Equivalent : Journal Of Economic, Accounting and Management
Vol. 4 No. 1, 2026, 407-416
Publisher: CV. Doki Course and Training
E-ISSN: 2985-8089 | P-ISSN: 2986-8777

THE COGNITIVE BRIDGE: ANALYZING THE MEDIATING ROLE OF PSYCHOLOGICAL WELL-BEING ON THE IMPACT OF FREE NUTRITIOUS MEALS ON STUDENT LEARNING OUTCOMES

Lily Anisetiawan[1], Vika Annisa Qurrata[2], Thomas Sosecco[3]
Faculty of Economics and Business, Universitas Negeri Malang, East Java [1-3]
Corresponding email: lily.anisetiawan.2504328@students.um.ac.id

ARTICLE INFO

Article History
Submission : 09/12/2025
Review : 15/01/2026
Revised : 24/01/2026
Accepted : 01/02/2026
Publish : 02/02/2026

Keywords
Free Nutritious Meals Program
Psychological Well-being
Student Learning Outcomes
SMKN 3 Balikpapan.

ABSTRACT

This study aims to analyze the effect of the Free Nutritious Meals Program (FNMP) on Student Learning Outcomes (SLO) with Psychological Well-being (PWB) as a mediating variable. The background of this research is driven by the increasing implementation of nutritious food programs in schools, but their effectiveness in improving student learning outcomes still shows variation and does not have consistent conclusions in scientific studies. A quantitative approach with an explanatory survey design was used in this research, involving 108 grade XII students from SMK Negeri 3 Balikpapan as the sample. The research instrument was a Likert scale questionnaire, and data analysis was conducted using Structural Equation Modeling-Partial Least Squares (SEM-PLS). The results showed that FNMP had a positive and significant effect on PWB, and PWB had a significant effect on SLO. Additionally, it was found that FNMP does not directly increase SLO significantly without the involvement of psychological well-being factors. This finding confirms that PWB plays a full mediating role in the relationship between FNMP and SLO. The better the implementation of FNMP, the higher the level of students' psychological well-being, which ultimately improves their learning outcomes. This study concludes that FNMP should not only be understood as a nutritional intervention, but also as a psychological intervention that focuses on improving students' emotional well-being in order to optimize its academic impact. Practically speaking, schools and policymakers are advised to integrate free meal programs with strategies that support students' psychological well-being.

INTRODUCTION

Educational involvement plays a role in developing quality human resources. Various policies related to education regulations have been enacted worldwide to create fair and sustainable education. The main contribution to the problem is the lack of basic literacy skills, with poor nutrition as a contributing factor. This situation requires a

Equivalent : Journal Of Economic, Accounting and Management
Vol. 4 No. 1, 2026, 407-416

solution, so that in the 2023-2024 school year, several states (California, Colorado, Maine, Massachusetts, Michigan, Minnesota, New Mexico, and Vermont) have enacted laws to offer universal free school meals, and by May 2025, at least 25 other states are actively considering similar policies (Zeitlin et al., 2025).

The National School Lunch Program (NSLP) provides access to food for approximately 30 million students every day in the US, serving as an important safety net program by providing a reliable source of nutrition for students. On average, school meals are the healthiest source of food consumed by US students, providing > 50% of their daily energy intake and essential nutrients (Chelius et al., 2025). Universally provided school meals, where all children in school are given free school lunches, can benefit children's health, development, well-being, education, and equity (Manson et al., 2025).

Indonesia has an MBG program designed to reduce the gap in access to nutritious food, especially for students from underprivileged families. According to a FAO report (2022), there are around 45 million children worldwide who suffer from malnutrition, a condition that directly affects their academic performance and physical growth. Indonesia itself still faces the problems of stunting and malnutrition, which remain obstacles in the world of education. Data from the Indonesian Ministry of Health (2023) shows that the national stunting rate has reached 21.6%, which has an impact on children's cognitive development and their ability to understand lessons (Qomarrullah et al., 2025).

Initially, MBG was known as the “free lunch program,” but the scope of the program was later expanded to provide nutritious meals twice a day, namely in the morning and at noon. This expansion was based on findings by the Ministry of Health and the Coordinating Ministry for Human Development and Culture, which revealed that 41% of students in Indonesia go to school hungry, which has a negative impact on the quality of their learning. The MBG program targets not only students, but also toddlers, pregnant women, and nursing mothers. The government has allocated around Rp71 trillion in the 2025 Draft State Budget for the initial phase of implementation, which is planned to start on January 2, 2025. When fully implemented, the program is targeted to reach around 82.9 million recipients (Kevin Andreas Halomoan Tambunan et al., 2025; Merlinda & Yusuf, 2025).

