Journal of Pediatric Nursing 67 (2022) 15–26

Contents lists available at ScienceDirect

Journal of Pediatric Nursing

journal homepage: www.pediatricnursing.org

Child's perceived stress: A concept analysis

Sara L. Davis, PhD, RN, PCNS-BC [a,*], Heather C. Soistmann, PhD, RN [b]

[a] University of South Alabama College of Nursing, 5721 Dr. N., Mobile, AL 36608, USA
[b] Penn State Health Children's Hospital, 500 University Dr, Hershey, PA 17033, USA

ARTICLE INFO

Article history:
Received 12 October 2021
Revised 14 July 2022
Accepted 15 July 2022

Keywords:
School-aged children
Perceived stress
Concept analysis

ABSTRACT

Problem: Child's perceived stress is a term used widely in literature, yet it is poorly defined. Perceived stress in childhood has been linked to negative health outcomes throughout the lifespan. Therefore, the ability of researchers and healthcare providers to conceptualize child's perceived stress and form accurate measures of the concept is of utmost importance.
Eligibility criteria: Following the eight steps identified by Walker and Avant, a literature review was conducted to identify studies that measured perceived stress in school-age children over the last 10 years.
Sample: Of 914 records identified, 136 were screened, and 16 met inclusion criteria.
Results: Child's perceived stress is best defined as any actual or imagined threat, personal and specific to childhood, which overwhelms the child and leads to changes in emotional, psychological, developmental, and/or physiological domains.
Conclusions: While the concept of child's perceived stress is understood similarly throughout studies, there is notable variation in the way child's perceived stress is measured. Because of the specificity of perceived stress to childhood, and the wide range of what may be perceived as stressful by the child, the child is the best reporter of child's perceived stress.
Implications: Researchers and clinicians must use child self-report tools to measure the concept of child's perceived stress. Opportunities exist for healthcare workers to intervene, educate, and help children and families recognize and manage child's perceived stress. This concept analysis includes many resources that practitioners may use to help alleviate stress in children.

Introduction

Stress is a large part of human behavior, coping, and adaptation (Osório et al., 2017). Data have emerged from adult and childhood studies indicating that stress in childhood influences cardiovascular disease (CVD), obesity, metabolic syndrome, inflammation, immune dysregulation, and cognitive development (Campbell et al., 2016; Chang et al., 2019; Gilgoff et al., 2020; Oh et al., 2018). Importantly, high levels of stress, chronic stress, and stressful events occurring during childhood can lead to negative health outcomes and life-long deficits in health in adulthood (Fagundes & Way, 2014; Gilgoff et al., 2020; McEwen & Gianaros, 2010). Identifying precursors to stress, stressful events, and perception of stress in children is crucial to understanding stress-related health outcomes and prevention (Gilgoff et al., 2020). Further, early identification and intervention for stress in children ultimately decreases negative health outcomes in adulthood (Fagundes & Way, 2014; Gillespie, 2019; Kelley & Lowe, 2018). Researchers interested in stress must be able to conceptually and operationally define and measure various types of stress. Similarly, healthcare providers must be able to recognize, assess, and intervene when a child exhibits high levels of perceived stress by subsequently connecting at-risk children and their parents with education, therapy, or resources to help manage or decrease perceived stress (Garner, 2013; Gillespie, 2019).

Perceived stress is a term used widely in healthcare literature, research, and assessment, yet the perception of stress from a child's perspective, the concept of "child's perceived stress," warrants a clearer understanding (Rew et al., 2012; Snoeren & Hoefnagels, 2014). To date, the concept of child's perceived stress has not been analyzed. This gap in the literature merits attention, as perceived stress is measured and studied in children (Allwood et al., 2017; Bevans et al., 2018; Mason et al., 2019). For the purposes of this concept analysis "child" refers to children ages 6–12 years old. However, due to limitations in self-report by children younger than 8 (Ryan-Wenger et al., 2012; Snoeren & Hoefnagels, 2014), the focus of this review is children 8–12 years old. Various disciplines use the term perceived stress interchangeably with acute and chronic stress; however, child's perceived

* Corresponding author.
E-mail addresses: saradavis@southalabama.edu (S.L. Davis), hsoistmann@pennstatehealth.psu.edu (H.C. Soistmann).

https://doi.org/10.1016/j.pedn.2022.07.013
0882-5963/

stress is a concept within itself. Therefore, the purpose of this analysis is to explore the concept of child's perceived stress and suggest a conceptual definition to improve stress research and enhance health outcomes in children.

Aims of this analysis are to clarify child's perceived stress as a concept unique to childhood and to emphasize the importance of developmental stages when considering child's perceived stress. Enhancing awareness of the importance of child's perceived stress as a concept allows researchers and pediatric providers to better assess, treat, and mitigate perceived stress in children. Pediatric nurses will benefit from a clearer understanding that school-age children experience stress at an individual level, and this perceived stress has an impact on immediate and long term health outcomes. Further, the analysis will clarify the ambiguity associated with the concepts of stress, perceived stress, and child's perceived stress (Walker & Avant, 2011). These goals will be achieved by exploring diverse uses of the concept and providing various cases to illustrate child's perceived stress as suggested by Walker and Avant (2011).

Methods

The current analysis follows the eight steps of the Walker and Avant (2011). This method was used to provide a review of the use of the concept and related concepts in the literature. Examining definitions, antecedents, attributes, consequences, and cases provides the basis for the development of concept development.

A literature search was conducted using CINAHL, PsychINFO, PubMed, and Scopus databases. Search terms, with the use of Boolean operators (and, or, not), included: stress, perceived, perceived stress, child, and children. Search limitations included: publication years between 2010 and 2020, access to full text, and English language. Articles were included if the research pertained to stress and included children in data collection. Dissertations, book chapters, commentaries, and letters to the editor were excluded. Using titles and abstracts for relevance, 136 articles were identified, and full-text versions of selected articles were retrieved. All articles were screened for inclusion by both authors. Screening and inclusion of articles is found as a PRISMA diagram in Fig. 1. Our goal was to include school-age children 8–12 years old. However, there are few studies that have only focused on this specific age range when examining perceived stress in children. Some have included younger children, while most include adolescents (13+) in their studies. To address this and include relevant literature that captures perceived stress in school-age children 8–12 years old using self-report measures, we included studies that involved children as long as 1) there was no child over the age of 14 or younger than 6, and 2) the mean age of children was younger than 12. Studies that did not include children 10 years or younger were excluded. Two articles that included older children were included since children aged 8–12, and 9–12 were analyzed by subgroup (Bevans et al., 2018; Ricker et al., 2018). Sixteen articles were included in the final review (see Table 1). Reference lists of the final 16 articles selected for inclusion were searched for additional

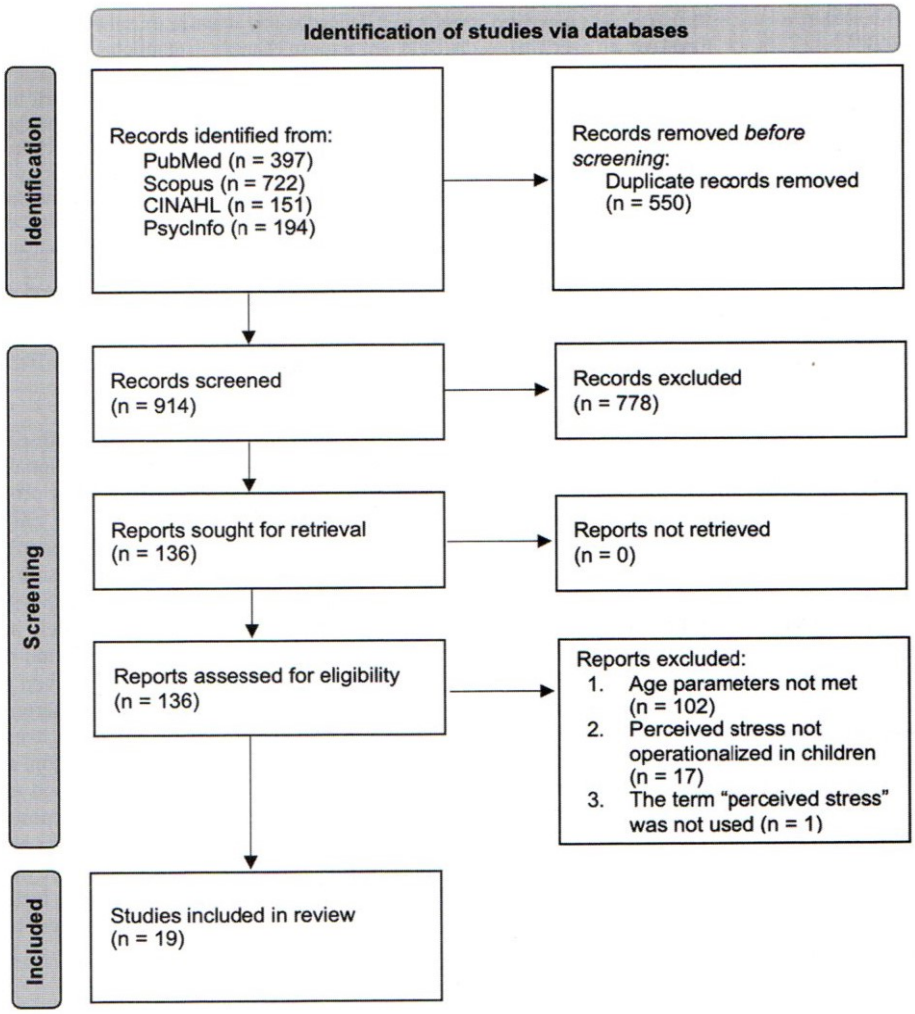

Fig. 1. PRISMA flow diagram of search strategy.

