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WHEN GOOD INTENTION FAILS: A STRESS AND CULTURE INDUCED SELF-REGULATION BREAKDOWN MODEL OF HEALTHY EATING BEHAVIOR IN INDONESIA

Lissa Rosdiana Noer¹, Arman Hakim Nasution¹, Fadila Isnaini¹, Berto Mulia Wibawa, Suci Megawati², Muhammad Alfarizi¹

¹Department of Business Management, Faculty of Creative Design and Digital Business, Institut Teknologi Sepuluh Nopember, Surabaya, Indonesia

²Department of Public Administration, Faculty of Social Science and Political Science, Universitas Negeri Surabaya, Surabaya, Indonesia

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Corresponding Author: Lissa Rosdiana Noer

(lissarosdiananoer@gmail.com)

ABSTRACT

Despite widespread awareness of the benefits of healthy eating, many individuals fail to translate good intentions into actual dietary behavior. This study investigates why healthy eating intentions frequently collapse in Indonesia by developing and empirically testing a Stress and Culture Induced Self-Regulation Breakdown Model. Drawing on self-regulation theory, emotional eating literature, and socio-cultural perspectives, the model examines how perceived daily stress, time scarcity, and food environment pressure interact with cultural eating norms to shape eating behavior deviation. Using a cross-sectional survey and Partial Least Squares Structural Equation Modeling (PLS-SEM), data were analyzed to assess both direct and moderated relationships among key constructs. The results reveal that perceived daily stress and food environment pressure significantly increase both negative emotional eating and self-regulation failure. Time scarcity does not directly trigger emotional eating but significantly undermines self-regulation capacity through cognitive overload. Importantly, negative emotional eating emerges as the dominant and proximal predictor of healthy eating behavior deviation, while self-regulation failure alone does not directly translate into unhealthy eating without affective activation. Moderation analysis further demonstrates that cultural eating norms significantly amplify the effects of time scarcity and food environment pressure on self-regulation failure, whereas gender differences are negligible. These findings suggest that unhealthy eating failure in Indonesia is not primarily driven by a lack of knowledge or weak willpower, but by affective regulatory processes embedded within stressful, time-pressured, and culturally permissive food environments. The study advances the literature by integrating emotional, cognitive, and cultural mechanisms into a unified explanatory framework. Practically, the results highlight the need for emotion-sensitive and culture-responsive public health interventions that move beyond individualistic self-control models toward systemic and contextual solutions.

KEYWORDS: Cultural Eating Norms, Food Environment Pressure, Negative Emotional Eating, Perceived Daily Stress, Self-Regulation Failure.

1. INTRODUCTION

Non-communicable diseases (NCDs), including obesity, diabetes, and cardiovascular diseases, continue to impose a substantial global health burden and currently account for more than 70% of all deaths worldwide (World Health Organization, 2024). Evidence from the Global Burden of Disease studies indicates that NCDs were responsible for over 43 million deaths and more than 1.7 billion disability-adjusted life years globally, with cardiovascular diseases and diabetes as major contributors (Y. Huang *et al.*, 2025). Beyond health outcomes, NCDs generate profound economic pressures, with projected global productivity losses reaching tens of trillions of US dollars and placing sustained strain on already overstretched health systems, particularly in low- and middle-income countries (LMICs) (Thakur *et al.*, 2011). In Asia and other LMICs, the burden of NCDs has intensified alongside rapid urbanization and dietary transitions toward energy-dense, ultra-processed foods high in sugars, fats, and refined carbohydrates (Chakrabarti & Verguet, 2022). Notably, these trends persist despite extensive public health campaigns promoting healthy lifestyles and dietary awareness (Bassi *et al.*, 2024). This situation reflects a central paradox in contemporary nutrition research: while awareness of healthy eating continues to increase, the consistency and sustainability of healthy dietary behaviors appear to stagnate or even deteriorate.