Student academic achievement is a product of the interaction of biological, psychological, and educational environmental factors. Growing evidence, in addition to teaching quality, shows that nutritional status plays an important role in children's cognitive development and daily learning capacity (Wang et al., 2021). Nutritional improvements through school feeding programs that provide nutritious meals have been reported to improve educational outcomes such as attendance, academic achievement, and graduation rates in many contexts, particularly in low- and middle-income countries (Kristjansson et al., 2016; Wang et al., 2021).

Nutrition influences brain functions relevant to learning, including synaptic development, working memory, attention, and information processing speed (Kim et al.,

2024). Micronutrients such as iron, B vitamins, and essential fatty acids are involved in neurotransmission and brain metabolism. Deficiencies in these substances are associated with reduced cognitive performance, which can impact short- and long-term academic outcomes (Gallo Ruelas et al., 2025). Interventions that increase micronutrient intake through school meals or supplements tend to show improvements in cognitive function in school children.

The relationship between nutritious food provision and learning outcomes does not only move through the nutritional pathway to the brain, impacting purely biological academic achievement. Recent literature emphasizes the importance of psychosocial mediators, particularly psychological well-being and learning focus, which act as cognitive bridges between nutritional improvement and educational output (Locke et al., 2024; Olgacher et al., 2025). Access to free school meals not only reduces acute hunger but can also decrease food insecurity-related stress, reduce social stigma, and increase students' emotional engagement in the school environment, all of which contribute to improved learning capacity. Systematic studies and reviews show that universal (non-selective) programs are often more effective in improving psychological well-being because they eliminate the stigma of receiving food assistance (Locke et al., 2024).

The Cognitive Bridge concept in this study integrates two main pathways. The first is the biological-cognitive pathway, in which improved nutritional status enhances basic cognitive capacity (working memory, information processing) necessary for academic learning (Kim et al., 2024). The second is the psycho-behavioral pathway, where access to nutritious food improves psychological well-being (reducing stress, improving mood and sense of security), which in turn increases learning focus, class engagement, and intrinsic motivation to learn (Igor Ferreira Santos Jesus et al., 2025; Ren et al., 2025). These two pathways can reinforce each other; for example, improved nutrition can reduce boredom and irritability, thereby facilitating short-term focus; better focus then allows students to maximize their cognitive capacity.

Based on the issues discussed, the purpose of this study is to analyze the mediating role of psychological well-being in influencing the relationship between the provision of free nutritious meals and student learning outcomes. The expected theoretical contribution is to enrich the ecological model in education through the integration of positive psychology and nutrition science perspectives, particularly in the context of Indonesian vocational education.

METHOD

This study uses a quantitative approach with an explanatory survey design that aims to analyze the mediating role of psychological well-being and learning focus on the effect of free nutritious meals on student learning outcomes. The research process focused on collecting quantitative data through a structured questionnaire instrument that had been tested for validity and reliability. This approach was considered most relevant for

Equivalent : Journal Of Economic, Accounting and Management
Vol. 4 No. 1, 2026, 407-416

measuring the structural relationship between psychological variables, learning patterns, and academic performance as recommended in modern education research based on structural model analysis (Hair et al., 2019).

The research population consisted of all 12th grade students at SMK Negeri 3 Balikpapan. Purposive sampling was used to select classes that had a free nutritious school meal program, thereby ensuring the suitability of the research context.

Table 1. Research sample

Class	Number of Students
XII TKJ 1	36 Students
XII TKJ 2	36 Students
XII BD	36 Students

The sample consisted of three classes, each comprising 36 students, for a total of 108 respondents. This sample size met the minimum recommendation for multivariate quantitative analysis, which is set at a minimum of 100–150 respondents for statistical models with mediating variables (Kline, 2016; Hair et al., 2019). Data collection was conducted using a questionnaire based on a 1–5 Likert scale, ranging from "strongly disagree" to "strongly agree."

Data analysis techniques were performed using Partial Least Squares (PLS)-based Structural Equation Modeling (SEM) because it is suitable for analyzing complex models with mediating variables and medium sample sizes (Henseler et al., 2016). The analysis was carried out in two main stages:

1. Outer Model (Measurement Model)

Evaluation of convergent validity (Outer Loading and AVE), discriminant validity (HTMT), and construct reliability (Composite Reliability and Cronbach Alpha).