Table 1
Studies examining perceived stress in school-age children (2010–2020).

Authors (Date)	Purpose	Country of origin	Sample Size and Characteristics	Research Design	Empirical Indicator (Measures)	Findings	Limitations/Biases
Bakkum et al., 2019	This study investigated relationships among perceived stress, emotional valence (feeling happy vs. unhappy) and daily reported proteinuria.	UK & The Netherlands	$N = 16$ children ages 4–13 years with idiopathic steroid-sensitive nephrotic syndrome	Prospective, longitudinal study over the course of 1 year	Urine samples Online diaries Perceived stress was measured with a visual analogue scale in the form of a Distress Thermometer Emotional valence was measured with the pleasure dimension of the Self-Assessment Manikin (SAM)	PS was associated with proteinuria from 1 day prior to the stress up to 5 days after the stressful event	Small sample size, and small effect sizes; Varying adherence to diary completion
Bevans et al., 2018	Two studies were conducted to test reliability and validity of newly developed PROMIS Pediatric Stress measures.	USA	Study 1: $N = 1874$ children aged 8–17* years and 924 parents of children aged 5–17 years. Study 2: $N = 1014$ children aged 8–17* years and 1314 parents of children aged 5–17 years *Data was analyzed by subgroup (8–12 years old & 13–17 years old)	Prospective, cross-sectional studies with subgroups	PSS-10 PROMIS Pediatric Psychological and Physical Stress Measures Children's Somatization Inventory-24 (CSI-24) PROMIS Short Forms: Depression, Anxiety, Anger, Fatigue, & Pain Interference	Children 13–17 years old experienced more child- and parent-reported psychological stress than children aged 8–12 years old.	The addition of less severe stress indicators would strengthen the instruments since both instruments measure above average stress The PSS was not validated in children younger than 12. Longitudinal assessment is needed to measure change over time.
Davis et al., 2019	A pilot study to test feasibility of collecting salivary samples to measure cortisol change in children with type 1 diabetes and to determine effect sizes for relationships among maternal and child depressive symptoms, child perceived stress, and glycemic control	USA	$N = 30$ children ages 6–12 with type 1 diabetes and their mothers	Cross-sectional quantitative study using survey and physiological data	Perceived stress was measured by the Feel Bad Scale (FBS); completed by children Center for Epidemiologic Studies–Depression Scale for Children (CES-DC); Completed by children Center for Epidemiologic Studies Depression Scale–Revised (CESDR); completed by mothers Chronic physiological stress was measured by salivary cortisol	Perceived stress scores in children with diabetes were lower than anticipated, but similar to perceived stress scores in healthy children There was a potentially clinically meaningful relationship between child's perceived stress and glycemic control, as indicated by effect size, with children having better glycemic control when they reported higher levels of perceived stress	Small sample size and only mothers completed parental instruments
Felton et al., 2017	To examine relationships among distress tolerance, perceived stress, and internalizing symptoms in adolescents	USA	Cohort 1 included 244 children ages 10–14 years; Cohort 2 included 53 children ages 10–15 years.	Longitudinal study with adolescents surveyed annually for 5 years.	PSS- 10 item Revised Children's Anxiety and Depression Scale Positive and Negative Affect Schedule—Children (PANAS-C) Distress tolerance was assessed with the BIRD (based on the Paced Auditory Serial Addition Test—Children)	Distress intolerance predicted increases in perceived stress and influenced increases in internalizing symptoms	Limited statistical power to completely understand bidirectional relationships among variables.

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Table 1 (*continued*)

Authors (Date)	Purpose	Country of origin	Sample Size and Characteristics	Research Design	Empirical Indicator (Measures)	Findings	Limitations/Biases
Freda et al., 2016	Researchers examined stress and other psychological factors in children with hereditary angioedema	Italy	$N = 12$ children ages 6–14 with hereditary angioedema and their parents	Quali-quantitative experimental design based on a multimethod procedure	Perceived stress was measured using the Coddington Life Events Scale (CLES) Child Behavior Check-List (CBCL) Alexithymia Questionnaire for Children (AQC) Level of Emotional Awareness Scale for Children (LEAS-C)	Children with hereditary angioedema perceived themselves to be more stressed than healthy children Parents were perceptive of a relationship between stress and angioedema attacks in their child	Small sample size; Children were not involved in qualitative interviews; control groups were not used to compare stress between healthy children and children with hereditary angioedema
He & Yin, 2016	To examine mediating roles of child's stress and affective state on the relationship between home environment and child's executive function.	China	$N = 157$ children between the ages of 8–12 and their families	Cross-sectional design	Self-reported stress was measured with the PSS-14 completed by the child Positive and Negative Affectivity Schedule (PANAS) completed by the child Demographic and family environment questionnaires completed by parents Digit Span, Trail Making Test (TMT), Stroop Test, and Tower of Hanoi test completed by the child	Negative affect and self-reported stress mediated the role between family environment and cognitive flexibility. Children in poorer families performed worse on executive functioning tests.	Limited generalizability; other potential mediating variables such as language abilities were not assessed
Johnson et al., 2018	To estimate the magnitude of the relationships between child perceived stress, physiological stress, sleep wake disturbances, and cancer related fatigue during early survivorship in children with brain tumors.	USA	$N = 21$ children ages 8–12 years old diagnosed with a brain tumor	Exploratory, correlational, and cross-sectional study	Perceived stress was measured by the Feel Bad Scale (FBS) Physiologic stress was measured by cortisol PedsQL Multidimensional Fatigue Scale (MDFS) Children's Sleep Habits Questionnaire (CSHQ) Actigraphy was used to measure sleep-wake disturbance	Children reported perceived stress in early survivorship following brain tumor treatment. Examination of effect sizes revealed that child perceived stress showed potentially clinically meaningful relationships with cancer related fatigue, cognitive fatigue, wake after sleep onset, and total sleep time.	Small sample size; limited generalizability
Kelley & Lowe, 2018	To test the feasibility of a cultural-based talking circle intervention	USA	$N = 50$ Native American children ages 10–13 years at risk for obesity	Exploratory; pre-post intervention The intervention included 45-min talking circle sessions once a week for 7 weeks and education for youth on recognizing, acknowledging, monitoring, and evaluating personal obesity risks	Perceived stress was measured with the PSS 24-item Cherokee Self Reliance (CSR) Questionnaire Obesity Knowledge and Behavior (OKB)	Youth participating in the intervention experienced a significant decrease in perceived stress from baseline to post intervention, with males having a greater decrease compared to female participants. CSR Questionnaire scores increased pre to post intervention Females had better overall improvements in obesity knowledge and behavior in comparison to male participants	Limited generalizability, Long term effects and benefits not measured

Table 1 (*continued*)

