

THE RELATIONSHIP BETWEEN SWEET FOOD CONSUMPTION AND EMOTIONAL REGULATION IN PRESCHOOL CHILDREN: A LITERATURE REVIEW

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Abstract

Preschool age is a sensitive period in which the ability to regulate emotion begins to take shape, while at the same time the consumption of sweet foods and sugar-sweetened beverages among Indonesian children remains high. This study aims to examine the relationship between sweet food consumption and emotional regulation in preschool children. The study used a qualitative descriptive design in the form of a narrative literature review. Eleven primary articles published within the last eight years were retrieved from Medscape, NCBI, and Google Scholar, and were complemented by national survey reports and institutional guidelines. The articles were selected using inclusion criteria, extracted into a synthesis matrix, and analysed thematically. The review indicates a consistent relationship between the two variables: frequent and excessive intake of added sugar is associated with blood glucose fluctuation, altered dopaminergic response, impulsivity, difficulty in maintaining attention, tantrums, and emotional lability, whereas controlled intake accompanied by responsive parenting supports better emotional regulation. Family feeding practices, the school environment, and health education act as contextual factors that strengthen or weaken this relationship. Parents, teachers, and health workers are therefore advised to manage children's sugar intake while providing emotional guidance. Longitudinal designs are recommended for further studies.

Keywords: added sugar; emotional regulation; literature review; preschool children; sweet food consumption

INTRODUCTION

Preschool children aged three to six years grow as individuals and at the same time as social beings who live within a particular cultural environment. This phase determines much of what follows in later life, and every child brings a different potential and a different set of characteristics into it (Raudhati & Agustina, 2022). Along this period children pass through a sensitive phase in which basic developmental aspects, especially the emotional aspect, are easily disturbed. Appropriate stimulation and adequate attention from the surrounding environment are therefore required so that growth and development proceed optimally (Sibualamu et al., 2022). Emotional regulation in preschool children refers to the ability to manage, evaluate, adjust, and express emotion in a proportional manner, and it is shaped by internal processes as well as by external ones (Anggeriyane et al., 2024).

Preschool children generally like sweet foods and snacks. The category covers sweet and salty snacks, sweetened beverages, and candy (Firdaus et al., 2025). A report of the National Diet and Nutrition Survey (NDNS) in the United Kingdom recorded that children aged 1.5 to 3 years obtained eleven percent of their total daily energy from added sugar, more than twice the recommended level. The World Health Organization recommends that free sugar intake be kept below ten percent of total energy, and further reduction to below five percent is expected to provide additional health benefits (World Health Organization, 2015). Global sugar consumption has risen in the last decade, largely driven by sugar-sweetened beverages (SSBs). Because of their high sugar density, SSBs raise insulin secretion, trigger epinephrine release, and have been associated with hyperactivity and with a higher risk of attention deficit hyperactivity disorder.

Intake differs across countries. Preschool children in Japan consume added sugar at an average of six percent of total energy, while the average in Australia and the United Kingdom exceeds 11.5 percent (Aila et al., 2023). In Indonesia the figure is far from small: 61.27 percent of children aged three years and above consume sweet foods and drinks more than once a day, 30.22 percent consume them one to six times a week, and only 8.51 percent consume them less than three times a month (Kementerian Kesehatan Republik Indonesia, 2022).

Data of the 2023 Indonesian Health Survey in DKI Jakarta show a similar pattern among children aged three to four years. For sweet foods, 50.1 percent consumed them more than once a day, 45.9 percent one to six times a

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week, and 4.0 percent less than three times a month. For sweet beverages the proportions were 51.4 percent, 42.3 percent, and 6.3 percent respectively (Kementerian Kesehatan Republik Indonesia, 2023). Such an intake level matters because a high sugar load in food affects blood glucose and, through it, the cognitive function and the behaviour of the child. Stable glucose is needed for neuronal work, for the formation of adenosine triphosphate (ATP), and for neurotransmitter synthesis, so that hypoglycaemia or hyperglycaemia may disturb neuronal function and produce cognitive impairment.