In Indonesia, the burden of non-communicable diseases has reached a particularly alarming level. National and international data indicate that NCDs accounted for more than three-quarters of all deaths in 2025, with obesity, diabetes, and cardiovascular diseases as the dominant contributors (World Health Organization, 2025). Evidence from Riskesdas and related national analyses shows a persistent rise in obesity and central obesity across provinces, which substantially elevates the risks of hypertension, diabetes, and coronary heart disease (Ferdina *et al.*, 2024). Diabetes prevalence alone is projected to increase markedly over the coming decades, accompanied by growing cardiovascular mortality linked to hyperglycemia and obesity (Sibarani & Somboonsuke, 2024). This growing burden unfolds within a distinctive Indonesian environment characterized by rapid urbanization, long working hours, and profound changes in the food environment. Urban lifestyles increasingly favor convenience-oriented eating patterns, supported by the rapid expansion of fast-food outlets and online food delivery platforms, which promote energy-dense and highly processed foods (Mallick & Sahoo,

2025). Consequently, despite widespread health promotion initiatives, structural and lifestyle pressures continue to undermine consistent healthy eating practices in Indonesia.

Many public health policies and nutrition interventions continue to rely heavily on education, awareness raising, and the assumption that stronger individual intentions will translate into healthier eating behaviors. However, a growing body of empirical evidence demonstrates that such knowledge-based approaches rarely achieve sustained dietary change over time. Studies consistently show that individuals may possess adequate nutrition knowledge and express strong intentions to eat healthily, yet still engage in unhealthy eating practices in their daily lives (Mancone *et al.*, 2024; Wang-Chen *et al.*, 2022). This intention-behavior gap reflects persistent behavioral inconsistencies, where situational, social, and contextual influences frequently override healthy eating goals (Aulbach *et al.*, 2025). Eating behavior is often automatic and cue-driven rather than the outcome of deliberate decision-making, making it highly vulnerable to environmental exposure and social norms (Atakan & Bagozzi, 2025). Consequently, the core challenge is not a lack of awareness or intention, but the difficulty of maintaining healthy eating behaviors within real-life contexts characterized by competing demands, convenience pressures, and habitual responses (Wattick *et al.*, 2023).

Everyday eating decisions are embedded in the pressures and constraints of daily life rather than made under ideal, rational conditions. Contemporary lifestyles are increasingly characterized by high work demands, prolonged mental effort, and persistent time scarcity, all of which impose substantial cognitive and emotional burdens on individuals (Majumdar, 2022). Sustained work pressure and insufficient recovery contribute to mental fatigue and reduced cognitive capacity, impairing judgment and increasing reliance on habitual or convenience-based choices (Law *et al.*, 2020). Under conditions of time pressure and cognitive depletion, individuals tend to prioritize immediacy and effort minimization over deliberative evaluation of long-term health consequences (Huseynov & Palma, 2021). These everyday constraints are further reinforced by contemporary consumption environments dominated by cheap, fast, and readily accessible unhealthy food options. The widespread availability and affordability of energy-dense foods make them particularly attractive when cognitive resources are strained and

time is limited (van der Veer et al., 2024). As a result, food choices are often adaptive responses to pressure-laden contexts rather than failures of knowledge or motivation, highlighting the need to reconsider healthy eating as a behavior shaped by lived constraints rather than purely rational intent.

Eating behavior in Indonesia is deeply embedded in socio-cultural practices and a highly diverse culinary tradition characterized by intensive use of spices, rich flavors, and cooking methods that often involve high fat and calorie content (Dziljian et al., 2025; Wijaya, 2019). Food is not merely a nutritional choice but a central element of social life and cultural identity. Norms of eating together remain dominant, reinforcing social cohesion while simultaneously shaping individual food intake through shared dishes and collective expectations (Pramezwarly et al., 2025a). In such contexts, refusing food is socially complex and may be perceived as impolite or disrespectful, as food often serves as an expression of hospitality and relational commitment (Higgs et al., 2019). However, much of the global healthy eating literature is grounded in Western cultural assumptions that emphasize individual autonomy and rational choice. These models often overlook the social obligations and cultural pressures inherent in non-Western settings such as Indonesia, thereby limiting their explanatory power and practical relevance (Jayasinghe et al., 2025). Consequently, dietary behavior cannot be fully understood without accounting for its cultural embeddedness and social meaning.

