponding Secondary Presenting Author

Mona Wicks, PhD, RN, FAAN
The University of Tennessee Health Science Center
College of Nursing
Professor
Memphis TN
USA

Professional Experience: Dr. Wicks' research interests include ethnic minority, family caregiver, and women's health within the context of chronic illness; health promotion/risk reduction; and health disparities. Dr. Wicks teaches and mentors students enrolled in the Ph.D. program and teaches DNP program courses.
Author Summary: Dr. Wicks' research interests include ethnic minority, family caregiver, and women's health within the context of chronic illness; health promotion/risk reduction; and health disparities. Dr. Wicks teaches and mentors students enrolled in the Ph.D. program and teaches DNP program courses.

Third Author

Elizabeth A. Tolley, PhD
University of Tennessee Health Science Center
Department of Preventive Medicine
Professor of Biostatistics and Epidemiology
Memphis TN
USA

Professional Experience: Dr. Tolley is a tenured Professor of Biostatistics and Epidemiology in the Department of Preventive Medicine at the University of Tennessee Health Science Center. She is course director of graduate-level courses in Biostatistics for the Health Sciences and Linear Regression Models. Dr. Tolley has mentored numerous graduate students at the masters and doctoral levels and has served as a biostatistician, co-investigator, and consultant on many NIH grants. Dr. Tolley provides biostatistical consulting and collaboration services for many basic science and clinical investigators. She has served as the biostatistician on clinical trials and prospective cohorts and has expertise in designing, analyzing, and interpreting results from these types of studies. Dr. Tolley has worked with clinical investigators to develop diagnostic and predictive models. She has collaborated with clinical investigators on a wide range of research topics including pediatric asthma, health disparities, and family studies.
Author Summary: Dr. Tolley has mentored numerous graduate students at the masters and doctoral levels and has served as a biostatistician, co-investigator, and consultant on many NIH grants. Dr. Tolley provides biostatistical consulting and collaboration services for many basic science and clinical investigators. She has served as the biostatistician on clinical trials and prospective cohorts and has expertise in designing, analyzing, and interpreting results from these types of studies.

Fourth Author

Christie Michael, MD
University of Tennessee Health Science Center
Department of Pediatrics
Associate Professor
Memphis TN
USA

Professional Experience: Dr. Christie Michael is an allergist-immunologist affiliated with Methodist Le Bonheur Healthcare system in Memphis, Tennessee. She is an Associate Professor in the Department of Pediatrics at the University of Tennessee Health Science Center. Dr. Michael serves as the Medical Director of the CHAMP, or Changing High-Risk Asthma in Memphis through Partnership, program at Le Bonheur Children's Hospital. The CHAMP program is designed to reduce asthma-related morbidity and mortality and to improve quality of life of children with uncontrolled asthma living in the Memphis area. Dr. Michael is currently a co-investigator on an NIH-funded peer-led teen asthma self-management intervention trial.
Author Summary: Dr. Christie Michael is an allergist-immunologist affiliated with Methodist Le Bonheur Healthcare system in Memphis, Tennessee. She is an associate professor in the Department of Pediatrics at the University of Tennessee Health Science Center. Dr. Michael serves as the Medical Director of the CHAMP, or Changing High-Risk Asthma in Memphis through Partnership, program at Le Bonheur Children's Hospital and is also currently a co-investigator for an NIH-funded peer-led teen asthma self-management intervention trial.

Fifth Author

J. Carolyn Graff, PhD
University of Tennessee Health Science Center
College of Nursing, Department of Health Promotion and Disease Prevention

College of Nursing: Professor; Director, Nursing Science PhD Program. Boling Center for Developmental Disabilities: Chief of Nursing; Research Coordinator
Boling Center for Developmental Disabilities
Memphis TN
USA

Professional Experience: Dr. Graff has extensive experience working with infants, children, and adolescents with and at risk for developmental disability and chronic health conditions and their families. This includes clinical and research experience in rural and urban health care settings. She has presented at local, regional, national, and international meetings on my clinical experience and research and highly value my collaboration with researchers and clinicians from various disciplines. This interdisciplinary work is essential in addressing the health care needs of an increasingly diverse pediatric population in the U.S. and worldwide.
Author Summary: As a member of Jennifer Dolgoff's faculty committee, Dr. Graff works with other faculty committee members to guide Jennifer's dissertation research. Her expertise in quantitative, qualitative, and mixed methods research is valuable to Jennifer and the committee as Jennifer moves forward with her research in this area.

Sixth Author

Shaquita A. Starks, PhD
University of Tennessee Health Science Center
College of Nursing
Assistant Professor
Memphis TN
USA

Professional Experience: I am currently an APRN with 20 years of experience in various feilds of nursing. My research interests include social determinants of health, quality of life, and health disparities in African-American women and children. I am dually certified as an FNP and PMHNP and have provided care to individuals and families with asthma. I am currently a member of a research team of a randomized control trial examining self-management of diabetes mellitus type 2 and other multiple chronic conditions using mobile technology.
Author Summary: Shaquita Starks joined the College of Nursing faculty at UTHSC-Memphis as an Assistant Professor in the Department of Health Promotion and Disease Prevention in January 2017 and currently teaches in the Advanced Practice and Doctoral Studies Program. She is the lead author of one published manuscript, and has presented her work at local, state, and regional conferences. Additionally, she has 20 years of nursing experience and is dually certified as a FNP and PMHNP.

Seventh Author

Loretta Alexia Williams, PhD
University of Tennessee Health Science Center
College of Nursing
Assistant Professor
Memphis TN
USA

Professional Experience: Dr. Williams obtained her PhD in Nursing Science in 2015. She has been PI in a mixed methods study involving burden, depression, and perceived health in male caregivers of persons with end stage renal disease from which she published two manuscripts in Nephrology Nursing

Journal. Dr. Williams also served as PI for a qualitative study involving mental health in male caregivers of stroke survivors. She recently submitted a manuscript to Rehabilitation Nursing Journal involving the results of this study, which is currently under review.
Author Summary: Dr. Williams has conducted family caregiver research within the context of chronic illnesses, including pediatric chronic illnesses. Her research interests have focused on health disparities and minority health as well as the mental health of caregivers within the context of chronic illness.

Eighth Author

Hyekyun Rhee, PhD, RN, FAAN
University of Rochester
School of Nursing
Professor
Rochester NY
USA

Professional Experience: The broad area of Dr. Rhee's research is in adolescent health. She has developed her program of research in asthma self-management in adolescents. Currently, Dr. Rhee is conducting a multi-site randomized controlled trial evaluating the effects of a peer-led asthma self-management program targeting inner city adolescents. Dr. Rhee has expertise in development and evaluation of asthma self-management programs for adolescents, peer leader programs, mobile health applications, and randomized controlled trials. years of training/experience--16 years
Author Summary: Dr. Rhee is a faculty member with an established program of research in the areas of asthma self-management in adolescents. She has conducted multiple research projects that evaluate asthma self-management interventions specifically designed for adolescents.