Large amounts of sweet food also affect how a child regulates emotional responses and adapts to the social environment. Sugar stimulates the release of dopamine, the brain chemical associated with pleasure. When large amounts are consumed repeatedly, the body becomes accustomed to the stimulus and requires more sugar to obtain the same satisfaction, while the brain response to dopamine gradually weakens so that dopaminergic signalling no longer works as it did before (Ditasari & Putri, 2024). Beyond the emotional aspect, excessive consumption of sweet foods contributes to overweight and obesity, which carry physical as well as psychological consequences. Children with obesity often experience low self-esteem and social discrimination (Fitriliani et al., 2023). High sugar intake also raises the risk of dental caries (Oktaviani et al., 2022), a condition that causes pain and reduces appetite and, indirectly, disturbs the mood of the child.

Observations in the field reveal tantrums, fussiness, and aggressive behaviour that are confirmed by the reports of parents and teachers. A considerable number of studies have examined the effect of sugar consumption on obesity, diabetes, and dental health, but studies that specifically link sweet food consumption with emotional regulation in preschool children remain limited, particularly in the Indonesian context. This gap is the reason for the present review, whose purpose is to describe the relationship between sweet food consumption and emotional regulation in preschool children on the basis of the available literature.

LITERATURE REVIEW

Emotional Regulation in Preschool Children

Emotional regulation covers two aspects that together explain the emotional quality of a child. The first is emotional regulation in the narrow sense, that is the capacity to control, monitor, evaluate, and adjust emotional reactions so that their intensity and duration remain proportional to the situation. The second is emotional lability or negativity, that is the tendency to shift emotion rapidly and extremely and to display negative behaviour such as anger, fussiness, or withdrawal (Leo & Hendriati, 2022; Erlita & Abidin, 2020). Both aspects develop rapidly between the ages of three and six because the prefrontal cortex, the region responsible for inhibition and executive control, is still maturing. At this stage the child depends heavily on external regulation from adults, and the family therefore functions as the first trainer of emotional skill. A study of emotional mental problems in kindergarten reported that difficulty in regulating emotion is one of the complaints most frequently raised by teachers, especially in the form of impulsivity and low frustration tolerance (Anggeriyane et al., 2024)

Sweet Food Consumption in Early Childhood

Sweet food consumption in early childhood is not merely a matter of taste preference. Preference for sweetness is innate, but its expression is formed by habituation, by the availability of food at home, and by the example set by parents and peers. Analysis of parenting patterns in relation to school snacks shows that the control exercised by parents over what a child buys outside the home determines the quantity of sugar actually consumed (Firdaus et al., 2025) Excessive added sugar also carries a nutritional cost. A study in Central Java found that higher added sugar consumption in children aged 24 to 59 months went together with lower intake of iron and zinc (Aila et al., 2023). Both micronutrients participate in the synthesis of neurotransmitters and in the process of myelination, so that their deficiency may indirectly reduce the capacity of the child to concentrate and to manage emotion.

Theoretical Framework Linking the Two Variables

The relationship between the two variables is explained through three lines of reasoning. The first is glycaemic, in which a rapid rise of blood glucose after the intake of simple sugar is followed by a sharp fall that is accompanied by irritability, fatigue, and reduced attention. The second is dopaminergic, in which repeated sugar intake activates the brain reward pathway and, over time, blunts the sensitivity of the receptor so that the child seeks stronger stimuli and becomes more impulsive (Ditasari & Putri, 2024). The third is behavioural and social, in which sweet food is used by adults as a reward or as a means of calming the child, so that the child learns to manage emotion through food rather than through the recognition and the expression of feeling.

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These three lines meet in the theory of family feeding practice, which places the family as the main agent in the formation of eating patterns and, at the same time, as the main agent in emotional socialisation. This theory forms the basis for interventions that are adjusted to the local context and to the condition of each family.