Authors (Date)	Purpose	Country of origin	Sample Size and Characteristics	Research Design	Empirical Indicator (Measures)	Findings	Limitations/Biases
Kertes et al. (2017)	To test whether the presence of a child's pet dog buffered perceived stress and cortisol responses during a standardized laboratory stressor, in comparison to when they were alone or accompanied by their caregiver.	USA	N = 101 children ages 7–12 years, their caregiver, and their pet dog	Randomized; cross-sectional study using the Trier Social Stress Test for Children (TSST-C)	Perceived stress was measured using a modified version of the Self-Assessment Manikin (SAM) with a pictorial scale for self-reported emotion. Salivary cortisol Observation with video coding & scoring	Pet presence buffered increases in perceived stress compared to when the caregiver was present or the child was alone Cortisol response did not differ significantly between experimental conditions.	Perceived stress was only measured at the end of the TSST rather than during which may have led to recall bias; limited generalizability
Lynch et al., 2019	To examine the influence of stress and depressive symptoms on body mass index and central adiposity in children	USA	*N* = 147 children ages 10–12 years (84 females; 63 males)	Descriptive, cross-sectional study	Perceived stress was measured with the Feel Bad Scale (FBS) The Children's Depression Inventory (CDI) Salivary cortisol Height, weight, waist circumference Pubertal Rating Scale	Children reported relatively low levels of perceived stress. Child's stress levels were related to the child's depressive symptoms. BMI was not related to stress, but children with higher stress levels had higher BMI	Limited generalizability; inability to establish causality; only one sample of cortisol collected which does not capture diurnal variations in cortisol over the day
Mason et al. (2019)	To examine relationships among negative affect, positive affect, ability to cope with stress, and food intake in children and their mothers using an actor-partner interdependence model	USA	*N* = 202 mother-child dyads. Children were 8–12 years old.	Longitudinal, prospective study; participants completed surveys over 8 days with 3 waves of data collection in 6 months.	Ecological momentary assessment (EMA) surveys were used with random prompts Affect was measured with specifically selected/written items Ability to cope with stress was measured with 1 item from the PSS Food intake was measured by recall	Mother's reported ability to cope with stress predicted their & their child's food intake Child's reported ability to cope with stress predicted child food intake	Only a limited number of items were used to measure concepts of interest and the selected/limited items may not best represent the construct. Results had wide confidence intervals with unstable effect sizes; times when prompts were sent/received by participants may have moderated findings.
Rew et al., 2012	To examine sources of stress in preadolescent children	USA	*N* = 1568 preadolescents in grades 406. Mean age of children was 10.77 years (SD = 0.71)	Secondary analysis	Perceived stress was measured with the Feel Bad Scale Schoolagers' Coping Strategies Inventory	Older children reported less intense stressors, and boys reported more intense stressors compared to girls. Younger children, girls, and non-Hispanic children reported more efficacy with coping strategies.	Does not measure newer stressors that may be more applicable to children such as homelessness, violence, and illicit drug availability Use of convenience sample limits generalizability
Ricker et al., 2018	The study examined the relationship of cumulative early life perceived stress to memory and perceptual speed from middle childhood to early adulthood	USA	*N* = 690 children between 9 and 12* years old drawn from the Colorado Adoption/Twin Study of Lifespan behavioral development and cognitive aging (CATSLife) study *The study included children beginning at the age of 9 until they were 30 years old; however, middle	Longitudinal, prospective study with 7 data collection time points from the age of 9 to the age of 30.	Stress was measured with the Brooks-Gunn Life Events Scale for Adolescents (LSEA) Cognitive and memory function tests	The mean stress score between the ages of 9–12 years was 85.8 (sd = 39.94) Cumulative perceived stress between the ages of 9–12 was not a predictor of memory or speed tasks.	Perceived stress in participants was not measured after the age of 16. While cumulative stress was measured, the severity of stressful events was not captured.

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Table 1 (*continued*)

Authors (Date)	Purpose	Country of origin	Sample Size and Characteristics	Research Design	Empirical Indicator (Measures)	Findings	Limitations/Biases
			childhood stress was analyzed by subgroup with stress scores obtained between the ages of 9–12.				
Sarkissian et al., 2018	To assess the effects of a 10-week yoga program on perceived stress, affect and resilience in school-age children	USA	N = 30 children ages 9–14 who participated in a yoga intervention	Interventional design with pre and post measures	PSS-10 The Positive Affect and Negative Affect Schedule—Child Form (PANAS-C) Resilience Scale (RS)	There was a significant decrease with a medium effect size in perceived stress from pre to post yoga intervention Increases in resilience and positive affect were noted pre to post yoga intervention	Small sample size; limited generalizability; attrition and compliance with the intervention
Snoeren & Hoefnagels, 2014	To develop self-report questionnaires for perceived stress and perceived social support for children 8–11 years old	Netherlands	223 children ages 8–11 years	Cross-sectional, psychometric study	Perceived Stress Questionnaire 8–11; developed from the Maastricht University Stress Instrument for Children Perceived Social Support Questionnaire 8–11; developed from the Social Support Inventory-Interactions adolescent version	Cronbach's α showed good internal consistency for the Perceived Stress questionnaire (α = 0.85). Test-retest reliability was also good ($r = 0.78$).	Additional studies are needed to replicate findings Only tested in healthy, school children; needs to be validated in other populations
Wen et al., 2018	To determine if perceived stress moderated the relationships between affect states and physical/sedentary behaviors	USA	$N = 180$ children ages 8–12 years	7-day ecological momentary assessment (EMA) study	Waist-worn actigraph accelerometers Self-reported positive and negative affect scale Mother's perceived stress was measured with the PSS (10-item). Child's perceived stress was measured with the Stress in Children Scale (21-item)	Baseline scores for mothers' and child's perceived stress were low, but marginally correlated. Children's psychological well being was impacted by physical activity and sedentary behavior. Only mother's perceived stress moderated the relationship between physical activity and positive affect.	Waist-worn accelerometers only detect activities that involve limbic movements and may not be an accurate portrayal of physical/sedentary behaviors. Data prompts were sent later in the day/after school which limits generalizability.

significant contributions to content analysis including the first uses of the term stress.

Results

Common definition

The term "perceived stress" does not occur in the dictionary. Rather, "stress" and "perceive" are defined separately. Stress is classified as both a noun and verb and defined in the Oxford English dictionary as "pressure or tension exerted on a material object", "give particular emphasis or importance to (a point, statement, or idea) made in speech or writing", "a state of mental or emotional strain or tension resulting from adverse or very demanding circumstances", and "subject to pressure or tension". The latter two definitions are more closely related to the use of the term "stress" in behavioral and psychological research. Similarly, perceive[d] is defined as 'become aware or conscious of (something); come to realize or understand" and "interpret or look on (someone or something) in a particular way; regard as". The combination of perceived and stress may then be interpreted as awareness of mental or emotional strain, which is the way the term is commonly used in psychological research literature.

Historical definition

The term "perceived stress" is relatively new in literature, having first been used in 1983 when Cohen and colleagues developed the Perceived Stress Scale. However, it is derived from an early stress theory which defines stress as a physiological concept, the *general adaptation syndrome* (Selye, 1936; Selye, 1956). Selye described stress as a physiological change in an individual's response and adaptation system with a subsequent impact on health (Selye, 1950). This theory was one of the first ways to describe how stress is perceived or the perception of stress. The general adaptation syndrome later became known simply as stress,

an interaction between damage and defense (Selye, 1970). This has sparked theoretical definitions of stress in literature. However, literature on "perceived stress" is primarily derived from research in adults.

Theoretical definitions

There are many theories on stress, but there are few theories focused on stress in children. However, some of these theories may transcend and apply to childhood (Kang et al., 2010; Lazarus & Folkman, 1984; Masarik & Conger, 2017; McEwen, 2007; Neuman, 2002; Selye, 1956). For example, following the work of Selye, Lazarus and Folkman (1984) developed the Theory of Cognitive Appraisal which accounts for individual and environmental influences regarding how a person responds to stress, and includes three concepts: stress, cognitive appraisal of a stressor, and the coping process. In this theory, stress is defined as demands greater than what an individual is capable of managing, and cognitive appraisal is defined as the assessment a person makes regarding the degree of stress and their resources available to handle the stress (Lazarus & Folkman, 1984). These definitions of stress and cognitive appraisal accentuate the fact that the perception of stress influences the degree to which adaptation and coping with stress is achieved.

In adults, the appraisal of stress has been described as perceiving stress. Cohen et al. (1983) defined perceived stress as "the degree to which situations in one's life are appraised as stressful" (p. 385). Additionally, perceived stress was described as what the person perceives it to be and includes physical, psychological, actual, and anticipated aspects of stress (Cohen et al., 1983). Perceived psychological stress has been expressed as life events such as personal conflicts, anxiety, fear, or grief presenting excessive demands resulting in the person losing the ability to cope (Cohen et al., 2016; Lazarus & Folkman, 1984). While these triggers to perceived stress have been extensively studied in adults, some of these events may also be perceived as stressful for the child and may extend into adulthood. For example, in children physical and environmental stressors impacting the perception of stress, including trauma, toxic environments, and illness, may alter brain chemistry with effects extending into adulthood (Shonkoff & Garner, 2012).