Although the literature on healthy eating behaviors has grown rapidly, significant scientific and practical gaps remain. Conceptually, most studies place healthy eating behaviors as the result of an individual's knowledge, intentions, or attitudes, assuming that the individual acts rationally and consistently. This approach tends to ignore the real conditions under which eating decisions are made, i.e., under the pressure of daily stress, time constraints, mental exhaustion, and socio-cultural demands. The literature on stress, emotions, and self-regulation often stands apart from the study of consumption culture and environment, thus failing to capture the mechanisms of behavioral failure holistically. From a practical perspective, nutrition policies and interventions still focus on education and awareness campaigns, which have proven to have a short-term, less effective impact on the daily lives of the Indonesian people. As a result, there is a gap between the design of intention-based interventions and the reality of eating behaviors shaped by structural pressures and binding social

norms.

Based on these gaps, the study asks several key questions:

RQ1. To what extent do daily stress, time constraints, and dietary environmental pressures significantly predict self-regulation failure and negative emotional eating as the psychological mechanisms that accompany deviations in healthy eating behaviors?

RQ2. Do gender and cultural eating norms moderate the relationship between situational stress (stress, time scarcity, food environment pressure) and psychological mechanisms (negative emotional eating and failure to self-regulate)?

This study aims to empirically examine the model of self-regulation failure triggered by stress and culture to explain the deviation from healthy eating behavior in Indonesia. This study also seeks to evaluate the role of gender moderation and cultural eating norms in strengthening or weakening the relationship between situational stress and individual psychological responses. The theoretical contribution of this study lies in affirming that deviations in healthy eating behaviors are not solely the result of a failure of intention, but rather a consequence of structural and cultural pressures that act directly on the individual. This study expands the literature on eating behavior by integrating psychological and socio-cultural factors. Practically, the findings of this study provide an empirical basis for designing nutrition policies and public health interventions that are more realistic, with a focus on stress management, the food environment, and the social norms that shape daily consumption behaviors.

2. LITERATURE REVIEW

2.1. *Healthy Eating Behavior dan Intention-Behavior Gap*

Healthy eating behavior is a fundamental component of public health because it is directly related to the prevention of non-communicable diseases such as obesity, hypertension, and diabetes (Zhang & Yang, 2023). However, a healthy diet is not only determined by nutritional knowledge, but is also influenced by socio-economic conditions, cultural preferences, and the availability and affordability of healthy foods (Penafiel et al., 2022; Van Der Velde et al., 2019). Many people intend to eat healthier, but daily practices are often inconsistent—a phenomenon known as the intention-behavior gap (Higgs, 2015; van't Riet et al., 2011). Globally, research shows healthy eating intentions are high, but food prices hamper their

implementation, the convenience of ultra-processed foods, social influences, and the obesogenic food environment (Kotowska *et al.*, 2024). In Indonesia, a similar pattern has occurred: the transition to fast food and high sodium consumption has led to low fruit and vegetable intake despite increased nutritional awareness (Nurhasan *et al.*, 2024; Rachmi *et al.*, 2021). Urban teenagers in Jakarta, for example, have healthy intentions but remain high in unhealthy snacking (Lisetyaningrum & Pujasari, 2021). The behavioral literature explains that the intention-action gap arises because eating decisions are often automatic, triggered by food cues, momentary emotions, and habits formed in daily routines. Self-regulation capacity, automaticity, and long-term habit formation are key determinants of the realization of healthy eating behaviors (Worsley *et al.*, 2018). Thus, improving eating behavior is not enough to increase intention but requires context-based interventions, environmental support, and self-regulation strategies.

