Published in final edited form as:
J Pediatr Nurs. 2010 June ; 25(3): 157–166. doi:10.1016/j.pedn.2008.10.006.

Factors Associated with Health Behaviors in Middle Childhood

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A common assumption about school-aged children is that they are basically healthy. However, recent evidence suggests that children under the age of 5 years are healthier than those between 5-17 years (Federal Interagency Forum on Child and Family Statistics, 2003). Health behaviors (i.e., health-promoting and health-risk behaviors) of school-age children and early adolescents originate at the intersection of genetic, environmental, and social variables. Some behaviors can protect and promote healthy bodies, quality social relationships, mastery of life's tasks, meaning and purpose in life, and resilience to stress and change (Institute of Medicine, 2001). However, not all children engage in health-promoting behaviors and, by the time they reach adolescence, their health behaviors are often better described as health-risk behaviors including poor nutrition, lack of physical activity, smoking, drinking alcohol and using non-prescribed drugs, having unprotected sex, and carrying weapons or fighting (Brindis, Park, Ozer, & Irwin, 2002). In their review of national data sets, researchers at the National Adolescent Health Information Center (Ozer, Park, Paul, Brindis, & Irwin, 2003) provided ample evidence that health-risk behaviors increase from grades 8-12 and in the lower grades, such behaviors are highest among Hispanics.

Researchers have shown that health-risk behaviors tend to increase with age (Cartland & Ruch-Ross, 2006) and are related to male gender (Wu, Rose, & Bancroft, 2006), ethnicity (Ozer et al., 2003), and family structure (Brener & Collins, 1998; Rouse, Ingersoll, & Orr, 1998). Several health-risk behaviors that vary by ethnicity and gender have been identified in school-age children and early adolescents, including disordered eating and aggression in young Hispanic females (McLaughlin, Hilt, & Nolen-Hoeksema, 2007). At present, very little is known about the development of health behaviors in children and early adolescents, particularly among the growing population of Hispanics. Therefore, the purpose of this study was to describe the health behaviors, both health-promoting and health-risking, of school-age children and how they differ by grade level, gender and ethnicity. A second purpose was to determine how health behaviors are related to factors that may either promote or impede health.

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Conceptual Framework and Related Literature

Resilience Framework

A youth resilience framework (Rew & Horner, 2003) guided the study. Rutter (1987) asserted that resilience is concerned with "individual variations in response to risk" (p. 317) and added that vulnerability and protection are two poles of the same concept. Thus resilience represents the interaction between risk factors (vulnerability) and protective resources (protection). Children who have good or desirable outcomes in the face of high risk are described as resilient (Garmezy, 1991; Rutter, 1993; Tiet et al., 1998; Werner, 1989a; 1989b). While it may be impossible to influence or alter the vulnerability of children, it is possible to enhance protective resources through interventions and thereby foster resilience (Blum, 1998).

Risk factors are internal or external hazards or threats that increase the child's vulnerability or susceptibility to negative developmental and health outcomes (Flaskerud & Winslow, 1998). Risk factors include stress (Smith & Prior, 1995), difficult temperament (Brody, Stoneman, & Gauger, 1996), poverty, (Smith & Prior, 1995), large-size families (Blum, 1998), lack of school engagement (Resnick et al, 1997), and neighborhood quality (Franzini, Caughy, Spears, & Esquer, 2005).

Studies of resilient children have shown that in spite of multiple risk factors, some children develop into competent adults (Rutter, 1985; Werner, 1989a, 1989b). Protective resources that involve the interactions of personal and environmental characteristics have been identified among such resilient children (Somchit & Sriyaporn, 2004). Social connectedness and support have been identified as protective resources that buffer the effects of extreme risk conditions such as poverty and neighborhoods with high crime and violence (Appleyard, Egeland, & Sroufe, 2007; Frauenglass, Routh, Pantin, & Mason, 1997). Having a sense of humor has been shown to improve health outcomes in children with high levels of stress (Dowling, Hockenberry, & Gregory, 2003). Moreover, children who are competent in various domains of functioning (e.g., scholastic ability, social skills, and physical ability) are less vulnerable to risk factors than those who are not competent (Garmezy & Masten, 1991; Harter, 1982, 1985; Luthar, 1991; Luthar & Zigler, 1991). The school setting is a significant environment for children, one where they learn about their social world and judge themselves in the context of peers. Successes in school, whether academic or otherwise, have been shown to foster resilience in children (Garmezy & Masten, 1991; Stewart, Reid, & Mangham, 1997). Thus, school-age children's resistance to stressors can be enhanced by fostering skills that promote their competence (Stewart et al., 1997) and engagement.