McEwen (2007) further included the awareness that the degree of stress is perceived differently by individuals when appraising stress. For example, stress may be perceived differently by children. Lewis et al. (1984) offered a theory of perceived stress specific to children. They described perceived stress as something that makes one "feel bad" (Lewis et al., 1984). Other factors contributing to perceived stress are daily life events and other discrete events that may make a child feel bad (Lewis et al., 1984).

Perceiving stress is fundamentally different from experiencing actual stress. Perceiving stress falls along a continuum of "occurring" and may or may not have an identifiable source (Cohen et al., 1983). Due to the personal nature of perception, it is inappropriate to assume that persons outside the individual can quantify another's perception of stress (Cohen et al., 1983). For this reason, a child's perceived stress is better measured by self-report and not based on the subjectivity of the parent or clinician (Allwood et al., 2017; Lewis et al., 1984; Ryan-Wenger et al., 2012; Snoeren & Hoefnagels, 2014). Perceived stressors differ for children and adults (Ryan-Wenger et al., 2012). Adults are prone to underestimate the importance of stressful events in children (Allwood et al., 2017; Rodriguez et al., 2012). In particular, stressful events related to peers are much more significant to children than to adults (Lewis et al., 1984; Rew et al., 2012; Ryan-Wenger et al., 2012). These differences in perception of stressful events (interaction with peers, loss of a friend, etc.) are believed to be closely related to developmental age (Bevans et al., 2018; Muldoon, 2003; Rew et al., 2012; Ryan-Wenger et al., 2012).

Developmentally related definition

In the last 10 years, there have been limited studies that examine the concept of perceived stress in school-age children through self-report as demonstrated in Table 1. This may be due to difficulties reliably measuring the concept in children while being mindful of their developmental stage and understanding (Bevans et al., 2018). Traditionally, instruments measuring perceived stress in children are derived from adult instruments or adult perception of what constitutes stress in a child (Ryan-Wenger et al., 2005). Although adults and children may share some perceived stressors, many stressors in children are different from adults, and these child-specific stressors can vary with developmental age (Coddington, 1972; Lewis et al., 1984; Ryan-Wenger et al., 2012).

Children can experience stress and show signs of distress at any age (CDC, 2020), and can self-report their stress as early as eight years old (Lewis et al., 1984; Ryan-Wenger et al., 2012; Snoeren & Hoefnagels, 2014). School-age children are at a developmental stage where they are still highly dependent upon parental support but have increased autonomy and are beginning the transition to self-care (Davies & Troy, 2020). Therefore, these children may be affected by both parent and peer stressors (Davies & Troy, 2020). Characteristics of children in this age group include: the development of more logical thinking, self-concept, and understanding other points of view; independence/industry; the ability to focus attention for longer periods of time; beginning to enjoy problem-solving; and the capability of analytical thinking (Davies & Troy, 2020). These characteristics enable this age group to have the developmental and cognitive ability to complete self-report measures, which is important as parent-child reports have the potential to have a low concordance in stress measurement (Allwood et al., 2017; Rodriguez et al., 2012). Although there are known developmental differences in the experience of stress and stressors specific to childhood (Rew et al., 2012; Snoeren & Hoefnagels, 2014), the concept of child's perceived stress is not well defined.

Defining attributes

Defining attributes are how the child recognizes, interprets, and copes with specific stressors (see Table 2). Despite the lack of a clear definition for child's perceived stress, defining attributes for this concept may be found in literature. The way stressors are appraised and exhibited by children may be altered by perceived stress (Allwood et al., 2017). If a child has more perceived stress, then he/she may be more sensitive and/or have a greater response to the stressor. While researchers working with children commonly use attributes indicated by Lazarus' and Cohen's works (Bevans et al., 2018; Felton et al., 2017; Kelley & Lowe, 2018), researchers also use defining attributes of stressful life events or daily hassles to help define what may be a child's source or attributes of stress (Bakkum et al., 2019; Johnson et al., 2018; Lynch et al., 2019; Ricker et al., 2018).

Attributes of child's perceived stress found throughout the literature include feeling bad or sick, feeling pressured or unable to overcome obstacles, inability to deal with environmental stressors or major life events, issues with concentration, fatigue, anxiety, lack of time, and/or pressure or demands from school or relationships (Davis et al., 2019; Freda et al., 2016; Johnson et al., 2018; Lynch et al., 2019; Rew et al., 2012; Ricker et al., 2018; Snoeren & Hoefnagels, 2014). Often, these attributes are associated with stressors experienced by the child. These stressors are experiences, actual or imagined, in which the individual is lacking in control and mastery. Often, these stressors are prolonged, recurrent, irritating, physically and emotionally draining, and/or dangerous (McEwen, 2007). Whether these occurrences are real or imagined, if they are perceived as stressful by the child in ways that overwhelm the system or inhibit the child's ability to cope, then they have the potential to contribute to a child's perceived stress. Child's perceived stress is thus defined as any actual or imagined threat, personal and specific to childhood, which overwhelms the child and leads to changes in emotional, psychological, developmental, and/or physiological domains.

Table 2
Antecedents, attributes, and consequences in child's perceived stress.

Defining Attributes	Antecedents	Consequences
• How the child recognizes, interprets, and copes with specific stressors • Stress that is perceived in ways that overwhelm the system or inhibit a child's ability to cope • Actual or imaginary experiences resulting in lacking control and mastery • Examples of defining attributes include: feeling bad, unable to overcome obstacles, inability to deal with environmental stressors or major life events, issues with concentration, fatigue, anxiety, lack of time, and/or pressure or demands from school or relationships	• Stressors specific to children: school activities and academic achievement; threats to safety and wellbeing; and threats to physical, physiological, psychological, mental, and social wellbeing • Daily hassles: being bullied; missing the bus; caring for siblings; being late for school; self-consciousness; concern about grades, parents, financial situations at home; feeling left out, and being overscheduled • Psychosocial stressors: chronic illness, pain, mental health, child maltreatment, life events, and response to political unrest and natural disasters	• Physical, emotional, and/or behavioral health outcomes (acute and/or chronic) • Depression, anxiety, pain, aggression, alterations in sleep or eating patterns, decreased reports of wellness, feelings of apathy, helplessness, or powerlessness, and fatigue • Biological responses: cortisol release, inflammation, increased BMI, poor metabolic control, sleep disturbances

Cases

Model case

In the last year, Johnathon's parents were divorced. Johnathon and his mom moved to a new city, and he began his 5th-grade year. He was looking forward to joining the lacrosse team to meet friends, but his new school doesn't have a lacrosse team. Since beginning school, Johnathon's grades have dropped, and his mom has been worried about the time he's spent alone. The teacher has been calling home lately to report that Johnathon's having trouble fitting in with peers, his grades have been low, and he's been acting out in class. Johnathon's mom has been encouraging Johnathon to make new friends and try new activities such as signing up for a soccer club. Johnathon recently talked to his friend, Max, from his old school. He told Max that he felt like everyone was pressuring him and putting a lot of stress on him. He said he wished everyone would ease up and leave him alone.

Contrary case

Samantha is enjoying her last year of grade school. She is on the volleyball team, making A's and B's in her classes, and looking forward to high school next year. When Samantha is not at school, she is frequently with friends. Last night at dinner, Samantha told her mom she liked being busy and was happy with all the things she was involved in. She is looking forward to Christmas break so that she can work at her grandparent's store to earn spending money for her vacation

Related case

Charlie had a busy month. He had been studying and took his placement test for high school, practiced soccer three times a week, and volunteered in the food pantry every Saturday at his church. Tonight was the Fall Dance, but Charlie wasn't looking forward to attending the dance. While he always had fun dancing and staying up late hanging out with friends, he felt exhausted from all the activities he participated in this last month. Charlie sat in his room looking out the window thinking about how tired he was. Rather than go to the dance, Charlie decided to climb in bed and rest.

Borderline case

On the school field trip to the pool, the other students tease Kelly for not jumping from the high dive. Kelly is terribly afraid of heights and does not want to jump. She feels pressured by her peers and wishes they would stop. Kelly gets mad and goes to the snack bar to get away from the teasing and soon forgets about feeling the peer pressure.

Illegitimate case

Justin was trying to decide what type of soda to buy at the vending machine at school. His friend Zach was teasing him by telling him he was taking too long to make a choice. Justin told Zach that he was stressing him out. The two boys laughed, Justin made his selection, and they headed to their next class.