2.2. Stress, Cognitive Load, and Self-Regulation Breakdown dalam Eating Behavior

Stress is defined as a disturbance of perception of an individual's psychophysiological balance, ranging from acute stress to prolonged chronic stress (Ross, 2020). In the context of food consumption, stress often arises from daily hassles—small demands that interfere with daily routines (Wright *et al.*, 2010) and can encourage increased consumption of high-sugar/fat foods as well as decreased diet quality (O'Connor *et al.*, 2008). This condition is exacerbated by time scarcity, which is the perception of a lack of time to prepare healthy food, so that individuals tend to choose fast food or ready-to-consume products (Jabs & Devine, 2006). Meanwhile, mental fatigue arises due to prolonged cognitive activity and decreases executive control functions, decision-making ability, and sensitivity to hunger and satiety signals (Alfarizi *et al.*, 2024; Veasey *et al.*, 2013; C.-H. Wu *et al.*, 2024).

The primary psychological mechanism that links stress to unhealthy eating behaviors is self-regulation breakdown, when self-regulation capacity decreases due to cognitive load and mental energy consumption (Bian *et al.*, 2025; Deck & Jahedi, 2015). HPA-axis activation and increased cortisol trigger a preference for high-calorie comfort foods as a form of emotional coping (Finch & Tomiyama, 2014; Torres & Nowson, 2007). This pattern is known as stress-induced eating, which is eating that is driven by emotions, not physiological needs (Tan & Chow, 2014; Warren & Frame, 2025). Foods high in sugar

and fat provide short-term relief by suppressing stress responses, but reinforce repetitive emotional eating habits (Chiu & Tomiyama, 2023). Under conditions of high cognitive load, eating decision-making shifts from deliberative to impulsive processes, making it difficult to realize the intention to eat healthily in real practice.

Taken together, self-regulation failure and negative emotional eating represent two theoretically distinct but sequentially related mechanisms in the stress-eating process. Self-regulation failure reflects a cognitive depletion pathway, whereby stress, time pressure, and mental fatigue undermine executive control, planning capacity, and impulse inhibition. This weakened regulatory state does not automatically result in unhealthy eating behavior; rather, it creates a latent vulnerability. Behavioral deviation becomes most pronounced when this vulnerability is affectively activated through negative emotional eating, in which food is used as a maladaptive emotion regulation strategy in response to stress and negative affect. In this sense, self-regulation failure functions as a distal and enabling condition, while negative emotional eating serves as the proximal trigger that translates stress-induced dysregulation into observable deviations in healthy eating behavior.

2.3. Cultural Eating Norms, Social Obligations, and Collective Consumption in Indonesia

Eating culture in Indonesia is deeply rooted in communal practices, the value of cooperation, and the symbolism of food as a social medium. Traditions such as Makan Megibung in Karangasem-Bali show how eating together is not only a nutritional activity, but a mechanism to build social cohesion, community collaboration, and cultural identity (Pramezwary *et al.*, 2025b). The value of cooperation is reflected in the process of cooking, sharing food, and distributing the local economy, just as the preservation of East Java's culinary interests encourages the people's economic sector (Santoso *et al.*, 2025) and the practice of food-sharing networks in Jakarta villages (Arciniegas, 2021). In addition, food has religious and historical symbolic value—tumpeng is a representation of gratitude and collective harmony (Surya *et al.*, 2025), while the representation of sweet cakes in Bobo magazine shows how food shapes social meaning and preferences from an early age (Fadhilla & Hudaa, 2025).

This communal context gives rise to social pressure in eating together situations, such as food refusal difficulty, when refusing food is seen as

disrespectful, hurting the giver's feelings, or disturbing social harmony (Cheney, 2013; Schönberger & Schröder, 2015). The phenomenon of courtesy eating and social expectation eating emerged as a form of conforming to norms, maintaining relationships, or people-pleasing (Exline et al., 2012). Modeling eating behavior between friends/family increases the portion of consumption through social facilitation (Higgs et al., 2022; Kaisari & Higgs, 2015; Q. Wu et al., 2025), suggests that social norms can reinforce impulsive eating behaviors—even when individuals have healthy eating intentions.

In contrast to the more individualistic Western culture, where self-control is often linked to personal autonomy, Indonesia's collectivist culture makes food a behavioral gatekeeper that can strengthen self-regulation through norms of control and social awareness, but also weaken it when norms demand compliance with group consumption (Jaramillo et al., 2017; Onwezen et al., 2014). Responses to gender-based social pressures are also relevant—women are more often associated with the practice of courtesy eating for the sake of harmony. At the same time, men tend to be influenced by masculine norms in food choices. Thus, culture functions as a behavioral gatekeeper, which, in some contexts, refines self-control through social norms, but, in others, weakens it through collective pressure to eat.