The concept of child health behaviors is based on the assumption that health and behavior are intimately linked across the lifespan (Hayman, 1998). That is, long-term healthy behaviors and healthy lifestyles begin with knowledge and skills attained in childhood (Whitener, Cox, & Maglich, 1998). Child health behaviors are those activities that promote health and prevent injury in childhood (Polivka & Ryan-Wenger, 1999). *Healthy Children 2010* (Betz, 2002; Weissberg, Gullota, Hampton, Ryan, & Adams, 1997) contains numerous objectives for healthy behavioral patterns for children, in terms of nutrition, exercise, oral health, and prevention of unintentional injuries as well as major diseases. Behaviors characteristic of children's lifestyles (e.g. diet and activity levels) have been implicated in increasing risk for chronic health problems such as diabetes and cardiovascular disease; such behaviors are amenable to interventions that can attenuate the long-term adverse health effects by focusing on activities that promote health (Lippman, Hayman, & Fabian, 1997).

In summary, the youth resilience framework (Rew & Horner, 2003) consists of three major constructs: contextual/risk factors, protective resources, and health behavioral outcomes. For

the purposes of this study, contextual/risk factors were age, gender, ethnicity, family size and constellation, socioeconomic status, temperament, stress, and neighborhood quality. Protective resources were coping, sense of humor, social connectedness, school engagement, and competence. The outcomes were child health behaviors.

Methods

The work presented here is the analysis of the first wave of data in a 5-year cohort-sequential longitudinal study of health behaviors of children in grades 4 through 6. The larger study follows these three cohorts of children through grade 8. In this paper, the following research questions were addressed:

1. What are the differences in contextual/risk factors, protective resources, and child health behaviors when examined by children's gender, ethnicity, and grade cohort (4^{th}, 5^{th}, 6^{th} grade children)?
2. For each of the three grade cohorts, what contextual/risk factors and protective resources are associated with health behaviors?

Setting and Sample

The study took place in a rural setting in central Texas, a state with a rapidly-expanding population of Hispanics, primarily of Mexican descent. The non-probability sample was comprised of 1934 children in grades 4 (n=781), 5 (n=621) and 6 (n=532) who were enrolled in three rural school districts in central Texas and one of their parents. There were 900 (46.5%) boys and 1034 (53.5%) girls, and included an over-representation of Hispanic children when compared to non-Hispanic children (991=51.2% of this sample vs. 38.3% in the three school districts sampled). The total sample represented 37% of the accessible population. Of the 943 non-Hispanic participants, 597 were White, 192 were Black, 5 were Asian, 2 were Native Hawaiian/Pacific Islanders, 6 were American Indian, and the remaining indicated either multi-racial or unspecified. Of the 991 Hispanics, 434 were White, 71 were Black, 16 were Asian, 2 were Native Hawaiian/Pacific Islanders, 7 were American Indian, and the remaining indicated either multi-racial or unspecified.

Instruments

A battery of instruments with established reliabilities and validities was used to measure the risk factors, protective resources, and child health behaviors identified in the conceptual framework. All instruments were translated into Spanish and back translated into English by two independent translators, both of whom were native Spanish speakers. The parents provided demographic data on their child's age, gender, race/ethnicity, grade level in school, family size, family constellation (e.g. single-parent, two-parent), and family socioeconomic status (SES), defined as family income and the mother's highest level of education completed.

Parents also provided information about neighborhood quality with respect to safety, social involvement, and public services provided. The 13 items of the original Likert scale were developed and validated with a diverse national sample of 337 parents (Greenberg, Lengua, Cole, & Pinderhughes, 1999). The Neighborhood Questionnaire had evidence of construct validity determined through factor analysis and reliability coefficients that ranged from .74-.77 for subscales of safety, social involvement, and satisfaction with public services (Greenberg et al.). Negatively worded items were reverse coded such that higher scores indicated greater neighborhood quality than lower scores. In this sample, subscale reliabilities were: safety (α = .65), social involvement (α = .78), and public services (α = .34).