2. Inner Model (Structural Model)

Evaluation of R^2, effect size (f^2), predictive relevance (Q^2), and significance testing of path coefficients through bootstrapping to identify the direct and indirect effects of the mediating variables psychological well-being and learning focus.

RESULTS AND DISCUSSION

Results

The participants consisted of 12th grade students from SMK Negeri 3 Balikpapan. The demographics of the respondents showed an interesting pattern, as shown in Table 2. Female students dominated, and the percentage of female students was high. The number of respondents with male characteristics from the 3 classes was 46 respondents with a percentage of 42.60%, while female respondents numbered 62 with a percentage of 57.40%.

Table 2. Respondent Characteristics

XII TKJ 1	Man : 23
	Woman : 13
XII TKJ 2	Man : 22

		Woman : 14
	XII BD	Man : 1
		Woman : 35

The processed data shows that out of a total of 30 questions, there are 7 invalid questions with outer loading values below 0.7.

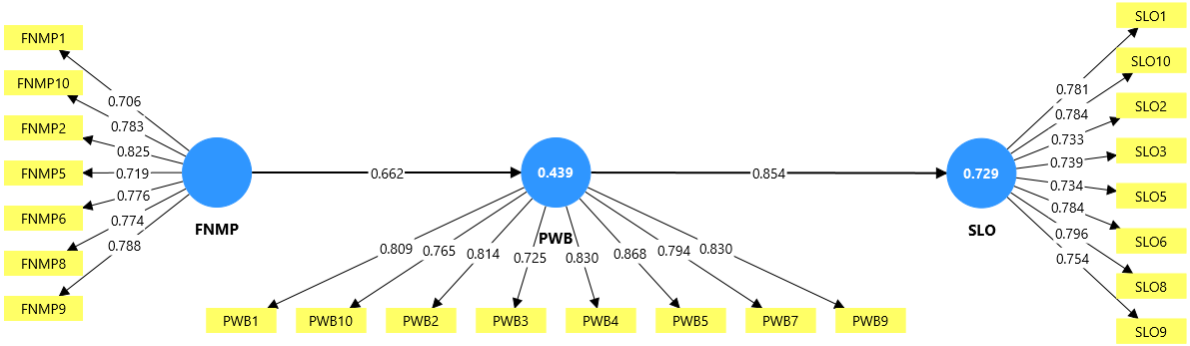

Figure 1. Result outer loading

The re-estimation results show that all variables have met the convergent validity criteria by fulfilling the outer loading above 0.7. It can be seen that the constructed construct is valid.

Table 3. Result Cronbach's alpha, composite reliability, AVE

	Cronbach's alpha	Composite reliability	AVE
FNMP	0.887	0.928	0.590
PWB	0.922	0.925	0.649
SLO	0.898	0.898	0.583

All constructs showed high reliability with Cronbach's Alpha values of FNMP = 0.887, PWB = 0.922, and SLO = 0.898. Composite Reliability ranged from 0.898 to 0.936, indicating excellent internal consistency. The AVE values for all variables are above the minimum threshold of 0.50, namely FNMP = 0.590, PWB = 0.649, and SLO = 0.583, which means that the indicators have strong convergent validity. This confirms that each variable is able to adequately explain its indicator.

Table 4. Result R-square

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)
PWB	0.439	0.454	0.070	6.252
SLO	0.729	0.735	0.061	12.053

The R-Square results show that (1) FNMP explains 43.9% of the variance in PWB (R^2 = 0.439; p = 0.000) (2) PWB explains 72.9% of the variance in SLO (R^2 = 0.729; p = 0.000). The R^2 value of PWB is in the moderate–strong category, while the R^2 value of SLO is in the strong category, indicating that the prediction model is very good.

Direct and indirect tests as well as mediation effects produced the most important findings in this study, with the following results:

Table 5. Direct and indirect test results

Equivalent : Journal Of Economic, Accounting and Management
Vol. 4 No. 1, 2026, 407-416

	Koefisien	T-Statistics	P-Value	Interpretation
FNMP → PWB	0.782	3.064	0.002	Significant
PWB → SLO	2.693	2.799	0.005	Significant
FNMP → PWB → SLO	0.566	9.854	0.000	Significant mediation

Psychological well-being has been shown to be a very strong mediator in the relationship between nutritious food provision and student learning outcomes.

