



Abstract

Objective

Chronic exposure to early-life stressors, known as adverse childhood experiences (ACEs), can disrupt brain development and neural pathways, leading to long-term physical and behavioral health issues. This phenomenon, termed “toxic stress,” is partly mediated by elevated cortisol levels and is associated with adverse outcomes such as immune dysfunction, heart disease, obesity, mental health disorders, and premature death. Studies suggest that increased salivary cortisol may correlate with higher levels of cariogenic bacteria and dental caries in children. However, research exploring the relationship between stress, hygiene, and caries incidence remains limited.

Methods

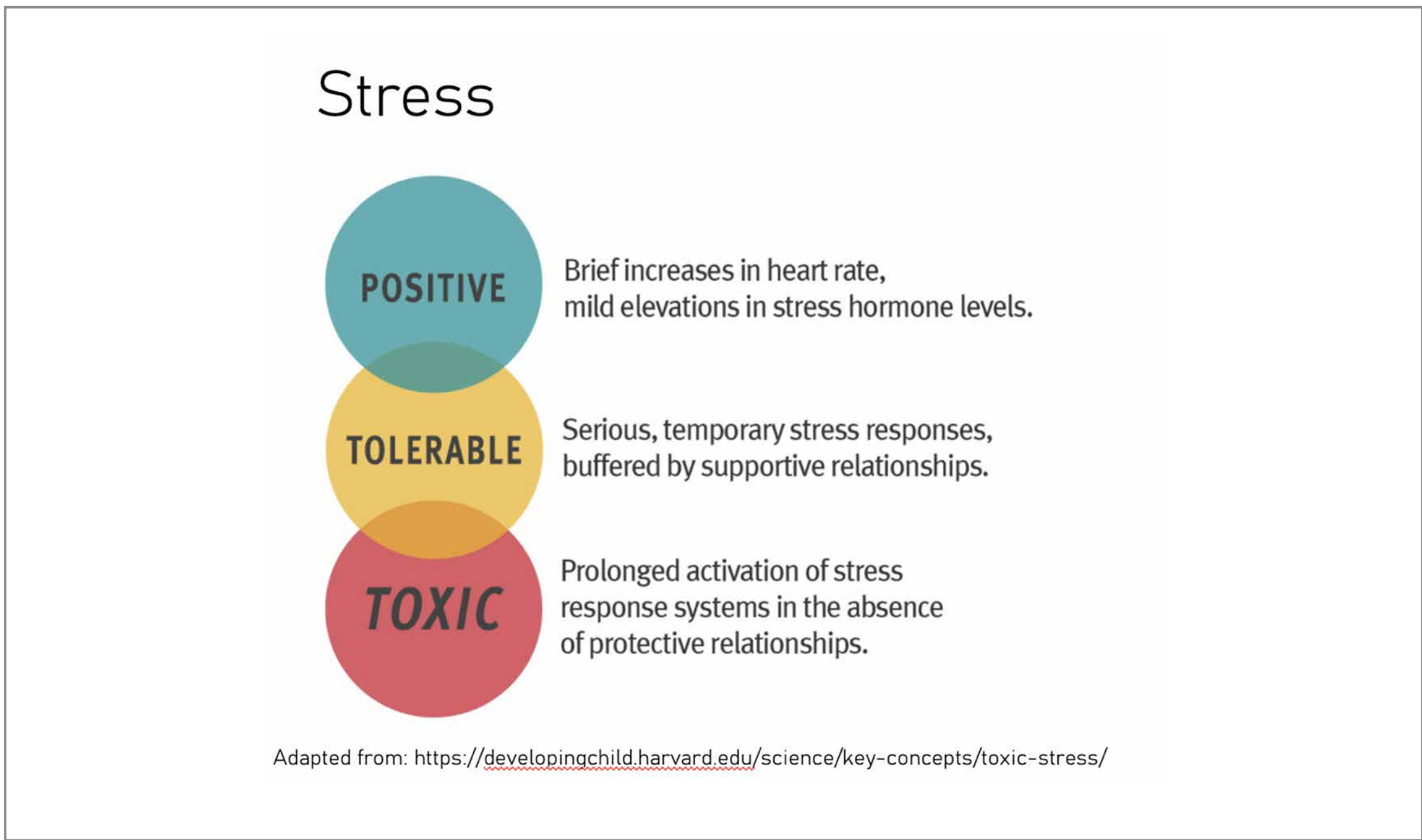
This study aims to investigate the association between stress, caries, and hygiene in children aged 2–6 undergoing elective surgical procedures at the University of Iowa Stead Family Children’s Hospital. Legal guardians will complete a questionnaire covering topics such as systemic health, oral hygiene habits, diet, socioeconomic status, mental health, and family dynamics. A dental examination will be performed on the children to determine DMFS and plaque levels.