The child's temperament was measured by the parent's report using the School-Age Temperament Inventory (SATI), which consisted of 38 items with a 5-point Likert response format (McClowry, 2003). The SATI was originally developed for parents to describe the temperament of 8-11 year-olds and was subjected to factor analysis, which yielded four dimensions of task persistence, negative reactivity, approach/withdrawal, and activity. Subsequent psychometric evaluation was done with samples of non-Hispanic White, Black, Hispanic, and Native American samples, which yielded Cronbach's alpha for the four dimensions ranging from .80-.92 (McClowry, Halverson, & Sanson, 2003). The Reliability coefficients for the subscales in this sample were: task persistence (α = .88), negative reactivity (α = .90), approach/withdrawal (α = .78), and activity (α = .78).

The Feel Bad Scale (FBS) for measuring stress consisted of two sets of 20 questions (Lewis, Siegel, & Lewis, 1984). Children were asked first to rate the intensity of the item by using a 5-point scale with 1 representing "not bad" to 5 representing "terrible," and then indicated the frequency the item occurred using a 5-point scale with 1 for never to 5 for always. Scale items were derived from focus groups with 5th and 6th grade children and a Cronbach's alpha of .82 was found in an ethnically diverse group of children (Lewis, et al.). The subscale scores were reported as scale mean scores. The FBS total score was obtained by summing the products of the item-frequency by the item-intensity to yield a weighted (FBS-W) stress score. Higher subscale and weighted scores indicated greater distress. Cronbach's alpha for this sample for the intensity and frequency subscales and the total scale were .85, . 89, and .84, respectively.

The School-ager's Coping Strategies Inventory, consisting of 26 items, also had two response formats (Ryan-Wenger, 1990). Children first indicated how often (frequency) they performed the coping strategy on a 4-point scale with 1 for never to 4 for always, and then rated the effectiveness of that same coping strategy using a 4-point scale with 1 for "never do it," 2 for "does not help," 3 for "helps a little," and 4 for "helps a lot." Scale items were developed from focus groups with 103 children aged 8-12 years and psychometric testing yielded Cronbach's alpha of .81 for frequency and .77 for effectiveness (Ryan-Wenger, 1990). The subscale scores were reported as scale mean scores. Higher subscale scores indicated more frequent use and effectiveness of coping strategies. Cronbach's alpha for this sample was .76 for frequency and .77 for effectiveness.

School engagement was measured by the child's responses to 6 questions with a variable ordinal response format ranging from 4-response options to 6-response options. For example, the response scale for the item, "How hard do you try on your schoolwork," has 1 for "I never try at all," 2 for "I don't try very hard," 3 for "I try hard enough, but I don't try as hard as I could," and 4 for "I try very hard to do my best." Whereas, the response scale for the item, "What is the most education you expect to finish," used a 6-point response scale that ranges from 1 for "less than high school," to 6 for "graduate or professional school beyond college." The other questions asked the child to indicate how many clubs or teams they participated in at school, what kind of student they were (e.g., average, one of the best, etc.), how they felt about going to school (e.g., "I don't like school at all" to "I like school all the time"), and whether or not they expected to drop out of school. With the exception of expectations for dropping out of school, higher scores indicated higher engagement. The scale was originally developed and used successfully in the Minnesota Adolescent Health Survey (Blum, Harris, Resnick, & Rosenwinkel, 1989).

Sense of humor was measured with the 15-item Multidimensional Sense of Humor Scale adapted and validated by Dowling and Fain (1999) for use with school-age children. Dowling and Fain reported a Cronbach's alpha of .88 for the scale when used with children aged 6-12 years. Higher scores indicate greater use of humor as an adaptive coping strategy.

The scale has a 5-point Likert response format and a readability level of 2.5. Cronbach's alpha for this sample was .90.

Social connectedness was measured using a 10-item scale with a 4-point Likert response format, higher scores indicating greater connectedness. Originally developed for use with adolescents, the scale had a Cronbach's alpha of .92 for females and .96 for males (Blum, et al., 1989). The wording of the scale was adapted by this research team for school-age children and found to have a readability level of 3rd grade. The Cronbach's alpha for this sample was .76.