Discussion

The Effect of the Free Nutritious Meals Program on Psychological Well-Being

The results of the study show that the FNMP (Free Nutritious Meals Program) has a positive and significant effect on students' psychological well-being (PWB). These findings reinforce the idea that free nutrition-based meal programs are not only intended to meet students' physical nutritional needs, but also have an impact on the psychological and emotional well-being of students. When students receive nutritious meals with good quality and intensity of provision, they tend to feel appreciated, safe, and cared for by the school. This creates a perception of social support and increases their sense of belonging, namely the feeling that they are an important part of the school community.

These results are in line with the research by Adolphus et al. (2019), which states that consuming nutritious food at school can reduce emotional tension and improve students' mood during the learning process. The results of research by Defeyter et al. (2020) also confirm that school breakfast and lunch programs contribute significantly to reducing anxiety and improving positive mood, especially among students from low-income backgrounds. The improvement in psychological well-being is not only a biological effect of meeting nutritional needs, but also an emotional and social response to the sense of acceptance and attention given by the school institution to students.

The link between the FNMP program and psychological well-being can also be explained through the theory of positive psychology in education, where school policies that eliminate shame, stigma, or discrimination in access to food can increase students' self-esteem and facilitate their emotional stability. Ryff and Keyes (1995) explain that psychological well-being consists of emotional balance, self-acceptance, growth, autonomy, and positive relationships with the environment. When students obtain free meals without administrative or social status barriers, they have more positive social experiences at school. Research by Murphy et al. (2016) found that the implementation of a universal (non-conditional) school breakfast program has a stronger impact on psychological well-being than selective programs that are only provided to poor students, because it eliminates potential social stigma. These findings position the FNMP as a form of nutrition-based educational intervention that also functions as psychosocial support for students.

The Effect of the Free Nutritious Meals Program on Student Learning Outcomes

The findings also show that psychological well-being has a significant effect on student learning outcomes (SLO). Students with high levels of psychological well-being

tend to have strong learning engagement, emotional control when facing difficulties, and internal motivation to achieve academic success. This relationship can be explained through motivation and self-regulated learning theories, which state that positive emotional states increase cognitive capacity and resilience in learning (Zimmerman, 2002).

These findings are consistent with Ryff's (2013) study, which shows that psychological well-being is closely related to cognitive capacity, self-determination, emotional regulation, and the ability to make productive academic decisions. A study by Huo (2022) proves that psychological well-being has a significant effect on learning focus and engagement in both online and face-to-face learning. Students with low stress levels and stable moods are more resistant to distractions, more active in asking questions, and better able to remember and apply the subject matter.

Research by C Hattie (2009) in his meta-analysis found that students' emotional conditions and self-perceptions are stronger predictors of learning outcomes than variables such as learning methods or school facilities. Psychological well-being increases information processing capacity and cognitive speed, especially when students feel loved, accepted, and safe in the learning environment (Laakso et al., 2021). The relationship between PWB and SLO is not only an emotional one, but also has a strong neurocognitive basis, as positive emotional states affect the activation of brain regions responsible for working memory and concentration.

The Mediating Effect of Psychological Well-Being on the Free Nutritious Meals Program's Impact on Student Learning Outcomes

The mediating effect of FNMP → PWB → SLO shows that FNMP works effectively in improving academic achievement only if students' psychological capabilities are strengthened. Providing nutritious meals does not automatically improve academic grades; the academic impact occurs when the FNMP first improves students' inner state, self-confidence, social comfort, and emotional stability. This pattern of relationship is very much in line with a systematic study that found that nutrition-based free meal programs only have a significant academic effect when they involve aspects of social support and students' psychological experiences in their implementation (Cohen et al., 2021). School nutrition improves achievement indirectly by strengthening motivation, class engagement, and perceptions of academic competence.

This mediating effect emphasizes that school food policies should be understood as nutrition-based psychological interventions. Schools that only provide food without paying attention to a non-discriminatory atmosphere and students' emotional comfort tend to have low academic impacts. Schools that manage free meals as part of a student social welfare strategy will achieve maximum effects on achievement. When students feel known, accepted, and cared for through FNMP, they feel valuable enough to try harder in their studies (Huo, 2022; Laakso et al., 2021).

