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Stress Management: A Study of Children's Perceptions of Stress in Task Performance Context

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Abstract. Stress, particularly learning stress, is prevalent among Chinese elementary school children and can lead to severe health and psychological consequences. Unlike adults, these children often lack the self-awareness to recognize their stress levels, particularly in the context of task performance. This deficiency in self-recognition makes it challenging for them to adapt or seek interventions. For further research, we conducted a study involving 87 elementary school children from various cities and counties in China. Through a designed questionnaire, we aimed to understand children's perceptions of stress and how they react to stress, especially when they are learning. Preliminary findings indicate that visualizing stress could be a promising research direction to enhance children's self-awareness. Future studies will delve deeper into determining which types of stress displays most effectively aid children in recognizing and positively adjusting their stress during the learning process.

Keywords. Children, stress, stress awareness, stress display

1. Introduction

Academic pressures and intense workloads have notably impacted the mental well-being of children in East Asian nations, including China, Japan, and Korea [1]. The demands of homework and related assignments stand as a leading cause of stress among these young students. In China, where academic excellence is often emphasized, elementary school children are particularly susceptible to the learning stress. This stress, if not addressed, can lead to a range of adverse psychological and physiological outcomes, including anxiety, depression, and even suicidal ideation [2].

Understanding how children perceive and internalize learning stress is crucial. Their perceptions shape their reactions, coping mechanisms, and overall well-being. Unlike adults, children, especially those in elementary school, often lack the cognitive tools and emotional maturity to recognize and articulate their stress levels. This gap in self-awareness and expression can hinder timely interventions and support, exacerbating the negative impacts of stress.

The realm of design offers promising avenues to address this challenge. By creating tools and interfaces that visualize and communicate stress, we can potentially bridge the

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gap between children's internal experiences and their external expression [3]. Such designs can empower children with a clearer understanding of their stress levels, enabling them to seek help or employ coping strategies more effectively. However, designing for such a sensitive and complex issue requires a deep understanding of the children's context, their cognitive and emotional development stages, and the cultural nuances that shape their experiences.

This research aims to delve into three primary areas:

Children's Perceptions of Learning Stress: By understanding how children perceive and internalize stress, especially in a task performance context, we can tailor interventions that resonate with their experiences. This understanding can also shed light on the discrepancies between children's self-perceptions and external observations, providing insights into potential areas of support.

Design Directions for Stress Relief: With a clear understanding of children's perceptions, we can explore design directions that effectively communicate and alleviate learning stress. These designs can range from tangible tools, like stress balls or fidget devices, to digital interfaces that visualize stress metrics in real-time.

Design Challenges and Solutions: Designing for children's well-being presents unique challenges. Ethical considerations, age-appropriateness, cultural sensitivities, and technological constraints are just a few of the issues that might arise. Addressing these challenges requires a multidisciplinary approach, combining insights from psychology, design, technology, and education.

In conclusion, this research seeks to contribute to the growing body of knowledge on children's well-being in the context of learning stress. By exploring their perceptions, potential design interventions, and the challenges therein, we aim to pave the way for more effective and empathetic solutions that support children's mental and emotional health in their learning process.

2. Related Work

2.1. Children's Perception of Stress within Educational Settings

In recent times, there has been an escalating focus on the mental health of children, with a specific emphasis on the stresses associated with academic environments. Endorsed studies from the American Psychological Association have underscored the imperative to investigate the mental health adversities confronting children and adolescents, aiming to discern the underlying causes and to identify potential remedial measures [4]. A 2023 analysis illuminated the emerging trends in pediatric mental health, underscoring the value of these findings in the development of efficacious interventions [5]. Furthermore, the nuanced way children perceive stress, especially during task-oriented activities, demands an in-depth understanding of its multifaceted nature. A seminal 2018 research emphasized the pronounced effects of stress on children's task performance, advocating for a comprehensive understanding of both its physiological and psychological dimensions to devise robust interventions [6].

2.2. Approaches to Mitigate Stress

Anticipations for the near future suggest a marked growth in the domain of stress management, specifically designed for the younger cohort [7]. Current scholarly works

offer a plethora of empirically supported, non-pharmacological methodologies tailored for children and adolescents. These encompass a spectrum from mindfulness practices to biofeedback techniques, all aimed at equipping the youth to adeptly manage their stressors [5]. In-depth neuroscientific explorations have unveiled the adverse repercussions of stress on cognitive processes like learning and memory in children, which subsequently influence their academic performance and overall well-being [7].