Competence was measured with a modified version of the Self-Perception Profile for Children instrument that has 36 items and was comprised of six subscales with reliability coefficients ranging from .71-.86 (Harter, 1985). Reliability coefficients for the subscales for this sample were: scholastic (α = .72), social acceptance (α = .67), athletic (α = .69), physical appearance (α = .76), behavioral (α = .73), global self-worth (α = .73). The original tool, designed for use by 8-14 year-olds, used an alternate response format wherein the child chooses which of two opposite options is the best match for them and then further rates if this selected response option is 'somewhat true' or 'very true' of the child. Although the left-right presentation of the structured alternative format has been used successfully in paper-and-pencil questionnaires, the format can be confusing for youth (Eiser, Eiser, & Havermans, 1995). This format also did not work well when adapted to computerized data collection methods. The presentation of the items was modified so that the child read down a list and made one selection rather than weighing a left-side to a right-side alternate-option response. For example, one of the scholastic items presented the option, "Some kids do very well at their classwork," followed by the second option, "But … other kids don't do very well at their classwork." The two options were followed by four response options: a) "I am really like the first kind of kid," b) "I am sort of like the first kind of kid," c) "I am really like the second kind of kid," d) "I am sort of like the second kind of kid." The computer allowed only one response per question, and was scored in keeping with the instructions for the paper-pencil version. High scores on each subscale indicated higher perceived competence in the respective domain.

Child health behaviors were measured using the 25 items of the Lifestyle Questionnaire, which was originally developed to screen for healthy lifestyle practices of children between the ages of 5 and 12 years (Polivka & Ryan-Wenger, 1999). Although two of the items measured health-risk behaviors, which were reverse-scored, the majority of the behaviors included activities that promote health and prevent injury (e.g., "I sleep at least 8 hours every night" and "I wear a seatbelt in a car"). Total scores were obtained through summing across the 4-point items, with possible scores ranging from 25-100 and higher scores indicated greater engagement in health-promoting behaviors. Cronbach's alpha for this sample was .79, which was the reliability coefficient also reported by Polivka and Ryan-Wenger.

Data Collection Procedure

After study approval was obtained from the University Institutional Review Board and each of the school administrators, a packet was mailed to parents of all the children in grades 4 through 6 in three rural school districts. The packets included a cover letter from the child's school, an explanatory letter from the researchers, and consent forms. All materials were written in English and Spanish, with forward and backward translations by independent speakers, and were reviewed by bilingual members of the community for translation clarity and accuracy before mailing. Informational meetings were held at the schools following parent-teacher meetings. At those school meetings, the study was explained to the children, questions were answered, and signed permissions were obtained from parents. Data were

later collected during school hours using audio (optional) computer-assisted self-interviewing (A-CASI) technology using laptop computers after children who agreed to participate provided written assent.

Data were collected with 25 to 30 children from a single grade level participating in each session. The children were oriented to the A-CASI format and were directed to select either the English- or Spanish-language versions to complete. For children who had difficulty with reading, audio-support was engaged on the laptop computer and the children listened with an earpiece as the items were read to them in their preferred language. Rew, Horner, Riesch, and Cauvin (2004) identified the advantages and limitations of the CASI method used with children in more detail. As each child completed the questionnaires the research assistants saved the data record to the secure website. Students who were absent on the day data were collected completed the scales using paper-pencil forms mailed to their homes. Data were collected from parents via paper copies mailed to their homes.

Data Analysis

Data from CASI were imported directly into SPSS and analyzed using SPSS version 15.0. Subscale or scale scores were not computed for cases missing more than 20% of the underlying items. In instances of less than or equal to 20% missing item-level data, subscale and scale scores were computed using imputation of missing item data separately for each individual assuming a consistent pattern of responding. Grade level (cohorts) was treated as a categorical variable (grades 4, 5, and 6), gender was dichotomized (male, female), and ethnicity was dichotomized (not Hispanic, Hispanic).

General linear model analysis procedures were used to address each research question. Main effects models as well as models with interactions were considered as necessary, with the more parsimonious model adopted as appropriate. For the second research question, bivariate associates between each possible risk and protective variable were analyzed first. Because of the large sample size for each of the bivariate analyses, power to detect extremely small effects, which could be argued are not substantively significant, and the large number of variables examined, bivariate correlations were considered statistically significant at $p < .001$. Furthermore, to limit the general linear model analyses to variables with at least minimal contribution to the explained variance in health behaviors, only those that explained at least 1% of the variance in health behaviors were included in the models. Ninety-five percent confidence intervals for squared multiple correlations are reported using non-centrality interval estimation procedures (Steiger & Fouladi, 1997).