2.4. Integrated Underpinning Theory: Strength Model of Self-Regulation & Ego Depletion Theory

The Strength Model of Self-Regulation posits that self-regulation draws on limited psychological energy and can decline when individuals face stress, cognitive demands, or repetitive decision-making (Baumeister et al., 2018; Baumeister & Vohs, 2016). When regulatory resources are depleted, a condition of ego depletion occurs, which is a phase in which an individual's ability to resist temptation, control impulses, and maintain goal-oriented behavior becomes weakened (Baumeister, 2003; Hagger et al., 2010). In this phase, individuals are more likely to fail to maintain a healthy diet despite having strong intentions beforehand (Hagger et al., 2009).

Decreased self-control capacity drives a behavioral shift from deliberative processes to habitual and hedonic-driven choices, such as sweet/fatty food preferences, as emotional compensation (Englert, 2017; Maples-Keller et al., 2016). This mechanism is in line with the theory of Dual Processing, where System 2 (rational, slow, evaluative) requires mental resources, while System

1 is automatic, fast, and reward-based (Duell et al., 2016; Miller & Gizer, 2024). As mental resources decrease, System 2's control weakens, so that more eating decision-making is controlled by System 1, which triggers impulsive eating behaviors and makes it difficult to resist the temptation of delicious, practical, and high-calorie foods (Ellingson et al., 2018). Thus, this theory provides a conceptual basis for why good intentions often fail in healthy eating practices. Ego depletion explains that failure is not solely due to a lack of intention, but to a self-control resource depleted by daily stress and cognitive pressure.

3. HYPOTHESIS DEVELOPMENT

3.1. The Influence of Perceived Daily Stress on Emotional Eating and Self-Regulation Failure

Perceived daily stress refers to the process of subjective evaluation of individuals against daily demands and pressures that are considered to exceed the coping capacity possessed (Gyllensten, 2021; Hemati & Kiani, 2015). Because it is subjective, the level of stress felt is determined not only by the intensity of the stressor, but also by the perception of health, psychological condition, and the resources of individual self-regulation (Stefaniak et al., 2022). Different from objective stress, perceived stress emphasizes the perception of uncertainty, the inability to control situations, and feelings of overload in daily life, which are generally measured using the Perceived Stress Scale (PSS) (Kołodziej et al., 2025). The literature consistently shows that perceived stress in daily life contributes significantly to decreased psychological well-being and increased cognitive load, which ultimately weakens executive function and self-control (Shukri et al., 2024; Tracy et al., 2022).

Numerous cross-country empirical studies have consistently found that perceived daily stress is positively associated with emotional eating. This is because there is a tendency for routine stress levels to encourage eating food in response to negative emotions rather than physiological signals of hunger (Okumus & Ozturk, 2021). Study with students in Saudi Arabia (El-Zayat et al., 2025), Turki (Ersoy et al., 2024), and Amerika Serikat (Okumus & Ozturk, 2021) suggests that individuals with higher levels of stress tend to choose foods high in sugar, fat, and salt as emotional coping mechanisms. Emotional eating functions as a short-term emotion regulation strategy, but it is maladaptive because it does not resolve the source of stress and instead increases the risk of failure of healthy behaviors (Sporea et al., 2025).

Stress is also considered the main factor that depletes self-regulatory resources (ego depletion). Chronic psychological stress decreases an individual's capacity to maintain self-control, attention, and executive function necessary in healthy eating decision-making (Benson *et al.*, 2023). Various studies show that stress interferes with working memory and cognitive control, making individuals more impulsive and more dependent on habits or emotional responses in choosing foods (Chowdhury & Bhattacharyya, 2023; Salahuddin *et al.*, 2025). This condition explains why good intentions for healthy eating often fail when individuals are under high daily stress.