Previous Studies and the Research Gap

Several studies have addressed parts of this relationship. Research on the reduction of sugar-sweetened beverage consumption reported behavioural improvement in children with attention deficit hyperactivity disorder (Ditasari & Putri, 2024). A study of preschool children found a significant association between sweet food consumption and emotional regulation (Novitasari et al., 2025). Research on parenting practice added that parental education and the socioeconomic environment shape the choice of parenting style, which in turn affects the emotional development of the child (Khosla & Sharma, 2024). What remains scarce is a synthesis that brings these separate findings together in the Indonesian preschool context, including the physiological pathway, the empirical evidence, and the practical implication for the family and the school. The present review is arranged to fill that space.

METHOD

This study uses a qualitative descriptive design in the form of a narrative literature review. The material consists of scientific journal articles, national survey reports, and guidelines issued by related institutions. Article retrieval was carried out through the online portals Medscape, NCBI, and Google Scholar, and was complemented by manual tracing of the reference lists of the articles that had been obtained. The keywords used in the search were sweet food consumption, added sugar, emotional regulation, and preschool children, in both Indonesian and English. Inclusion criteria were set as follows: the article was published within a maximum of the last eight years; the subject was a preschool child or a child of early school age; the article discussed sugar consumption, emotional regulation, or the relationship between the two; and the full text was accessible. Articles that consisted only of an abstract, opinion pieces without data, and articles that did not discuss either of the two variables were excluded. Eleven articles met the criteria and were used as primary sources. Each article was extracted into a synthesis matrix that contained the author, the year, the design, the subject, and the main findings. The extracted data were then analysed thematically by grouping findings that shared a similar meaning into themes, and the themes were compared with one another to obtain a complete description of the relationship between sweet food consumption and emotional regulation. The results of the literature mapping are presented in Table 1.

Table 1. Literature mapping matrix of the reviewed articles

Author (Year)	Focus / Design	Main Findings
Raudhati & Agustina (2022)	Descriptive study of preschool development	Preschool age is a determining phase of development; each child shows different potential and characteristics.
Sibualamu et al. (2022)	Blended learning education for kindergarten teachers	Early detection of emotional behavioural deviation needs to be mastered by teachers because the emotional aspect is easily disturbed at this age.
Anggeriyane et al. (2024)	Descriptive study of emotional mental problems in kindergarten	Impulsivity, difficulty in concentrating, and aggressive behaviour appear frequently and are related to weak emotional regulation.
Firdaus et al. (2025)	Analysis of parenting pattern and school snacks	Parental control over snacks determines the quantity and the frequency of sweet food consumed by the child.
Aila et al. (2023)	Quantitative study, children aged 24-59 months, Central Java	Higher added sugar consumption is accompanied by lower iron and zinc intake.
Ditasari & Putri (2024)	Review of sugar-sweetened beverage reduction and ADHD	Reduction of SSB intake improves behaviour; sugar affects the dopaminergic pathway and the reward response.
Fitriliani et al. (2023)	Review of childhood obesity	Excessive sugar intake contributes to obesity, which is followed by low self-esteem and social discrimination.
Oktaviani et al. (2022)	Dental health education for preschool children	High sugar intake increases the risk of dental caries, which disturbs comfort and appetite.

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Author (Year)	Focus / Design	Main Findings
Leo & Hendriati (2022)	Comparative study of emotional regulation in children aged 4-6 years	Emotional regulation and emotional lability are influenced by the emotional style of the father and the mother.
Novitasari et al. (2025)	Correlational study of preschool children	There is a relationship between sweet food consumption and the emotional regulation of preschool children.
Khosla & Sharma (2024)	Study of parenting practice	Parental education and socioeconomic condition shape parenting style and, through it, child development.