Results

Description of Health Behaviors

A general linear model analysis was conducted on variation in health behaviors related to gender, ethnicity, and grade level. A main effects model with these three demographic variables treated as categorical explained 1.8% of the variance in health behaviors *[F* (4, 1929) = 9.047, $p < .001$; R^2 *adj*. = .016]. Addition of second order interaction terms to the demographics main effects model did not explain a significant proportion of additional variance *(p* =.311) nor did the further addition of the third order interaction term ($p = .616$). In the demographics main effects model, each of the underlying demographic variables contributed uniquely to the explained variance in health behaviors (gender: $F(1, 1929) = 19.152$, $p < .001$; ethnicity: $F(1, 1929) = 9.885$, $p = .002$; grade level: $F(1, 1929) = 5.080$, $p = .006$). In this model, results showed a pattern of higher self-reported health behavior scores for females versus males (β=1.77, *SE*=.40, $t(1929)=4.376$, $p<.001$); higher scores for non-Hispanics versus Hispanics (β=1.27, *SE*=.41, $t(1929)=3.144$, $p=.002$); and higher scores

at grades 4 and 5 versus grade 6 (grade 4 vs. 6: β=1.54, *SE*=.50, *t*(1929)=3.091, *p*=.002); grade 5 vs. 6: β=1.26, *SE*=.52, *t*(1929)=2.398, *p*=.017). General linear model based follow up LSD statistical analyses for the three grade levels also showed the means for health behavior at grades 4 and 5 were statistically significantly different from the mean for health behavior at grade 6 (*p*=.006 and *p*=.041, respectively), but that there was no statistically significant difference between means for grades 4 and 5 (*p*=.548). Table 1 provides the 95% Confidence Intervals (CI) on mean health behavior as a function of each level of the demographic variables.

Risk and Protective Factors

Health behaviors that were statistically significantly correlated with contextual/risk factors at a significance level of at least .001 were: the task persistence subscale of temperament *(r* = .080, *n* = 1777, *p*=.001), frequency of stress *(r* = −.264, n = 1900, *p*<.001), intensity of stress *(r* = .092, n = 1900, *p*<.001), and overall stress (*r* = − .121, *n* = 1904, *p*<.001). Of these four statistically significant correlations, the task persistence subscale of temperament and the intensity of stress subscale did not meet the threshold of explaining at least 1% of the variance in health behaviors. None of the other contextual/risk variables (i.e., neighborhood quality, family size and constellation, SES, and temperament subscales of negative reactivity, approach/withdrawal, or activity) were significantly correlated, a *p* of at least .001 with health behaviors.

Of the correlations of health behaviors with variables identified in the model as protective resources, all of the six school engagement variables [clubs or teams (*r* = .081, n = 1870, *p*<.001), how hard they try (*r* = .218, n = 1862, *p*<.001), kind of student (*r* = .165, n = 1854, *p*<.001), expectations about finishing (*r* = .115, n = 1855, *p*<.001), liking school (*r* = .290, n = 1852, *p*<.001), dropping out (*r* = −.113, n = 1856, *p*<.001)] were statistically significantly correlated at p of at least .001. Only one of the school engagement variables (how many clubs or teams the child was in) did not meet the threshold of explaining at least 1% of the variance in health behaviors. Other protective resources that were correlated with child health behaviors and that met the threshold of 1% explained variance included social connectedness (*r* = .305, *n* = 1870, *p*<.001), humor (*r* = .156, *n* = 1876, *p*<.001) and all subscales of competence (scholastic competence, *r* = .182, *n* = 1784, *p*<.001; social competence, *r* = .119, *n* = 1780, *p*<.001; athletic competence *r* = .128, *n* = 1777, *p*<.001; physical appearance *r* = .138, *n* = 1770, *p*<.001; behavioral competence *r* = .228, *n* = 1764, *p*<.001; and global self-worth *r* = .196, *n* = 1769, *p*<.001). Neither of the coping variables met the threshold for either significance and/or explained variance (frequency, *r* = − .009, *n* = 1903, *p* = .733; effectiveness, *r* = − .094, *n* = 1886, *p* < .001).