When synthesized as a whole, this study positions FNMP as an external educational stimulus, psychological well-being as an internal psychological mechanism, and SLO as

the final academic output. This pattern shows that education that humanizes students by providing basic needs and emotional reinforcement will produce more solid academic achievements than a purely pedagogical approach. This finding also expands the global literature on school nutrition, reinforcing the idea that nutrition, psychological well-being, and academic achievement are three components that influence each other in an educational ecosystem.

CONCLUSION

This study was conducted to examine the effect of the Free Nutritious Meals Program (FNMP) on Student Learning Outcomes (SLO) with Psychological Well-being (PWB) as a mediating variable. Based on the results of SEM-PLS analysis conducted on 108 students in grade XII at SMK Negeri 3 Balikpapan, this study produced several important conclusions. First, FNMP was proven to have a positive and significant effect on PWB. The implementation of the free nutritious meals program had an impact beyond merely fulfilling physical needs; the program was able to increase students' feelings of being valued, accepted, safe, and cared for in the school environment. These conditions contributed to improved mood, emotional stability, and self-confidence among students, thereby creating better psychological well-being

Second, the study shows that PWB has a positive and significant effect on SLO. Students with high levels of psychological well-being tend to have emotional calmness, strong learning motivation, good self-control, and higher academic resilience, which ultimately leads to more optimal learning outcomes. In other words, psychological well-being is a prerequisite for productive and meaningful learning processes.

Third, this study found that FNMP does not directly increase SLO significantly without the involvement of PWB factors. These findings indicate that FNMP works most effectively as a stimulus that builds the foundation of students' emotional well-being, and it is through these stable psychological conditions that academic improvement occurs. Thus, psychological well-being acts as a full mediator in the relationship between FNMP and SLO. This finding proves that the success of school meal programs in improving academic achievement is not solely determined by the nutritional value consumed, but mainly by the psychosocial and emotional impacts created through their implementation

References

C Hattie, J. A. (2009). *Visible Learning: A Synthesis of Over 800 Meta-Analyses Relating to Achievement*.

Chelius, C., Bacon, K. A., Orta-Aleman, D., Zuercher, M. D., Ritchie, L. D., Cohen, J. F. W., Hecht, C. E., Hecht, K., & Gosliner, W. (2025). California Middle and High School Students Report Wanting Fresh and Healthy School Lunch in the Context of Universal School Meals. *Journal of Nutrition Education and Behavior*, *57*(5), 374–384. https://doi.org/10.1016/j.jneb.2025.01.006

Cohen, J. F. W., Hecht, A. A., McLoughlin, G. M., Turner, L., & Schwartz, M. B. (2021). Universal school meals and associations with student participation, attendance, academic performance, diet quality, food security, and body mass index: A systematic review. *Nutrients*, *13*(3), 1–41. https://doi.org/10.3390/nu13030911

Gallo Ruelas, M., Alvarado-Gamarra, G., Aramburu, A., Dolores-Maldonado, G., Cueva, K., Rojas-Limache, G., Diaz-Parra, C. del P., & Lanata, C. F. (2025). A comparative analysis of heme vs non-heme iron administration: a systematic review and meta-analysis of randomized controlled trials. In *European Journal of Nutrition* (Vol. 64, Issue 1). Springer Science and Business Media Deutschland GmbH. https://doi.org/10.1007/s00394-024-03564-y

Huo, J. (2022). The Role of Learners' Psychological Well-Being and Academic Engagement on Their Grit. *Frontiers in Psychology*, *13*. https://doi.org/10.3389/fpsyg.2022.848325

Igor Ferreira Santos Jesus, J., Monfort-Pañego, M., Victor Alves Santos, G., Carla Monteiro, Y., Marçal Nogueira, S., Rayanne Silva, P., & Noll, M. (2025). Food, Quality of Life and Mental Health: A Cross-Sectional Study with Federal Education Workers. *Nutrients*, *17*, 2519. https://doi.org/10.3390/nu

Kevin Andreas Halomoan Tambunan, Ridha Nababan, Rimma Anisa Siagian, Roslin Naiborhu, Sintia Harianti, & Jamaludin Jamaludin. (2025). Tinjauan Kritis Tentang Program Makan Bergizi Gratis Terhadap Produktivitas Belajar Siswa. *Katalis Pendidikan : Jurnal Ilmu Pendidikan Dan Matematika*, *2*(2), 21–31. https://doi.org/10.62383/katalis.v2i2.1428