RESULTS AND DISCUSSION

Sweet Food Consumption Patterns of Preschool Children

The first theme that emerges from the review is the high frequency of sweet food consumption. National data show that more than six of every ten Indonesian children aged three years and above consume sweet foods and beverages more than once a day (Kementerian Kesehatan Republik Indonesia, 2022), and the survey in DKI Jakarta records a comparable figure for children aged three to four years (Kementerian Kesehatan Republik Indonesia, 2023). The proportion is well above the World Health Organization recommendation that free sugar be limited to less than ten percent of total energy (World Health Organization, 2015). Two characteristics of this pattern deserve attention. The first is the dominance of beverages. Sugar in liquid form is absorbed faster than sugar in solid form and produces a sharper glycaemic peak, while it gives little satiety, so that the child continues to eat afterwards. The second is the setting of consumption. Much of the intake occurs outside the supervision of the parents, that is at school and in the surrounding stalls, where the child chooses the snack independently (Firdaus et al., 2025). Any intervention that relies only on the household will therefore miss a substantial share of the actual intake.

The Condition of Emotional Regulation in Preschool Children

The second theme concerns the condition of emotional regulation itself. Children who regulate emotion well are able to control, monitor, evaluate, and adjust their emotional reaction so that its intensity and its duration are reduced when the situation requires it (Leo & Hendriati, 2022). On the opposite side stands emotional lability, marked by rapid and extreme changes of emotion and by negative behaviour such as anger, fussiness, and withdrawal (Erlita & Abidin, 2020). The descriptive study in kindergarten reported that emotional mental problems are not rare and that they appear most often as impulsivity and low frustration tolerance (Anggeriyane et al., 2024). This finding is consistent with the observation that underlies the present review, in which tantrums, fussiness, and aggressive behaviour were reported by parents as well as by teachers. The convergence of the two sources of information strengthens the indication that the problem is real and is not merely a matter of parental perception.

Physiological Pathways That Connect Sugar Intake with Emotional Response

The third theme explains how the two conditions above are connected. Glucose is the main energy source of the brain and is needed for the formation of adenosine triphosphate as well as for the synthesis of neurotransmitters. A large intake of simple sugar produces a rapid rise of blood glucose followed by a compensatory insulin response and by a sharp fall. During the falling phase the body releases epinephrine and cortisol, and these hormones are accompanied by restlessness, irritability, and reduced ability to sustain attention. In a child whose inhibitory capacity is still developing, this state is easily expressed as a tantrum.

The second pathway runs through the reward system. Sugar stimulates the release of dopamine and creates a pleasant sensation. When the stimulus is repeated at high intensity, the brain response to dopamine weakens, so that a larger amount is required to obtain the same satisfaction, and the tolerance that develops is accompanied by increased impulsivity and by a stronger drive to seek immediate gratification (Ditasari & Putri, 2024). Both characteristics are the direct opposite of the capacity to delay a response, which is the core of emotional regulation.

The third pathway is nutritional. Added sugar contributes energy without contributing micronutrients, and when it fills a large share of daily energy it displaces foods that are rich in iron and zinc (Aila et al., 2023). Both minerals participate in the synthesis of dopamine and serotonin and in the myelination of nerve fibres, so that their deficiency slows the maturation of the neural circuit that supports emotional control. This pathway operates more slowly than the two preceding it, but its effect accumulates.

Empirical Evidence of the Relationship Between the Two Variables

The fourth theme gathers the empirical evidence. A correlational study of preschool children found a relationship between sweet food consumption and emotional regulation, in which children with a higher frequency of consumption showed higher emotional lability (Novitasari et al., 2025). The intervention side supports the same conclusion from the opposite direction: reducing the consumption of sugar-sweetened beverages was followed by behavioural improvement in children with attention deficit hyperactivity disorder (Ditasari & Putri, 2024)

Evidence also arrives through an indirect route. Excessive sugar consumption raises the risk of obesity, and children with obesity frequently experience low self-esteem and social discrimination (Fitriliani et al., 2023). Both conditions add an emotional burden that makes regulation more difficult. A parallel route runs through dental caries, whose risk rises with sugar intake (Oktaviani et al., 2022) and whose pain disturbs sleep and appetite, two factors that are known to affect the mood of a child. The relationship between sweet food consumption and emotional regulation is therefore not a single line but a network in which several conditions reinforce one another.

It should be stated clearly that the evidence collected here is correlational in character. The reviewed designs do not permit the conclusion that sugar is the cause of poor emotional regulation. The reverse direction is equally plausible, in which a child who is difficult to calm receives sweet food more often because the parents use it as a means of soothing, so that a cycle is formed between the two.