Conclusion

This study aims to provide valuable insights into the effects of stress, caries, and hygiene on the oral health of children aged 2–6 undergoing minor surgical procedures at the University of Iowa Stead Family Children’s Hospital. By integrating guardian-completed questionnaires on health, oral hygiene, diet, socioeconomic status, mental health, and family dynamics, this research seeks to deepen the understanding of the complex interplay between stress and oral health. Ultimately, it aims to uncover how adverse childhood experiences and toxic stress contribute to oral health disparities.

Introduction

- Toxic(prolonged/frequent) stress has been shown to disrupt metabolic pathways with long term consequences
- Stress modulates cortisol levels
- Previous research has shown that cortisol can influence dental caries
- Goal: Discover the relationship between stress, caries, and hygiene in the pediatric population.



Methods

Stress Score

To standardize data across research questions, an ordinal point system was utilized to evaluate stress levels for the child, caretaker, and family. The calculation is as follows:

- Child’s Stress Score: Derived from affirmative responses to questions about stress exposures (Q 1-6), as well as observations of a defiant or strong-willed temperament (Q 3) (Table 1).
- Caretaker’s Emotions Score: Determined by responses indicating stressful emotions experienced “some of the time” or more frequently (Q7a-7d) (Table 1).
- Household Stress Score: Based on “yes” responses to questions to household stressors (Q 8-14) (Table 1).
- Aggregate Stress Score: An aggregate score calculated by combining individual stress scores from all relevant questions (see Table 1).

Hygiene Score

The hygiene score was calculated based on the frequency of brushing, who performed the brushing, whether the toothpaste contained fluoride, and whether tongue brushing was performed. Points were assigned as follows:

- Frequency of brushing: 1 point for brushing once daily, 2 points for brushing twice daily, and 3 points for brushing three or more times daily.
- Who performed the brushing: 1 point if the child brushed, 2 points if a parent brushed, and 3 points if both the parent and child brushed.
- Tongue brushing: 0 points for no brushing, 0.5 points for infrequent brushing, and 1 point for consistent brushing.
- Fluoride use: 0 points for “unsure,” 1 point for occasional use, and 2 points for regular use.

Caries

A clinical examination was conducted for each child enrolled in the study. The number of teeth present in the mouth was recorded, along with the number of carious teeth. Caries were diagnosed based on the ADA Caries Identification System.

Results

Main Data Observations

- The average tooth count was 20.16 with the highest number of carious teeth found in a subject being 16. (Figure 1)
- Stress and caries were observed in approximately 50% of patients. (Figure 2)
- We did not see a relationship between stress and the number of carious teeth. (Figure 2)
- We did not see a relationship with oral hygiene and stress scores. (Figure 3)
- We currently see no trends between oral hygiene and caries. (Figure 4)