2.3. Designing Interventions: Challenges and Resolutions

The endeavor to formulate interventions for the younger demographic is laden with distinct challenges, ranging from ethical considerations to technological constraints. A pioneering study, which employed serious gaming as a tool to aid children with autism spectrum disorder (ASD) and their guardians in stress management, emphasized the necessity of bespoke interventions tailored to specific demographics [8]. Moreover, the ramifications of global events, such as the COVID-19 pandemic, on child welfare necessitate a comprehensive strategy that integrates wider socio-economic and health-related factors [9]. External influencers, like family dynamics and academic pressures, significantly mold children's stress profiles. A 2022 study corroborated the linkage between academic stress, depressive tendencies, and academic outcomes, accentuating the need for holistic stress management paradigms [8].

In summation, contemporary literature underscores the importance of comprehending children's perceptions of stress within educational milieus and the potential of tailored interventions. It is essential to employ a comprehensive strategy, cognizant of the unique challenges and requirements inherent in devising solutions for this demographic.

3. Methodology

Participants: A total of 87 elementary school children (aged 8-12) participated in this study. Consent was obtained from parents and children. Children completed the study in the company of parents. Parents signed informed consent forms. These participants were recruited from various cities and counties across China, ensuring a diverse representation. Those who do not willing to participate in the study were excluded.

Instrument: A comprehensive questionnaire was developed to gauge the children's perceptions of stress, with a particular focus on the context of task performance. The questionnaire was meticulously designed to ensure clarity, relevance, and appropriateness for the age group.

Procedure: Upon obtaining informed consent, participants were administered the questionnaire in a controlled environment to minimize external influences. The children were given ample time to complete the questionnaire, with facilitators available to address any queries or concerns. Their parents and us provided the explanations.

Data Analysis: Based on the insights derived from the questionnaire responses, several insights for stress information displays were found. These insights aimed to help guide how to represent stress levels and cues, tailored specifically for the understanding and cognitive capabilities of elementary school children.

Future Directions: Subsequent research will develop several designs based on these findings and evaluate the effectiveness of these stress display prototypes. The primary objective will be to ascertain which types of displays are most efficacious in assisting

children in recognizing and positively modulating their stress levels during the learning process.

4. Results

The study aimed to understand the learning stresses faced by Chinese primary school children in the cities and the counties (Figure 1). Information overview was indicated in Table 1.

Table 1. Basic information statistics of subjects

Area	Grade	Stress Term Awareness	Gender Distribution	
			Male	Female
Cities	Sixth	100%	25	21
Counties	Third	95.12%	23	18

The data was collected through a questionnaire, and the results are as follows (46 children from cities):

Gender Distribution: Out of the 46 respondents, 54.35% were male and 45.65% were female.

Awareness of the term "stress": All respondents (100%) were aware of the term "stress".

Experience of Learning Stress: When asked about experiencing stress during learning, 23.91% frequently felt stressed, 56.52% occasionally felt it, and 4.35% rarely felt it.

Coping with Learning Stress: In the face of learning stress, 15.22% would continue to study hard, while others preferred to take a break and then continue (21.74%), seek help from teachers or parents (67.39%), or give up studying (8.7%).

Sources of Learning Stress: The main sources of stress were exam scores (21.74%), parental expectations (67.39%), teacher demands (8.7%), peer competition (2.17%), and personal expectations (95.65%).

Relief Methods for Learning Stress: Popular methods to relieve learning stress included playing games (28.26%), chatting with friends (73.91%), engaging in sports or dance (73.91%), listening to music, or singing (78.26%), reading or watching movies (67.39%), and seeking help from family, teachers, or peers (17.39%).

Role of Parents and Teachers: A significant 93.48% of respondents believed that teachers should help students alleviate learning stress, and 97.83% felt that peers should support each other in this regard. Moreover, 50% believed that parents should help alleviate their child's academic stresses.

Impact of Learning Stress: 52.17% believed that learning stress could be alleviated through hard work, while 47.83% disagreed. Additionally, 69.57% were willing to express their learning stresses through preferred methods to their peers, parents, or teachers.