Antecedents

Attributes and events that must arise prior to a concept's occurrence are defined as antecedents (Walker & Avant, 2011). When examining child's perceived stress, there are times attributes and antecedents can overlap (see Table 2). The most notable antecedents are "stressors" specific to childhood. Children perceive stress associated with a variety of things: school activities and academic achievement; threats to safety and wellbeing; and threats to physical, physiological, psychological, mental, and social wellbeing (Ryan-Wenger et al., 2012). Daily hassles, or stressors occurring on a more frequent basis, are familiar occurrences that may be unpleasant such as being bullied at school, missing the bus, caring for siblings, being late for school, self-consciousness about looks or weight, concern about grades, worry about parents or financial situations at home, feeling left out or not fitting in, and being overscheduled with many extracurricular activities (Rew et al., 2012; Ricker et al., 2018; Snoeren & Hoefnagels, 2014; Terzian et al., 2010). School-age children may also experience stress in many psychosocial areas in the context of chronic illness, pain, mental health, child maltreatment, life events, and in response to political unrest and natural disasters (Muldoon, 2003; Rew et al., 2012; Ryan-Wenger et al., 2012; Sarkissian et al., 2018; Snoeren & Hoefnagels, 2014)

Stressors specific to school-age children include: self-image; fights with siblings, parents, and/or peers; bullying; sports; school-work; health; trauma; dating; peer relationships; feeling left out; work; money and/or possessions; daily hassles; and feelings of guilt in situations the child cannot control (Johnson et al., 2018; Lewis et al., 1984; Lynch et al., 2019; Rew et al., 2012; Snoeren & Hoefnagels, 2014). Stressors may also include anxiety related to illness, scholastic achievement pressure, feelings of being a burden, death of loved ones (family, friends, pets), moving, and having to change schools (Lewis et al., 1984; Ricker et al., 2018; Rodriguez et al., 2012; Snoeren & Hoefnagels, 2014). Stressors from social and political changes, such as community and personal violence, homelessness, availability of illicit drugs, threat of war, and pandemics, may also affect children (Liu & Doan, 2020; Muldoon, 2003; Ryan-Wenger et al., 2005).

Consequences

Walker and Avant (2011) define consequence as events that result from the occurrence of a concept (see Table 2). Oftentimes, these consequences stimulate new directions for research pertaining to the concept of interest (Walker & Avant, 2011). Consequences of perceived stress in school-age children may be physical, emotional, and/or behavioral (Garner, 2013; Kertes et al., 2017; Terzian et al., 2010), and include depression, anxiety, pain, aggression, alterations in sleep or eating patterns, decreased reports of wellness, feelings of apathy, helplessness, or powerlessness, and fatigue (Bakkum et al., 2019; Davis et al., 2019; Felton et al., 2017; Freda et al., 2016; He & Yin, 2016; Johnson et al., 2018; Lynch et al., 2019; Ricker et al., 2018). As with the overlap

between attributes and attencedents, so too can there be overlap between attributes and consequences. For example, consequences such as helplessness, feeling bad, and anxiety may act as further stressors (Lewis et al., 1984; Rew et al., 2012; Ryan-Wenger et al., 2012; Snoeren & Hoefnagels, 2014) and thus increase a child's sense of perceived stress

Perceived stress in children may also be linked to biological responses such as cortisol release, inflammation, increased body mass index, poor metabolic control, and sleep disturbances (Davis et al., 2019; Johnson et al., 2018; Lynch et al., 2019; Pervanidou & Chrousos, 2012). However, consequences of perceived stress may be mitigated when perceived stress is decreased through targeted interventions. For example, Kelley and Lowe (2018) demonstrated decreases in reports of perceived stress from children 10–13 years old when using a talking circle intervention. Similarly, a yoga intervention decreased child-reported perceived stress and increased child-reported resilience in children 9–14 years old (Sarkissian et al., 2018).

Empirical referents

Empirical referents measure defining attributes that demonstrate the occurrence of a concept (Walker & Avant, 2011). Because "child's perceived stress" is perceived, subjective, self-report tools should be used to measure the concept. However, there are few, well-validated instruments to measure a child's perceived stress using child self-report (see Table 3). Many tools rely on parent or clinician report for children ages 8–12 years (Saxe & Bosquet, 2004; Williamson et al., 2003), or they measure concepts related to perceived stress, such as physical responses to stress (Evans et al., 2013; Walker et al., 2009) and stressful life events (Coddington, 1972; Williamson et al., 2003). Other researchers use self-report measures in children such as PROMIS Perceived Stress Scale (Bevans et al., 2018) and the Perceived Stress Scale (Cohen et al., 1983) which have been validated in children older than 12 but are not validated in younger children. Although instruments to measure perceived stress in adolescents are more widely available, adolescents may experience different perceptions of stress compared to school-age children (Bevans et al., 2018).

Discussion

Most studies included in this concept analysis identified similar attributes for child's perceived stress, mainly daily hassles or stressors that children face. This concept analysis revealed a wide variety of factors that may be considered stressors in school-aged children, from daily struggles to geopolitical uncertainty, and include real or imagined stressors that are specific to children. Other sources of stress in school-aged children may include poverty and socioeconomic status, systemic racism, social media, and ongoing abuse and neglect (Danese & Lewis, 2017; Douglas et al., 2021; Hornor, 2017). Although not examined in school-aged children, fear of gun violence, political climate, issues in the news, immigration, and drugs and alcohol were also reported as additional sources of stress by children 15–17 years old (*American Psychological Association*, 2018). Likely, these are stressors for children 8–12 years old. Children are exposed to these societal stressors (American Academy of Child and Adolescent Psychiatry, 2020), and drug and alcohol use may begin in children as young as 9 (Substance Abuse and Mental Health Services Administration, 2021).

Because of the specificity and personal experience of perceived stress, the child is the best reporter of child's perceived stress. However, as noted, there are limited, well-validated, self-report tools to measure perceived stress in school-aged children. Despite this, there are manifestations of general stress that may be observed in school-aged children experiencing abnormal levels of stressful experiences. These include poor academic performance, trouble concentrating, somatic complaints (such as stomach pain or headaches), changes in eating habits, changes in weight, sleep disturbances, bruxism, stuttering, and alterations in play (De Luca Canto et al., 2015; Dufton et al., 2010; Pascoe et al., 2020; Zengin-Bolatkale et al., 2018). It must be noted that these manifestations of stress may be altered or not exhibited because of the child's temperament and/or resiliency (Hornor, 2017; Skinner, 2016), and therefore may not be the most reliable and valid measure of stress.

Biomarkers may also be an alternative measure of stress, or used to confirm physiological stress that often accompanies perceived stress (Davis et al., 2019; Johnson et al., 2018; Lynch et al., 2019). Cortisol, a stress hormone, is a common biomarker used to examine stress (Miller et al., 2017). Cortisol is a good biomarker to measure stress in children because it may be collected non-invasively through hair, saliva, and fingernail clippings and, thus, less likely to induce stress (Bates et al., 2017; Liu & Doan, 2019; Miller et al., 2017). Other physiological measures, such as heart rate, heart rate variability, and blood pressure may also be used to confirm a physiological stress response in children (Figueroa-Fankhanel, 2014; Pascoe et al., 2020).

Clinically, it is of utmost importance to recognize and treat stress in children since stress has been associated with numerous negative health outcomes (Charmandari et al., 2012; Gilgoff et al., 2020; Terzian et al., 2010). For example, psychological stress may lead to alterations in the immune response (Carlsson et al., 2014; Danese & Lewis, 2017; Fagundes & Way, 2014) as well as epigenetic changes (Hornor, 2017). In addition to physiologic changes in health, ongoing and excessive stress in children is also associated with early initiation and dependency on drugs and alcohol, unemployment, homelessness, violent crime, and difficulty maintaining social support networks in adulthood (Shonkoff & Garner, 2012). Recognition and treatment of stress in childhood may help mitigate negative effects on health outcomes.

Table 3
Self-report measures of perceived stress in children.