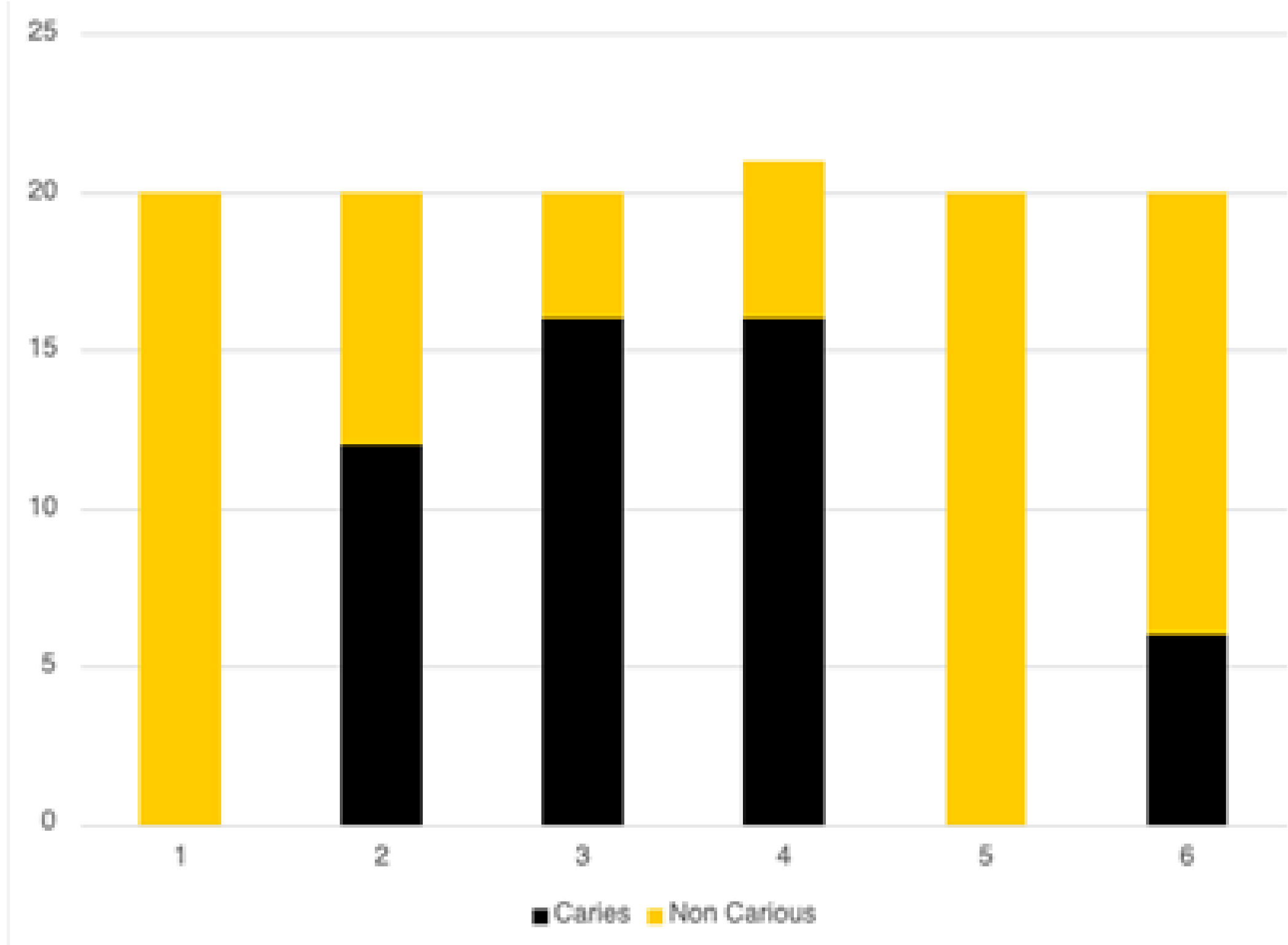


Figure 1. Caries incidence

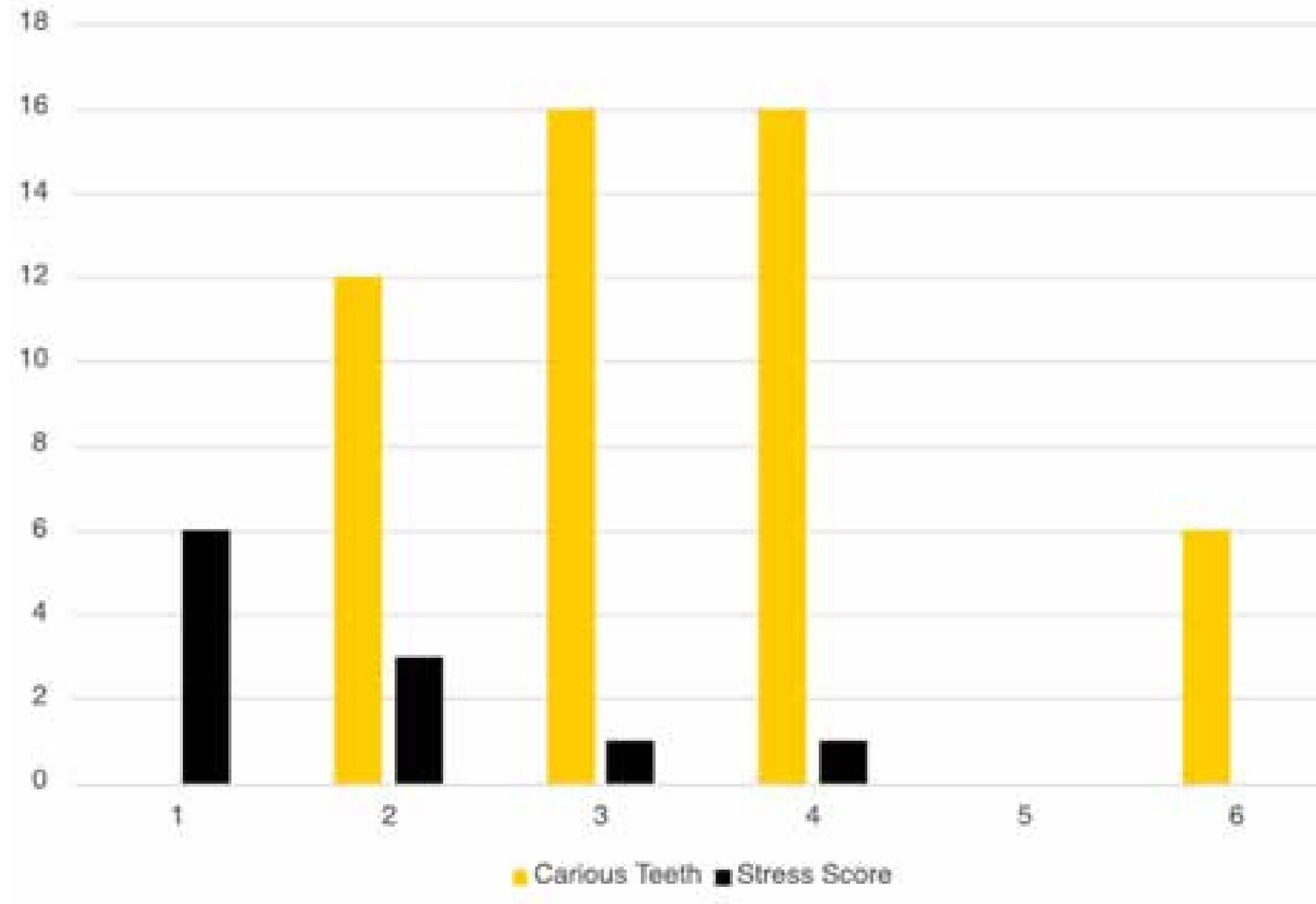


Figure 2. Number of carious teeth and stress score

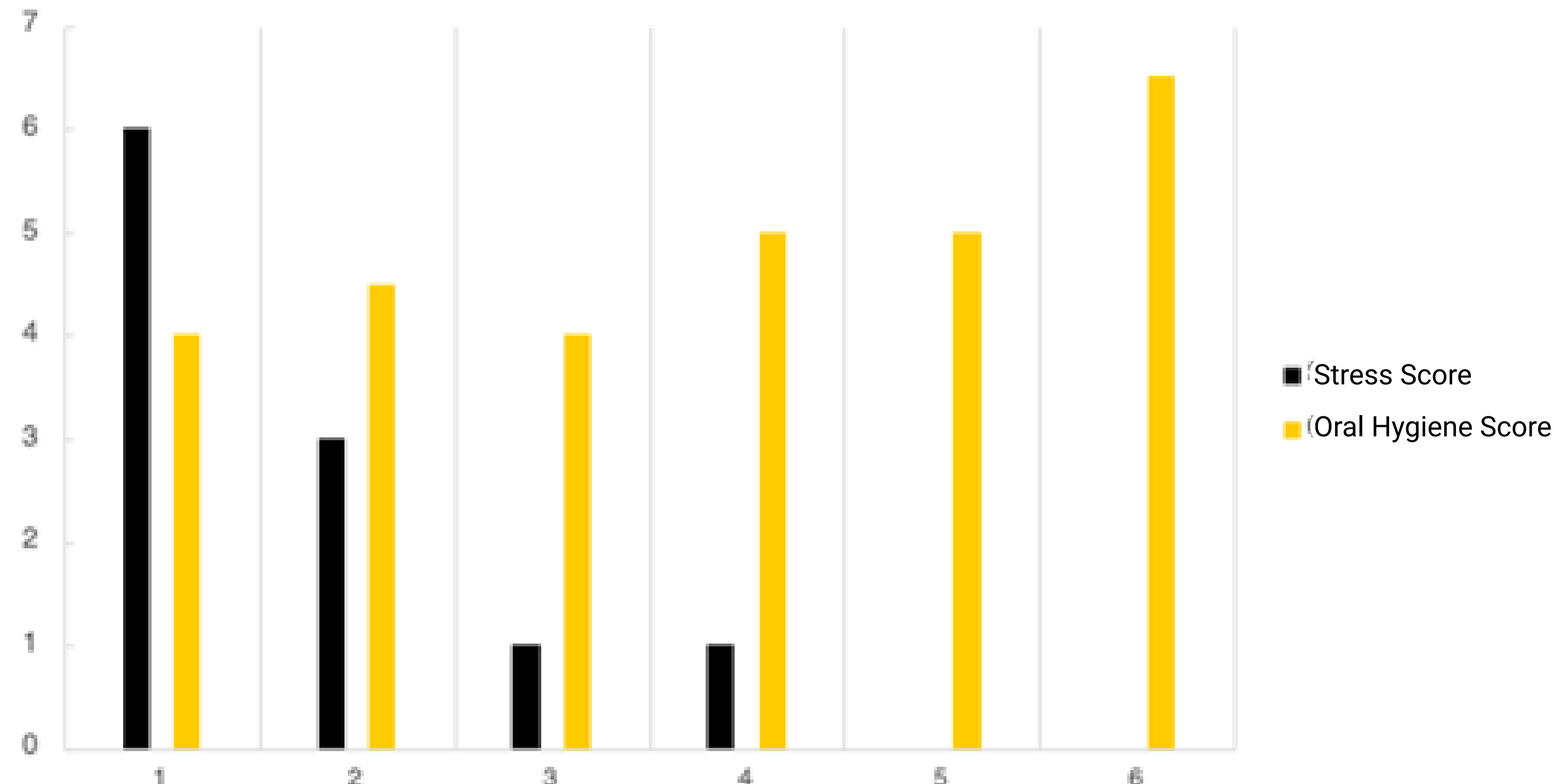


Figure 3. Stress and oral hygiene

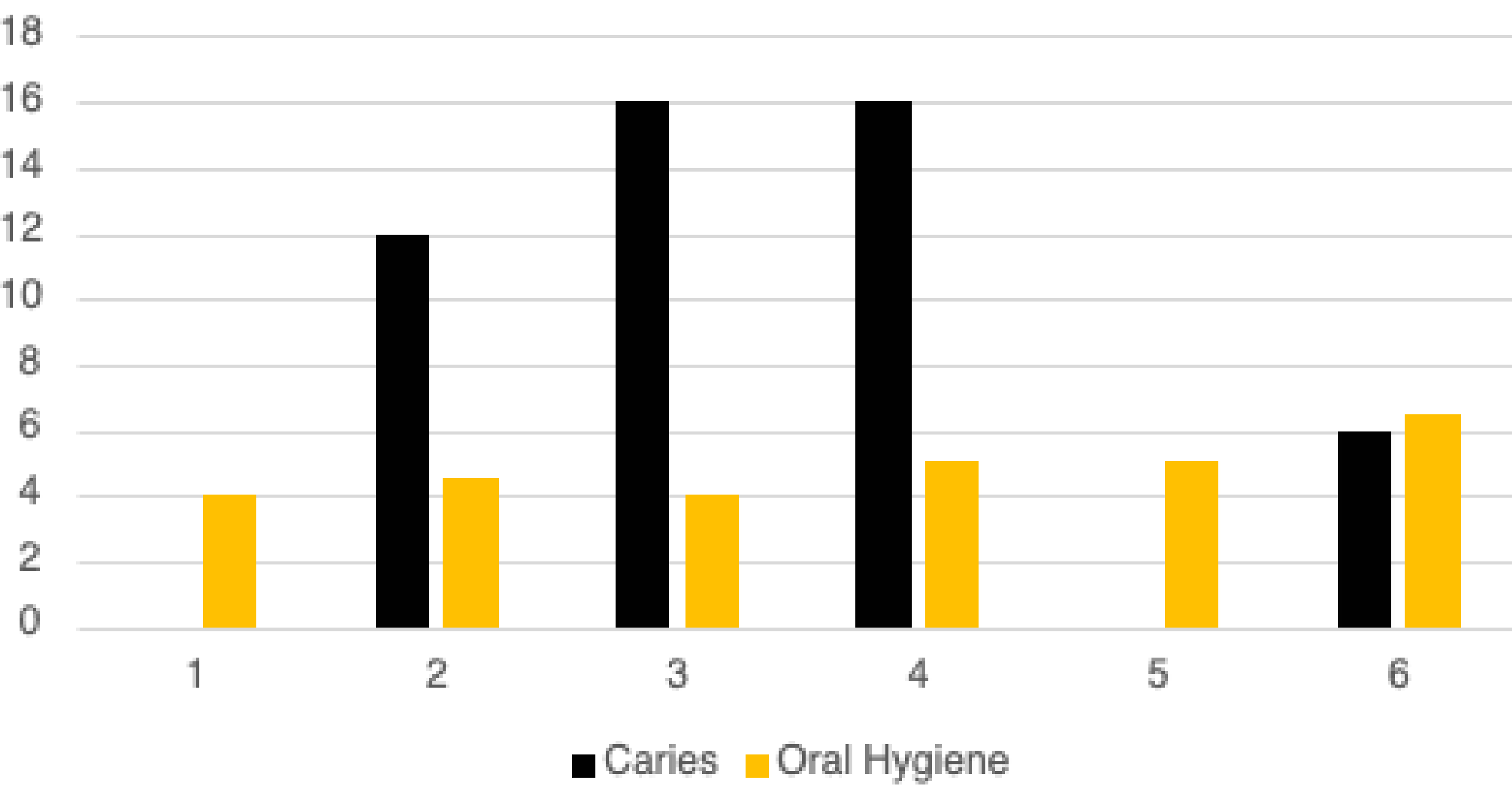


Figure 4. Caries and oral hygiene

Table 1. Stress Scoring

Subjects	Child's Stress Score (Out of 5)	Caretaker's Emotions Score (Out of 65)	Caretaker's Stress Score (Out of 10)	Household Stress Factor Score (Out of 21)
#1	1	3	6	10
#2	3	1	3	7
#3	2	1	1	4
#4	1	1	1	3
#5	1	0	0	1
#6	1	1	0	2

References

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2. Hughes, K., et al., The effect of multiple adverse childhood experiences on health: a systematic review and meta-analysis. Lancet Public Health, 2017. 2(8): p. e356-e366.
3. Bucci, M., et al., Toxic Stress in Children and Adolescents. Adv Pediatric, 2016. 63(1): p. 403-28.
4. Short, A. K. and T. Z. Baram (2019). “Early-life adversity and neurological disease: age-old questions and novel answers.” *Nat Rev Neurol* 15(11): 657-669.