Change in Learning Stress Over Time: Reflecting from grade one to the present, 34.78% felt that learning stress decreased with age, 26.09% felt no change, and 39.13% felt that it not only didn't decrease but also increased.

Figure 1. Survey data from cities and counties.

For children from counties, the results are as follows (41 children):

Gender Distribution: Out of the 41 respondents, 56.1% were male and 43.9% were female.

Awareness of the term "stress": 95.12% of the respondents were aware of the term "stress", while 4.88% were not.

Experience of Learning Stress: 7.32% frequently felt stressed, 43.9% occasionally felt it, 43.9% rarely felt it, and 4.88% never felt it.

Sources of Learning Stress: The main sources of stress were exam scores (90.24%), parental expectations (43.9%), teacher demands (12.2%), peer competition (19.51%), personal expectations (26.83%), and others (26.83%).

Coping with Learning Stress: In the face of learning stress, 41.46% would continue to study hard, 46.34% preferred to take a break and then continue, 12.2% sought help from teachers or parents, and none would give up studying.

Relief Methods for Learning Stress: Popular methods to relieve learning stress included playing games (9.76%), chatting with friends (31.71%), engaging in sports or dance (43.9%), listening to music or singing (41.46%), reading or watching movies

(19.51%), doing nothing and relaxing (48.78%), seeking help from family, teachers, or peers (2.44%), studying harder (2.44%), and others (7.32%).

Impact of Learning Stress: 34.15% believed that learning stress could be alleviated through hard work, while 65.85% disagreed. Additionally, 82.93% were willing to express their learning stresses through preferred methods to their peers, parents, or teachers.

Role of Parents, Teachers, and Peers: 92.68% believed that parents should help alleviate their child's academic stresses, 87.8% felt that teachers should help, and 85.37% believed that peers should support each other in this regard.

Change in Learning Stress Over Time: Reflecting from grade one to the present, 17.07% felt that learning stress decreased with age, 51.22% felt no change, and 31.71% felt that it not only didn't decrease but also increased.

Understanding the stressors faced by Chinese primary school children provides a unique opportunity to design effective stress management products tailored to their needs. By analyzing the data collected, we can derive insights that can guide the development of innovative solutions, such as stress visualization tools.

Key Differences & Insights:

Awareness: While almost all children in both groups are aware of "stress", city children have a slightly higher awareness at 100% compared to 95.12% in the county.

Experience of Learning Stress: City children seem to experience frequent learning stress more than county children.

Sources of Stress: City children are more stressed by parental and personal expectations, while county children are more stressed by exam results.

Coping Mechanisms: County children are more inclined to study hard and take breaks, while city children are more likely to seek help.

Relief Methods: City children prefer a wider range of activities, with a higher inclination towards chatting, music, and reading/movies. County children, on the other hand, prefer relaxation more.

Role of School: County children have a higher demand for stress relief courses in schools compared to city children.

These differences highlight the varying stressors and coping mechanisms between children in cities and counties. Tailored interventions and support systems can be developed based on these insights to better address the unique needs of each group.

Designing Stress Management Products

1) Stress Visualization Tools: Given the high awareness of stress among respondents, visualization tools can be effective. These tools can represent stress levels graphically, helping children understand their feelings better. For instance, a mobile app that allows students to log their daily stress levels, using colors or graphics, can provide a visual representation of their stress patterns over time.

2) Interactive Platforms: An interactive platform where students can share their feelings, seek advice, and learn coping mechanisms can be beneficial. This platform can also involve teachers and parents, fostering a supportive community.

3) Gamified Stress Relievers: Considering that playing games was a popular stress relief method, gamified stress-relief apps can be developed. These games can incorporate relaxation techniques, deep breathing exercises, and mindfulness practices in an engaging manner.

4) Educational Workshops for Parents: Since parental expectations are a significant stressor, workshops can be organized to educate parents about the importance of setting realistic expectations and understanding the pressures their children face.

5) Real-time Feedback Systems: Wearable devices that monitor physiological signs of stress, such as heart rate or skin conductivity, can provide real-time feedback to students. When high stress is detected, the device can suggest immediate interventions, such as taking a break or practicing deep breathing.

6) Personalized Stress Profiles: Using AI and machine learning, personalized stress profiles can be created for each student. These profiles can predict stress triggers and suggest personalized coping strategies.