Instrument/Authors	Age Group	Concepts Measured	Number of Items	Reliability (α)
Feel Bad Scale (Lewis et al., 1984).	8–12 years	frequency and severity of perceived stress	40-item Child self-report	0.82 to 0.85
Hassles Scale for Children (Kanner et al., 1985; Parfenoff & Jose, 1989)	School age children (2nd - 6th grade)	frequency and intensity of daily stressors placing emphasis on the meaning behind a stressful event rather than the occurrence	43-item	0.88
Stress Events Perceptions Scale (SEPS) (Muldoon, 2003)	8–11 years	perceptions of stress related to family, peers, school, and regional conflict three stress scales (trauma, every day, and misdemeanor-representing misbehaviors)	24-item Child self-report	0.63–0.73 for the three stress scales (trauma, every day, and misdemeanor-representing misbehaviors)
Perceived Stress Questionnaire 8–11 (Snoeren & Hoefnagels, 2014)	8–11 years	perceived stress including psychological and physiological subscales	20-item self-report questionnaire	Requires validation in other populations of interest

When examining outcomes related to child's perceived stress, it is important to consider the timing, severity, and frequency of the stressor (Charmandari et al., 2012; McEwen, 2007; McEwen & Gianaros, 2010; Terzian et al., 2010). Some children, especially those experiencing a lack of social support and economic resources, social isolation, and prior history of psychological or behavioral disorders, may be more vulnerable to stress, and experience worse outcomes related to stress (Ortiz & Sibinga, 2017). Protective factors such as strong social support, two-parent households, and positive experiences in school have been shown to influence whether a child perceives a threat to be stressful (Davies & Troy, 2020; Werner, 2011). In school-age children, protective factors include effective communication, reading for pleasure, and problem-solving skills, along with sports or a hobby that provides children with self-worth, pride, positive self-concept, and autonomy (Werner, 2011). Preliminary findings indicate that some interventions, such as yoga and talking circles, may be helpful to decrease perceived stress in school-aged children (Kelley & Lowe, 2018; Sarkissian et al., 2018).

Limitations

Two limitations exist for this concept analysis. First, the selected articles were in English giving rise to the possibility that research published in additional languages could add to the body of evidence. Secondly, the data bases and years were limited in the search, and a librarian was not involved in identifying and retrieving relevant articles. These limitations may impact the number of articles identified which could have met inclusion criteria. The databases were determined for their relevance to the healthcare profession. The year limitation was specified to include stressors impacting children in the last decade. Lastly, there may be overlap when differentiating stressors among school age children and adolescents since perceived stress has not been widely studied specifically in school age children.

Implications for research

A clear understanding of the concept "child's perceived stress" is beneficial as researchers and clinicians develop tools to measure perceived stress in children. It is of utmost importance that researchers and clinicians use well-validated child self-report measures to assess perceived stress since numerous studies demonstrate ambiguity in reports of stress between parents and children (Allwood et al., 2017; Rodriguez et al., 2012). This is concerning, however, since there are few, validated tools that measure the concept of child's perceived stress using self-report, especially in children younger than 12 years old. Additionally, standardized tools may not capture all sources of stress that may be perceived by a child or during childhood. The development of new tools and/or the incorporation of mixed methods research techniques may advance the way clinicians and researchers understand and measure the concept of child's perceived stress.

Implications for practice

Nurses and other healthcare providers can be trained to recognize, assess, and intervene when a child exhibits high levels of perceived stress. Understanding perceived stress in children will allow healthcare providers to teach children to recognize stress, equip them with ways to manage or decrease stress (Fagundes & Way, 2014; Garner, 2013; Terzian et al., 2010), and mitigate negative health outcomes associated with stress (Ortiz & Sibinga, 2017). The APA (2019), the National Institute of Mental Health (2022), and the American Academy of Pediatrics (Garner & Yogman, 2021) offer a multitude of resources designed to assist healthcare providers in the treatment of stress across different age groups. Healthcare providers should ask about and observe for physical outcomes of stress as discussed in this concept analysis.

Families and children face competing demands on their time and energy compounding stress; therefore, healthcare workers can further intervene by providing these at-risk children with additional support through mentorship or therapy from counselors, social workers, psychologists, or psychiatrists (Moazzezi et al., 2015), positive play opportunities (Nijhof et al., 2018) and helping children recognize and develop positive peer relationships (Garner, 2013; Van Ryzin & Roseth, 2018). Resources to manage or decrease perceived stress and outcomes of perceived stress can include providing sleep education, nutrition guidance (Hill et al., 2018), academic guidance and school performance strategies (Pascoe, Hetrick, & Parker, 2020), exercise recommendations or programs (Wen et al., 2018), healthy expression of stress through art, music, or writing, and by providing mindfulness techniques and training (Ortiz & Sibinga, 2017). A care plan based on interdisciplinary collaborative care, including the child and family, ensures the child's perceived stress is addressed from all aspects of care.

Conclusion

Child's perceived stress impacts physical, mental, emotional, and developmental health. Perceived stress, although a commonly defined concept in adult health research, does not have the same clarity in school-age children. This concept analysis provides a basis to begin to define and clarify "child's perceived stress" as an independent concept. Additionally, the analysis provides direction for how the concept of child's perceived stress may be measured in school-age children by researchers using self-report tools. It is vital that healthcare providers screen and identify children at risk of stress related poor health outcomes. There are numerous resources available to assist nurses and other healthcare providers when managing child's perceived stress. Early identification and management of perceived stress in childhood may prevent or mitigate adverse health outcomes that can last into adulthood.

Author statement

Both authors (Sara Davis & Heather Soistmann) equally contributed to the conceptualization, methodology, analysis, writing, and revision of the submitted manuscript.

Funding

Dr. Davis' efforts to this work were supported by the National Center for Advancing Translational Sciences of the National Institutes of Health under award number KL2TR003097. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

Declaration of Competing Interest

The authors have no conflicts of interest to disclose.

Acknowledgments

The authors would like to acknowledge Marti Rice, PhD, RN, FAAN for her guidance and editorial contributions.

References

Allwood, M. A., Gaffey, A. E., Vergara-Lopez, C., & Stroud, L. R. (2017). Stress through the mind of the beholder: Preliminary differences in child and maternal perceptions of child stress in relation to child cortisol and cardiovascular activity. *Stress (Amsterdam, Netherlands)*, *20*(4), 341–349. https://doi.org/10.1080/10253890.2017.1336617.

American Academy of Child and Adolescent Psychiatry (2020). News and children. https://www.aacap.org/AACAP/Families_and_Youth/Facts_for_Families/FFF-Guide/Children-And-The-News-067.aspx.