Kim, C., Schilder, N., Adolphus, K., Berry, A., Musillo, C., Dye, L., Cirulli, F., Korosi, A., & Thuret, S. (2024). The dynamic influence of nutrition on prolonged cognitive healthspan across the life course: A perspective review. In *Neuroscience Applied* (Vol. 3). Elsevier B.V. https://doi.org/10.1016/j.nsa.2024.104072

Kristjansson, E. A., Gelli, A., Welch, V., Greenhalgh, T., Liberato, S., Francis, D., & Espejo, F. (2016). Costs, and cost-outcome of school feeding programmes and feeding programmes for young children. Evidence and recommendations. *International Journal of Educational Development*, *48*, 79–83. https://doi.org/10.1016/j.ijedudev.2015.11.011

Laakso, M., Fagerlund, Å., Pesonen, A. K., Lahti-Nuuttila, P., Figueiredo, R. A. O., Karlsson, C., & Eriksson, J. G. (2021). Flourishing Students: The Efficacy of an Extensive Positive Education Program on Adolescents' Positive and Negative Affect. *International Journal of Applied Positive Psychology*, *6*(3), 253–276. https://doi.org/10.1007/s41042-020-00048-2

Locke, A., James, M., Jones, H., Davies, R., Williams, F., & Brophy, S. (2024). Impacts of Global School Feeding Programmes on Children's Health and Wellbeing Outcomes: A Scoping Review. In *BMJ Journals*. https://doi.org/10.1101/2024.09.03.24312981

Manson, A. C., Golley, R. K., Dutch, D. C., & Johnson, B. J. (2025). "Not just students in need": Findings from a nominal group technique study of what parents want in an Australian school-provided meal system. *Australian and New Zealand Journal of Public Health*, *49*(2). https://doi.org/10.1016/j.anzjph.2025.100221

Merlinda, A., & Yusuf, S. (2025). Analisis Program Makan Gratis Prabowo Subianto Terhadap Strategi Peningkatan Motivasi Belajar Siswa di Sekolah Tinjauan dari Perspektif Sosiologi Pendidikan. *Ranah Research : Journal of Multidisciplinary Research and Development*, *7*(2), 1364–1373.

Olgacher, D., Aldukair, S., Clarke, M., McCarthy, D., & Woodside, J. V. (2025). An Umbrella Review of Systematic Reviews of School-Based Nutrition Interventions to Determine Outcomes Used and Their Measurement Tools. *Nutrition Reviews*. https://doi.org/10.1093/nutrit/nuaf144

Qomarrullah, R., Suratni, Wulandari, L., & Sawir, M. (2025). THE LONG-TERM IMPACT OF THE FREE NUTRITIOUS MEAL PROGRAM ON HEALTH AND EDUCATIONAL SUSTAINABILITY. *Indonesian Journal of Intellectual Publication*.

Ren, T., Lu, Y., Dai, Z., Yang, J., Wu, Y., Chang, F., Wang, S., Wang, L., & Lu, Y. (2025). Effects of Nutrition-Specific Interventions to Prevent and Control Nutrition-Related Anemia in Infants, Children, and Adolescents: A Systematic Review and Network Meta-Analysis of Randomized Controlled Trials. *Journal of the Academy of Nutrition and Dietetics*, *125*(7), 964-983.e13. https://doi.org/10.1016/j.jand.2025.01.002

Ryff, C. D. (2013). Psychological well-being revisited: Advances in the science and practice of eudaimonia. *Psychotherapy and Psychosomatics*, *83*(1), 10–28. https://doi.org/10.1159/000353263

Wang, D., Shinde, S., Young, T., & Fawzi, W. W. (2021). Impacts of school feeding on educational and health outcomes of school-age children and adolescents in low- and middle-income countries: A systematic review and meta-analysis. *Journal of Global Health*, *11*, 1–27. https://doi.org/10.7189/jogh.11.04051

Zeitlin, A. B., Gómez, A. Z. D., Lee, C. J. Y., Pedroza-Tobias, A., Hecht, C. A., Patel, A. I., Hecht, K., & Grummon, A. H. (2025). Perspectives on Messaging Strategies to Increase Participation in Universal Free School Meal Programs: A Qualitative Study With Parents of Elementary School-Aged Children. *Journal of the Academy of Nutrition and Dietetics*. https://doi.org/10.1016/j.jand.2025.09.011

Zimmerman, B. J. (2002). Becoming a self-regulated learner: An overview. In *Theory into Practice* (Vol. 41, Issue 2, pp. 64–70). Ohio State University Press. https://doi.org/10.1207/s15430421tip4102_2