Brief Summary: The data provides a comprehensive understanding of the stressors faced by Chinese primary school children. By leveraging these insights, we can design innovative stress management products that not only address the root causes of stress but also empower students, teachers, and parents to foster a supportive and understanding learning environment. The future of stress management lies in personalized, tech-driven solutions that meet the unique needs of each individual.

5. Discussion

5.1. Findings from the Data

Gender and Stress Perception: While the data indicates an even distribution between male and female respondents, it's essential to recognize that stress is universally experienced across genders. However, individual responses to stress can vary widely among children. Therefore, when creating stress management products, it's crucial to account for these diverse reactions.

Universal Awareness: The fact that all respondents were aware of the term "stress" indicates a high level of awareness and understanding of the concept, even among young children. This underscores the importance of early interventions.

Frequency of Stress: A significant portion of respondents frequently or occasionally felt stressed during learning. This highlights the need for regular stress management interventions, rather than occasional ones.

Coping Mechanisms: Many students turn to teachers or parents for support when faced with stress, underscoring the valuable role adults play in guiding stress management. It's worth noting that a few students opt to pause their studies. While this might initially seem concerning, taking breaks can sometimes be beneficial for a student's learning state. The crucial aspect is to heighten their awareness of their stress levels. By recognizing and understanding their stress, students can more effectively navigate and manage their learning stress.

Sources of Stress: Examination performance is the major source of stress, although parental expectations also contribute. This indicates that stress management solutions should consider both the pressures of exams and the influence of parental expectations, offering strategies to cope with both.

5.2. Insights for Stress Management

Awareness & Communication: Both city and county children are highly aware of "stress". Encouraging open communication can help address their concerns.

Un Parental Expectations: This remains a significant source of stress. Parental education and counseling can help set realistic expectations.

School's Role: There's a strong demand for schools to offer stress relief courses and reduce academic pressures.

Relief Methods: Engaging in recreational activities and hobbies are popular stress-relief methods. Schools and parents can encourage such activities.

Seeking Help: A significant portion of children, especially in the city, prefer seeking help when stressed. Schools should ensure counseling services are accessible.

6. Limitations and Future Work

The survey, while insightful, has its limitations. We will sample more children varies from all different grades to provide a comprehensive representation of the entire population of children in cities and counties. Furthermore, the data is geographically limited to specific cities and counties. Expanding the study to other regions might yield different results. Another limitation is the reliance on children's self-reports. Although their parents and us will help them understand questions, such data might be influenced by their mood, understanding of the questions, or other external factors. Additionally, the study provides a snapshot of the current situation but doesn't track changes over time. Longitudinal studies would provide insights into how stress levels and coping mechanisms evolve as children grow. Lastly, the survey focuses mainly on learning stress, leaving out other forms of stress, such as social or familial stress.

In future, aiming for a larger and more diverse sample size in subsequent studies to ensure more generalizable results would be beneficial. Incorporating qualitative data through in-depth interviews or focus group discussions could provide deeper insights into the reasons behind the reported stress levels and coping mechanisms. Tracking the same group of children over several years in a longitudinal study would provide valuable data on the evolution of stress and its impact on their well-being. Based on the findings, interventions can be designed and tested to see which strategies are most effective in helping children manage stress. Finally, comparing the results with data from other countries or regions would help understand cultural or systemic differences in children's stress. Also, we will develop several prototypes of presenting stress information to explore which facilitate children’s awareness better.

7. Conclusions

Considering the study conducted in this paper, particularly within the context of task performance, several key insights have emerged. The research underscores the prevalence of learning stress among this demographic, with notable differences in stressors and coping mechanisms between children from urban and rural settings. The study's findings emphasize the potential of stress visualization as a promising avenue to enhance children's self-awareness of their stress levels. By visualizing stress, children can potentially gain a clearer understanding of their internal experiences, thereby facilitating timely interventions and support. Such tools can empower children to recognize and manage their stress more effectively, ultimately fostering a more supportive and understanding learning environment. As the educational landscape continues to evolve, it is imperative to prioritize children's mental and emotional well-being. The integration of stress visualization tools, coupled with a deeper understanding of children's perceptions, can pave the way for innovative solutions that cater to the

unique needs of each child, ensuring a holistic and empathetic approach to stress management in the learning process.

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