Because the overall stress scale incorporates scores from the subscales and because the frequency subscale explained a larger proportion of the variance in health behaviors, only the stress frequency subscale was further considered in a full main effects model. With the exception of overall stress, which included the subscale of stress frequency, entering all of the contextual/risk and protective factor variables that met the threshold of explaining at least 1% of the variance in health behaviors to the main effects demographics model (gender, ethnicity, and grade level) explained 19.7% of the total variance in health behaviors [R^2 *adj*. = 0.188; *F* (18, 1593) = 21.690, *p* < .001]. This full main effects model yielded a significant increase in explained variance over the main effects demographics model that included only gender, ethnicity, and grade level [R^2 change = 0.178, F (14, 1593) = 25.278, *p* < .001]. In the full model, gender (*p* = .049), Hispanic ethnicity (*p* = .015), stress frequency (*p* < .001), trying hard in school (*p* = .008), liking school (p < .001), humor (*p* < .001), and social connectedness (*p* < .001) explained unique variance above and beyond the other predictors in the model. Because of the collinearity among the subscales of competence (ranging from *r*=.261-.627), their collective contribution to the model was

considered as a set. The set of competence variables did not explain a substantive proportion of variance in child health behaviors [R^2 change = 0.005; F (6, 1593) = 1.742, p = .108] above and beyond the other predictors in the model.

Two-way interactions of grade level with each of the added risk and protective variables were further added to the full main effects model, resulting in a second order model with R^2 = 0.224, [F (46, 1565) = 9.73, p < .001]. Thus the two-way interactions explained an additional 2.7% of the variance in health behaviors [R^2 change = 0.027; F (28, 1565) = 1.92, p = .003]. The statistically significant two-way interactions in the second order model were: grade with trying hard in school (p = .009), grade with expectations about completing school (p = .009), and grade with liking school (p = .032). Results show a steady increase in the relationship between trying hard in school and health behaviors across grade cohorts, but the pattern is less consistent for expectations about completing school and liking school. This interaction shows that the relationship between trying hard in school and health behaviors is even stronger in higher grades.

Discussion and Implications for Nursing

This is one of the first known studies to describe health behaviors among school-age children in a comprehensive manner. There were significant differences in children's health behaviors based on gender, ethnicity, and grade level. Although engagement in more health behaviors does not necessarily imply engagement in fewer health-risk behaviors, the finding that females engaged in more health behaviors than males was not surprising given that other researchers have found that young adolescent males engage in more health-risk behaviors than females (Brener & Collins, 1998; Rouse, Ingersoll, & Orr, 1998; Wu, Rose, & Bancroft, 2006). The health behaviors measured in this study contain only two health-risk behaviors (watching TV and eating salty snacks). Thus high scores represented the child's health-promoting behaviors (e.g., "I visit the dentist every year, I eat fruits every day, I stay away from beer and wine") whereas low scores represented lower rates of engagement in behaviors that indicate behaviors that are more risky. These data provide evidence that, at least for boys, low rates of engaging in health-promoting behaviors thereby placing boys at greater risk, starts at least as early as 4th grade. This behavior pattern has serious implications for long-term health consequences. School nurses might develop strategies that focus on the gender differences in how children learn about and care for their bodies. There are ample opportunities in structured classes (e.g., health, biology, physical education, sports) to address health-promoting behaviors directly. Furthermore, the Child Nutrition and WIC Reauthorization Act (2004) that mandated schools develop and implement school wellness policies by the beginning of the 2006 academic year presents school nurses with an ideal opportunity for influencing the health of children. A collaborative approach to promoting healthy behaviors across the school environment can have a far greater impact than when the school nurses is the lone voice promoting health.

Similarly, the findings related to ethnicity and grade level differences were not unexpected. This study adds to the national findings of Ozer and colleagues (2003) that health-risk behaviors in grade 8 are highest among Hispanic students. Data from children as young as 4th grade in the study presented here indicate greater health-risk and reduced health-promoting behaviors in Hispanic children compared to non-Hispanic children. Moreover, Ozer and colleagues reported that children between the ages of 12 and 19 who were less engaged in and dropped out of school were more likely to engage in a variety of health-risk behaviors. Although negative health behaviors increase with grade level, staying in school provides potential opportunities for children and young adolescents to learn more about what contributes to health and to develop additional skills that contribute to lifetime healthy living.

The finding that health behaviors decreased from grades 4 and 5 to grade 6 is similar to the findings reported by Cartland and Ruch-Ross (2006). As these researchers suggested, although children's knowledge and self-efficacy may increase with age such that they have the tools that are needed to maintain or improve health behaviors, they do not necessarily practice what they know. Furthermore, the current structure of academic time and nutrition resources available in schools do not provide adequate opportunities for engaging in health-promoting behaviors. For example, it is recommended that elementary schools arrange for students to participate in 150 minutes per week of vigorous physical activity, yet only 8% of elementary schools met this goal (Pate et al., 2006). Further research is needed to determine what factors pull children away from engaging in behaviors that are health-promoting.