Stress in America: Generation Z(2018 October). American Psychological Association. https://www.apa.org/news/press/releases/stress/2018/stress-gen-z.pdf.
American Psychological Association (2019, October 24). *How to help children manage their stress.* https://www.apa.org/topics/child-development/stress.
Bakkum, L., Willemen, A. M., Zoetebier, L., & Bouts, A. H. (2019). A longitudinal study on the effects of psychological stress on proteinuria in childhood steroid-sensitive nephrotic syndrome. *Journal of Psychosomatic Research, 121*, 8–13. https://doi.org/10.1016/j.jpsychores.2019.01.011.
Bates, R., Salsberry, P., & Ford, J. (2017). Measuring stress in young children using hair cortisol: The state of the science. *Biological Research for Nursing, 19*(5), 499–510. https://doi.org/10.1177/1099800417711583.
Bevans, K. B., Gardner, W., Pajer, K. A., Becker, B., Carle, A., Tucker, C. A., & Forrest, C. B. (2018). Psychometric evaluation of the PROMIS® pediatric psychological and physical stress experiences measures. *Journal of Pediatric Psychology, 43*(6), 678–692. https://doi.org/10.1093/jpepsy/jsy010.
Campbell, J. A., Walker, R. J., & Egede, L. E. (2016). Associations between adverse childhood experiences, high-risk behaviors, and morbidity in adulthood. *American Journal of Preventive Medicine, 50*(3), 344–352. https://doi.org/10.1016/j.amepre.2015.07.022.
Carlsson, E., Frostell, A., Ludvigsson, J., & Faresjö, M. (2014). Psychological stress in children may alter the immune response. *The Journal of Immunology, 192*(5), 2071–2081.
Centers Disease Control and Prevention (2020). Helping children cope. https://www.cdc.gov/childrenindisasters/helping-children-cope.html.
Chang, X., Jiang, X., Mkandarwire, T., & Shen, M. (2019). Associations between adverse childhood experiences and health outcomes in adults aged 18-59 years. *PLoS One, 14*(2) Article: e0211850 https://doi.org/10.1371/journal.pone.0211850.
Charmandari, E., Achermann, J. C., Carel, J. C., Soder, O., & Chrousos, G. P. (2012). Stress response and child health. *Science Signaling, 5*(248), mr1. https://doi.org/10.1126/scisignal.2003595.
Coddington, R. D. (1972). The significance of life events as etiologic factors in the diseases of children-II a study of a normal population. *Journal of Psychosomatic Research, 16*(3), 205–213.
Cohen, S., Kamarck, T., & Mermelstein, R. (1983). A global measure of perceived stress. *Journal of Health and Social Behavior, 24*(4), 385–396. http://www.jstor.org/stable/2136404.
Cohen, S., Gianaros, P. J., & Manuck, S. B. (2016). A stage model of stress and disease. *Perspectives on Psychological Science: A Journal of the Association for Psychological Science, 11*(4), 456–463. https://doi.org/10.1177/1745691616646305.
Danese, A., & Lewis, S. J. (2017). Psychoneuroimmunology of early-life stress: the hidden wounds of childhood trauma? *Neuropsychopharmacology, 42*(1), 99–114.
Davies, D., & Troy, M. F. (2020). *Child development: A practitioner's guide* (4th ed.). Guilford Publications, Inc.
Davis, S. L., Kaulfers, A. M., Lochman, J. E., Morrison, S. A., Pryor, E. R., & Rice, M. (2019). Depressive symptoms, perceived stress, and cortisol in school-age children with Type 1 diabetes: A pilot study. *Biological Research for Nursing, 21*(2), 166–172. https://doi.org/10.1177/1099800418813713.
De Luca Canto, G., Singh, V., Conti, P., Dick, B. D., Gozal, D., Major, P. W., & Flores-Mir, C. (2015). Association between sleep bruxism and psychosocial factors in children and adolescents: a systematic review. *Clinical Pediatrics, 54*(5), 469–478. https://doi.org/10.1177/0009922814555976.
Douglas, R. D., Alvis, L. M., Rooney, E. E., Busby, D. R., & Kaplow, J. B. (2021). Racial, ethnic, and neighborhood income disparities in childhood posttraumatic stress and grief: Exploring indirect effects through trauma exposure and bereavement. *Journal of Traumatic Stress, 34*(5), 929–942. https://doi.org/10.1002/jts.22732.
Dufton, L. M., Dunn, M. J., Slosky, L. S., & Compas, B. E. (2010). Self-reported and laboratory-based responses to stress in children with recurrent pain and anxiety. *Journal of Pediatric Psychology, 36*(1), 95–105. https://doi.org/10.1093/jpepsy/jsq070.
Evans, B. E., Greaves-Lord, K., Euser, A. S., Tulen, J. H., Franken, I. H., & Huizink, A. C. (2013). Determinants of physiological and perceived physiological stress reactivity in children and adolescents. *PLoS One, 8*(4) Article: e61724https://doi.org/10.1371/journal.pone.0061724.
Fagundes, C. P., & Way, B. (2014). Early-life stress and adult inflammation. *Current Directions in Psychological Science, 23*(4), 277–283. https://doi.org/10.1177/0963721414535603.
Felton, J. W., Banducci, A. N., Shadur, J. M., Stadnik, R., MacPherson, L., & Lejuez, C. W. (2017). The developmental trajectory of perceived stress mediates the relations between distress tolerance and internalizing symptoms among youth. *Development and Psychopathology, 29*(4), 1391–1401. https://doi.org/10.1017/S0954579417000335.
Figueroa-Fankhanel, F. (2014). Measurement of stress. *Psychiatric Clinics, 37*(4), 455–487. https://doi.org/10.1016/j.psc.2014.08.001.
Freda, M. F., Savarese, L., Bova, M., Galante, A., De Falco, R., De Luca Picione, R., ... Triggiani, M. (2016). Stress and psychological factors in the variable clinical phenotype of hereditary angioedema in children: A pilot study. *Pediatric Allergy, Immunology and Pulmonology, 29*(1), 6–12. https://doi.org/10.1089/ped.2015.0557.
Garner, A. S. (2013). Home visiting and the biology of toxic stress: Opportunities to address early childhood adversity. *Pediatrics, 132*(Supplement 2), S65–S73. https://doi.org/10.1542/peds.2013-1021D.
Garner, A., Yogman, M., & Committee on Psychosocial Aspects of Child and Family Health, Section on Developmental and Behavioral Pediatrics, Council on Early Childhood (2021). Preventing childhood toxic stress: Partnering with families and communities to promote relational health. *Pediatrics, 148*(2) Article: e2021052582https://doi.org/10.1542/peds.2021-052582.
Gilgoff, R., Singh, L., Koita, K., Gentile, B., & Marques, S. S. (2020). Adverse childhood experiences, outcomes, and interventions. *Pediatric Clinics of North America, 67*(2), 259–273. https://doi.org/10.1016/j.pcl.2019.12.001.
Gillespie, R. J. (2019). Screening for adverse childhood experiences in pediatric primary care: pitfalls and possibilities. *Pediatric Annals, 48*(7), e257–e261. https://doi.org/10.3928/19382359-20190610-02.
He, Z. H., & Yin, W. G. (2016). Family environments and children's executive function: the mediating role of children's affective state and stress. *The Journal of Genetic Psychology, 177*(5), 143–155. https://doi.org/10.1080/00221325.2016.1218322.
Hill, D. C., Moss, R. H., Sykes-Muskett, B., Conner, M., & O'Connor, D. B. (2018). Stress and eating behaviors in children and adolescents: Systematic review and meta-analysis. *Appetite, 123*, 14–22. https://doi.org/10.1016/j.appet.2017.11.109.
Hornor, G. (2017). Resilience. *Journal of Pediatric Health Care, 31*(3), 384–390. https://doi.org/10.1016/j.pedhc.2016.09.005.
Johnson, A., Rice, M., Turner-Henson, A., Haase, J. E., & Azuero, A. (2018). Perceived stress and the fatigue symptom cluster in childhood brain tumor survivors. *Oncology Nursing Forum, 45*(6), 775–785. https://doi.org/10.1188/18.ONF.775-785.
Kang, D., Rice, M., Park, N., Turner-Henson, A., & Downs, C. (2010). Stress and inflammation: A biobehavioral approach for nursing research. *Western Journal of Nursing Research, 32*(6), 730–760. https://doi.org/10.1177/0193945909356556.
Kanner, A. D., Harrison, A., & Wertlieb, D. (1985). The development of the children's hassles and uplifts scales: A preliminary report. *Paper presented at the Annual Meeting of the American Psychological Association, Los Angeles, CA.*
Kelley, M. N., & Lowe, J. R. (2018). Strong cultural identity affects stress levels among Native American youth at risk for obesity. *Journal of Cultural Diversity, 25*(4), 127–131.
Kertes, D. A., Liu, J., Hall, N. J., Hadad, N. A., Wynne, C. D., & Bhatt, S. S. (2017). Effect of pet dogs on children's perceived stress and cortisol stress response. *Social Development, 26*(2), 382–401. https://doi.org/10.1111/sode.12203.
Lazarus, R., & Folkman, S. (1984). *Stress, appraisal, and coping.* Springer Publishing Company, Inc.
Lewis, C. E., Siegel, J. M., & Lewis, M. A. (1984). Feeling bad: Exploring sources of distress among pre-adolescent children. *American Journal of Public Health, 74*, 117–122. https://doi.org/10.2105/AJPH.74.2.117.
Liu, C. H., & Doan, S. N. (2019). Innovations in biological assessments of chronic stress through hair and nail cortisol: Conceptual, developmental, and methodological issues. *Developmental Pyschobiology, 61*(3), 465–476. https://doi.org/10.1002/dev.21830.
Liu, C. H., & Doan, S. N. (2020). Psychosocial stress contagion in children and families duringthe COVID-19 pandemic. *Clinical Pediatrics, 59*, 853–855. https://doi.org/10.1177/0009922820927044.
Lynch, T., Azuero, A., Lochman, J. E., Park, N. J., Turner-Henson, A., & Rice, M. (2019). The influence of psychological stress, depressive symptoms, and cortisol on body mass and central adiposity in 10-to-12-year-old children. *Journal of Pediatric Nursing, 44*, 42–49. https://doi.org/10.1016/j.pedn.2018.10.007.
Masarik, A. S., & Conger, R. D. (2017). Stress and child development: A review of the Family Stress Model. *Current Opinion in Psychology, 13*, 85–90. https://doi.org/10.1016/j.copsyc.2016.05.008.
Mason, T. B., O'Connor, S. G., Schembre, S. M., Huh, J., Chu, D., & Dunton, G. F. (2019). Momentary affect, stress coping, and food intake in mother–child dyads. *Health Psychology, 38*(3), 238–247. https://doi.org/10.1037/hea0000714.
McEwen, B. (2007). Physiology and neurobiology of stress and adaptation: Central role of the brain. *Physiological Reviews, 87*(3), 873–904. https://doi.org/10.1152/physrev.00041.2006.
McEwen, B. S., & Gianaros, P. J. (2010). Central role of the brain in stress and adaptation: Links to socioeconomic status, health, and disease. *Annals of the New York Academy of Sciences, 1186*, 190–222. https://doi.org/10.1111/j.1749-6632.2009.05331.x.
Miller, K., Margolin, G., Shapiro, L., & Timmons, A. (2017). Adolescent life stress and the cortisol awakening response: The moderating roles of attachment and sex. *Journal of Research on Adolescence, 27*(1), 34–48. https://doi.org/10.1111/jora.12250.
Moazzezi, M., Moghanloo, V. A., Moghanloo, R. A., & Pishvaei, M. (2015). Impact of acceptance and commitment therapy on perceived stress and special health self-efficacy in seven to fifteen-year-old children with diabetes mellitus. *Iranian Journal of Psychiatry and Behavioral Sciences, 9*(2), 31–36. http://doi.org/10.17795/ijpbs956.
Muldoon, O. T. (2003). Perceptions of stressful life events in Northern Irish school children - A longitudinal study. *Journal of Child Psychology and Psychiatry and Allied Health Disciplines, 44*(2), 193–201. https://doi.org/10.1111/1469-7610.00113.
National Institute of Mental Health (2022). Child and adolescent mental health. https://www.nimh.nih.gov/health/topics/child-and-adolescent-mental-health.
Neuman, B. (2002). The neuman systems model. In B. Neuman, & J. Fawcett (Eds.), *The Neuman System Model* (pp. 3–42) (4th ed.). Prentice Hall.
Nijhof, S. L., Vinkers, C. H., van Geelen, S. M., Duijff, S. N., Achterberg, E., van der Net, J., ... Lesscher, H. (2018). Healthy play, better coping: The importance of play for the development of children in health and disease. *Neuroscience and Biobehavioral Reviews, 95*, 421–429. https://doi.org/10.1016/j.neubiorev.2018.09.024.
Oh, D. L., Jerman, P., Silvério Marques, S., Koita, K., Purewal Boparai, S. K., Burke Harris, N., & Bucci, M. (2018). Systematic review of pediatric health outcomes associated with childhood adversity. *BMC Pediatrics, 18*(1), 83. https://doi.org/10.1186/s12887-018-1037-7.
Ortiz, R., & Sibinga, E. M. (2017). The role of mindfulness in reducing the adverse effects of childhood stress and trauma. *Children, 4*(3), 16. https://doi.org/10.3390/children4030016.
Osório, C., Probert, T., Jones, E., Young, A. H., & Robbins, I. (2017). Adapting to stress: understanding the neurobiology of resilience. *Behavioral Medicine (Washington D.C.), 43*(4), 307–322. https://doi.org/10.1080/08964289.2016.1170661.
Parfenoff, S. H., & Jose, P. E. (1989). Measuring daily stress in children. *Paper presented at the Biennial Meeting of the Society for Research in Child Development. Kansas City, MO.*
Pascoe, M. C., Hetrick, S. E., & Parker, A. G. (2020). The impact of stress on students in secondary school and higher education. *International Journal of Adolescence and Youth, 25*(1), 104–112. https://doi.org/10.1080/02673843.2019.1596823.