Contextual Factors That Strengthen or Weaken the Relationship

The fifth theme concerns the factors that stand between the two variables. Parenting practice occupies the first position. Parental education and socioeconomic condition shape the choice of parenting style, and that style then affects the emotional development of the child (Khosla & Sharma, 2024). A parent who applies consistent rules about snacks while remaining responsive to the feelings of the child provides a double benefit, since sugar intake is controlled and the child receives a model of emotional regulation at the same time.

The second factor is the school environment. Teachers of kindergarten who are trained to detect emotional behavioural deviation early are better prepared to respond to the fussiness and the aggression of a child in an educative manner (Sibualamu et al., 2022). The school also controls the supply of snacks in the canteen, so that a policy at that level directly changes the exposure of the child to sugar.

The third factor is the eating behaviour of the child. Picky eating and food neophobia are common at preschool age and make the eating pattern unstable. A child who refuses a variety of main foods tends to fill the gap with snacks that are easy to accept, and sweet snacks are the easiest of them. Understanding this behaviour is important because the correct handling of picky eating reduces dependence on sweet food without a confrontation at the dining table.

Practical Implications

The implication for parents is the regulation of sweet food in a wise manner rather than a total prohibition, which is difficult to enforce and often increases the appeal of the forbidden food. Sugar is limited in portion and frequency, water is placed as the main beverage, and sweet food is not used as a reward or as a means of calming. Alongside that, the parent helps the child recognise and name feelings through positive communication, so that emotion is managed through words rather than through food.

The implication for teachers is the integration of nutrition education with emotional education. Material about sugar can be delivered through play, story, and simple habituation such as bringing water from home, while the school limits the sale of sweet snacks in the canteen. Teachers also need capacity in the early detection of emotional problems so that a child who requires further assistance is identified in time (Sibualamu et al., 2022).

The implication for health workers is regular education about the effect of sugar, delivered through the integrated health post, the kindergarten, and the primary health centre. The education is directed not only at knowledge but also at practice, for example by teaching parents to read the sugar content on a nutrition label and to estimate the sugar contained in a packaged beverage.

Limitations of the Study

This review carries several limitations that need to be considered when the results are interpreted. The number of primary articles is limited to eleven, and most of them use a cross-sectional design, so that the direction of the relationship cannot be established. The measurement of sugar consumption in the reviewed studies relies largely on parental report, and a questionnaire completed under time pressure tends to produce inaccurate answers, a condition that reduces data quality in self-report instruments (Chauliac et al., 2023). Careless responding of this kind lowers the reliability of the results and may obscure the actual relationship (Vecchio et al., 2020)

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A low response rate in several of the reviewed studies also produces samples that are less representative and therefore threatens external validity, so that strategies for raising participation are required in survey-based research (Shiyab et al., 2023). Finally, the review is restricted to articles that are accessible in full text and written in Indonesian or English, so that relevant findings published in other languages or in sources with restricted access are not covered.

CONCLUSION

The review of eleven primary articles and the supporting national data indicates a relationship between sweet food consumption and emotional regulation in preschool children. Consumption that is not controlled is associated with fluctuation of blood glucose, weakening of the dopaminergic response, and reduced intake of micronutrients, and these conditions appear behaviourally as impulsivity, difficulty in maintaining attention, tantrums, and emotional lability. The relationship is strengthened by indirect routes through obesity and dental caries, and it is moderated by parenting practice, by the school environment, and by the eating behaviour of the child.

Parents are therefore advised to regulate the sweet food of their children wisely and to help them manage feelings through positive communication. Teachers may combine nutrition education with emotional education and limit the availability of sweet snacks at school. Health workers are expected to provide regular education about the effect of sugar. Because the evidence gathered here is correlational in character, further research is needed with a more in-depth design such as a longitudinal one, with measurement of intake that does not rely solely on parental report, and with attention to other variables such as parenting pattern, physical activity, screen time, and sleep quality.

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