The association of contextual/risk factors and protective resources with child health behaviors in this study are new findings for school-age children. In this study, constructs identified as risk factors and protective resources in a resilience framework were found to cumulatively explain a substantial proportion of the variance found in child health behaviors given the many genetic, environmental, and social variables that contribute to and influence such behaviors. In general, these findings support the resilience framework that guided this study. Based on the literature reviewed for this framework, temperament was treated as a risk factor, but the only subscale or domain that contributed significantly to the variance in health behaviors was task persistence, which more appropriately may represent a protective factor. Task persistence is the child's tendency to remain focused on a task until it is done and this was found to be more related to child health behaviors than other temperaments characterized by activity, approach/withdrawal, and negative reactivity. Although none of the domains taken alone is a total representation of a child's temperament, high task persistence is a strength when it means that a child completes things without multiple reminders. However, it may also indicate a need for perfection or an inability to stop an activity that is highly attractive to the child (McClowry, 2003). Children who are high in task persistence, however, may maintain a focus on healthy behaviors that protects them in a way that other temperaments do not.

Except for stress, none of the other contextual/risk factors identified in previous studies (i.e., family size and constellation, SES, and neighborhood quality) was found to be a significant predictor of child health behaviors in this sample. Stress in school-age children is not a commonly studied phenomenon, but this inverse association indicates that as children's perceptions of stress increase, their engagement in health behaviors decreases. This and other findings in this study suggest that the development of health behaviors may be a socially mediated process wherein factors in the environment may enhance or impede such development (Lynam, 2005). Again, school nurses might develop interventions that help children manage their stress in ways that also promote their health. Sources of stress that were measured in this study included parental factors (e.g., death of a parent, parents' divorce, parents fighting) and child factors (e.g., changing schools, moving, and pressure to complete home work). School nurses can focus their attention on those children who experience these more stressful situations and provide targeted interventions to address a child's specific needs.

The protective resources of school engagement, social connectedness, and humor are significant findings that suggest the importance of children being involved with others in the school setting as well as in other social settings. This finding is similar to the findings of other researchers that being socially connected through school and feeling that people at home and in other social situations care about them can buffer the effects of other factors that place them at risk (Appleyard et al, 2007; Frauenglass et al, 1997). Few other researchers have studied the role that having a sense of humor plays in the health behaviors and health status of children, but Dowling and Fain (1999) suggested that it might be used

by school-age children to facilitate social interactions and master stress. The findings in this study support this notion that humor is associated with health-promoting behaviors and as such is a useful resource for school-age children.

The various domains of competence (i.e., scholastic competence, social competence, athletic competence, physical appearance, behavioral competence, and global self-worth) were all significantly correlated with child health behaviors, but when considered as a set, they did not explain a significant proportion of the variance in these behaviors above and beyond what was already explained by the other variables in the model. It may be that for this sample of rural children, the other protective resources are more salient to their engaging in a healthy lifestyle. The interaction of trying hard in school and grade level indicates that in spite of the fewer health behaviors engaged in by 6th graders overall, those who were trying hard in school were also engaging in healthy behaviors. This finding supports the salience of school engagement as a protective resource that contributes to a healthy lifestyle.

The finding that coping was not significantly related to child health behaviors and did not contribute to the variance in those scores was unexpected. The coping scale used in this study represents a broad range of behaviors (e.g., cuddle my pet or stuffed animal; get mad; talk to myself; yell or scream). It may be that individual strategies of coping are related to health behaviors (some positively, others negatively) and, therefore, scores on the full scale cannot reflect and actually dilute this. It may also be that the various types of school engagement represent a type of coping that is serving these children better than the strategies suggested by the scale used in this study. This warrants further investigation in other samples of school-age children.

Limitations

The data analyzed in this study were cross-sectional, thus, no causal inferences can be made. The sample was a non-probability one from one geographic area and may not represent all rural school-age children in this country. All of the child data, with the exception of the temperament scale, were self-report measures, thus the findings may represent some social desirability bias on the part of the participants. The measure of health behaviors, although it had a high degree of reliability within this sample, also had some limitations. School-age children may have more control over some behaviors, such as what they chose to eat, than other behaviors, such as visiting the dentist every year. The neighborhood quality measure also included subscale reliabilities considerably lower than those reported by the originators of the scale and this could affect the validity of the data reported on that variable.