Pervanidou, P., & Chrousos, G. P. (2012). Metabolic consequences of stress during childhood and adolescence. *Metabolism, Clinical and Experimental, 61*(5), 611–619. https://doi.org/10.1016/j.metabol.2011.10.005.

Rew, L., Principe, C., & Hannah, D. (2012). Changes in stress and coping curing late childhood and preadolescence. *Journal of Child and Adolescent Psychiatric Nursing, 25*(3), 130–140. https://doi.org/10.1111/j.1744-6171.2012.00336.x.

Ricker, A. A., Corley, R., DeFries, J. C., Wadsworth, S. J., & Reynolds, C. A. (2018). Examining the influence of perceived stress on developmental change in memory and perceptual speed for adopted and nonadopted individuals. *Developmental Psychology, 54*(1), 138–150. https://doi.org/10.1037/dev0000329.

Rodriguez, E. M., Dunn, M. J., Zuckerman, T., Vannatta, K., Gerhardt, C. A., & Compas, B. E. (2012). Cancer-related sources of stress for children with cancer and their parents. *Journal of Pediatric Psychology, 37*(2), 185–197. https://doi.org/10.1093/jpepsy/jsr054.

Ryan-Wenger, N. A., Sharrer, V. W., & Campbell, K. K. (2005). Changes in children's stressors over the past 30 years. *Pediatric Nursing, 31*(4), 282–291.

Ryan-Wenger, N. A., Wilson, V. L., & Broussard, A. G. (2012). Stress, coping, and health in children. In V. H. Rice (Ed.), *Handbook of stress, coping, and health: Implications for nursing research, theory, and practice* (pp. 226–253). Sage Publications, Inc.

Sarkissian, M., Trent, N. L., Huchting, K., & Khalsa, S. B. S. (2018). Effects of a Kundalini yoga program on elementary and middle school students' stress, affect, and resilience. *Journal of Developmental & Behavioral Pediatrics, 39*(3), 210–216. https://doi.org/10.1097/DBP.0000000000000538.

Saxe, G. N., & Bosquet, M. (2004). *Child Stress Disorders Checklist-Screening Form (CSDC-SF) (v. 1.0-3/04)*. National Child Traumatic Stress Network and Boston University School of Medicine.

Selye, H. (1936). A syndrome produced by diverse nocuous agents. *Nature, 138*, 32. https://doi.org/10.1038/138032a0.

Selye, H. (1950). Stress and the general adaptation syndrome. *British Medical Journal, 1*(4667), 1383–1392. https://doi.org/10.1136/bmj.1.4667.1383.

Selye, H. (1956). *The stress of life*. McGraw-Hill Book Co.

Selye, H. (1970). The evolution of the stress concept. Stress and cardiovascular disease. *American Journal of Cardiology, 26*(3), 289–299. https://doi.org/10.1016/0002-9149(70)90796-4.

Shonkoff, J. P., & Garner, A. S. (2012). The lifelong effects of early childhood adversity and toxic stress. *Pediatrics, 129*(1), e232–e246. https://doi.org/10.1542/peds.2011-2663.

Skinner, E. A. (2016). *The development of coping: Stress, neurophysiology, social relationships, and resilience during childhood and adolescence*. Springer.

Snoeren, F., & Hoefnagels, C. (2014). Measuring perceived social support and perceived stress among primary school children in the Netherlands. *Child Indicators Research, 7*(3), 473–486. https://doi.org/10.1007/s12187-013-9200-z.

Substance Abuse and Mental Health Services Administration (2021). Why you should talk with your child about alcohol and other drugs. https://www.samhsa.gov/talk-they-hear-you/parent-resources/why-you-should-talk-your-child.

Terzian, M., Moore, K. A., & Nguyen, H. N. (2010). Assessing stress in children and youth: A guide for out-of-school time program practitioners. *Child Trends*, 1–6 October.

Van Ryzin, M. J., & Roseth, C. J. (2018). Cooperative learning in middle school: A means to improve peer relations and reduce victimization, bullying, and related outcomes. *Journal of Educational Psychology, 110*(8), 1192–1201. https://doi.org/10.1037/edu0000265.

Walker, L., & Avant, K. (2011). *Strategies for theory construction in nursing* (5th ed.). Prentice Hall.

Walker, L. S., Beck, J. E., Garber, J., & Lambert, W. (2009). Children's Somatization Inventory: Psychometric properties of the revised form (CSI-24). *Journal of Pediatric Psychology, 34*(4), 430–440. https://doi.org/10.1093/jpepsy/jsn093.

Wen, C. K. F., Liao, Y., Maher, J. P., Huh, J., Belcher, B. R., Dzubur, E., & Dunton, G. F. (2018). Relationships among affective states, physical activity, and sedentary behavior in children: Moderation by perceived stress. *Health Psychology, 37*(10), 904–914. https://doi.org/10.1037/hea0000639.

Werner, E. E. (2011). Protective factors and individual resilience. In J. P. Shonkoff, & S. J. Meisels (Eds.), *Handbook of early childhood intervention* (pp. 115–132) (2nd ed.). Cambridge University Press. https://doi.org/10.1017/CBO9780511529320.008.

Williamson, D. E., Birmaher, B., Ryan, N. D., Shiffrin, T. P., Lusky, J. A., Protopapa, J., ... Brent, D. A. (2003). The stressful life events schedule for children and adolescents: development and validation. *Psychiatry Research, 119*(3), 225–241. https://doi.org/10.1016/s0165-1781(03)00134-3.

Zengin-Bolatkale, H., Conture, E. G., Walden, T. A., & Jones, R. M. (2018). Sympathetic arousal as a marker of chronicity in childhood stuttering. *Developmental Neuropsychology, 43*(2), 135–151. https://doi.org/10.1080/87565641.2018.1432621.