Nursing Implications

In spite of these limitations, the comprehensive examination of health behaviors in children, use of the resilience framework (Rew & Horner, 2003) to examine theoretically relevant contextual/risk factors and protective resources, and over-representation of Hispanic children in the sample strengthen the importance of these findings to pediatric nursing. Based on the evidence provided here, pediatric nurses can provide anticipatory guidance to parents and teachers concerning the early indicators that male and Hispanic children, in particular, begin to show lower levels of health-promoting behaviors long before adolescence. The decrease in health-promoting behaviors reported by 6th grade children also highlights the need for active interventions to circumvent this behavioral pattern. The school environment can have a significant impact on the health of children because they spend a considerable portion of each day in school. Through collaboration with parents, teachers, administrators, and various community agencies, school nurses can work to create a culture of wellness in schools. School wellness policies with goals for nutrition education, physical activity, and other school-based health-promoting activities can support engagement in

health-promoting behaviors. Guiding children to develop strategies such as the use of humor for stress management may also be important activities for pediatric nurses to facilitate. Consistent with the youth resilience framework that guided this study, school engagement was found to be associated with healthy behaviors. By keeping children and young adolescents engaged in school and aware that adults in their lives care about them may be important messages for nurses to convey.

Acknowledgments

This study was supported by Grant Number R01-HD39554 from the National Institute of Child Health and Human Development and the National Institute of Nursing Research. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institute of Child Health and Human Development, the National Institute of Nursing Research, or the National Institutes of Health. The authors would also like to thank the many staff members and graduate students from The University of Texas at Austin who assisted in data collection and retention of study participants.

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Table 1

Descriptive Statistics for Health Behaviors as a Function of Gender, Ethnicity, and Grade.

Demographics Interval	Mean	Standard Error	Standard Deviation	95% Confidence
Gender:				
Female	81.8	.3	8.7	81.3 – 82.3
Male	80.1	.3	9.1	79.5 – 80.7
Ethnicity:				
Hispanic	80.4	.3	9.1	79.9 – 81.0
Non-Hispanic	81.6	.3	8.7	81.0 – 82.1
Grade:				
4	81.4*	.3	8.8	80.8 – 82.1
5	81.2**	.4	8.7	80.5 – 81.8
6	80.1	.4	9.3	79.3 – 80.9

* Statistically significantly different from grade 6 scores (p=.002).

** Statistically significantly different from grade 6 scores (p=.017).

Table 2

Bivariate Correlations and General Linear Model Results for Demographics Main Effects Model and Full Main Effects Model.

Variables		Correlations		Demographics Main Effects Model				Full Main Effects Model				
		r	p	F	df	p	Part η^2	F		df	p	Part η^2
Demographics	Gender	.095[a]	<.001	19.152	1,1929	<.001	.010	3.877	1,	1593	.049	.002
	Ethnicity	.063[b]	.006	9.885	1,1929	.002	.005	5.964	1,	1593	.015	.004
	Grade	n/a	n/a	5.080	2,1929	.006	.005	2.478	2,	1593	.084	.001
FBS-Intensity		−.264	<.001					23.821	1,	1593	<.001	.015
Engagement	Try hard	.218	<.001					7.117	1,	1593	.008	.004
	Student	.165	<.001					.603	1,	1593	.437	<.001
	Expectations	.115	<.001					3.255	1,	1593	.071	.002
	Like school	.290	<.001					42.243	1,	1593	<.001	.026
	Drop out	−.113	<.001					1.225	1,	1593	.268	.001
Connectedness		.305	<.001					30.035	1,	1593	<.001	.019
Humor		.156	<.001					17.309	1,	1593	<.001	.011
Competence	Scholastic	.182	<.001					.476	1,	1593	.490	<.001
	Social	.119	<.001					3.308	1,	1593	.069	.002
	Athletic	.128	<.001					2.337	1,	1593	.127	.001
	Phys Appear	.138	<.001					.069	1,	1593	.793	<.001
	Behavioral	.228	<.001					2.358	1,	1593	.125	.001
	Global	.196	<.001					.259	1,	1593	.611	<.001

[a] Notes: Male reference category,

[b] Hispanic reference category.