Based on these theoretical arguments and empirical findings, this study proposes the following hypotheses:

Hypothesis 1: Perceived Daily Stress has a significant positive effect on Negative Emotional Eating

Hypothesis 2: Perceived Daily Stress has a significant positive impact on Self-Regulation Failure

3.2. Time Scarcity as a Driver of Emotional Eating and Self-Regulation Breakdown

Time scarcity is defined as an individual's subjective perception that available time is insufficient to meet the demands of daily activities (De Sousa *et al.*, 2018). In contrast to material limitations, time scarcity is a form of psychological scarcity that directly burdens an individual's cognitive and emotional resources, thereby affecting decision-making processes and health behaviors (Venn & Strazdins, 2017). In modern society, high time pressure due to work, family commitments, and daily mobility makes time scarcity a chronic structural condition.

Cross-country empirical literature consistently shows that time scarcity is closely related to unhealthy food choices. A classic study in the United States found that individuals with limited time were more likely to consume fast food and processed foods because they required minimal preparation time (Jabs & Devine, 2006). Similar findings were reported in Australia, where time constraints contributed to low fruit and vegetable consumption and decreased physical activity with cooking (Venn & Strazdins, 2017). This condition suggests that, even though individuals intend to eat healthily, time constraints systematically hinder the realization of those intentions.

From a psychological perspective, time scarcity increases cognitive load and creates a state of

“tunneling,” where an individual's attention is focused on solving short-term demands, while long-term goals such as health become marginalized (van der Veer *et al.*, 2024). Under time pressure, individuals tend to use simple heuristics and choose the quickest and most convenient option, even if it is contrary to health goals (Lai & Gershman, 2024). This process weakens self-control and increases susceptibility to self-regulation failure.

Time scarcity also serves as an emotional trigger, encouraging emotional eating. Time pressure increases stress, mental fatigue, and negative emotions, which further trigger food consumption as a form of escape or emotional comfort (Fuentes *et al.*, 2023; Ling & Zahry, 2021). Studies in college students and office workers show that the combination of stress and time constraints significantly increases the tendency to engage in impulsive eating and unbalanced snacking (Knightley *et al.*, 2023; Silva & Rodrigues, 2025). Emotional eating in this condition reflects a failure of self-regulation, where the individual is no longer able to delay gratification or control the impulse to eat.

Based on the conceptual arguments and empirical evidence above, this study proposes the following hypotheses:

Hypothesis 3: Time Scarcity has a significant positive effect on Negative Emotional Eating

Hypothesis 4: Time Scarcity has a significant positive effect on Self-Regulation Failure

3.3. Food Environment Pressure and Its Impact on Eating Dysregulation

Food environment pressure refers to the sustained pressure that arises from the characteristics of the food environment, both physical, social, economic, and digital, that systematically encourage individuals to consume foods that are high in energy, low in nutrition, and highly palatable (Franco *et al.*, 2015; Turner, 2025). In an obesogenic environment, healthy food choices become less available, less affordable, or less attractive than unhealthy alternatives, creating a structural imbalance between individual intentions and actual behaviors (Drewnowski *et al.*, 2020). Various cross-contextual studies show that environmental pressures on food play an essential role in the emergence of eating dysregulation, including emotional eating, uncontrolled eating, and self-regulatory failure. Studies in Europe and North America found that the widespread availability of foods high in sugar and fat significantly increased the frequency of emotional and uncontrolled eating, which was ultimately associated with higher body mass index (BMI)

(Medina et al., 2024). Among adolescents, home and outdoor environments rich in snacks and sweetened beverages have been shown to weaken self-regulation, especially when self-control is still developing (Luszczynska et al., 2013).

From a psychological perspective, food environment pressure works through a constant mechanism of exposure to cues (food cues). This exposure increases the activation of the reward system and demands a high inhibition capacity to maintain healthy eating behaviors (de Ridder et al., 2013). However, these inhibition abilities are often limited, especially in individuals with high levels of impulsivity or emotional vulnerability. Experimental studies show that the presence of tempting foods can trigger self-regulation success in normal-weight individuals, but instead leads to overeating in overweight or restrained eaters (Ouweland & Papies, 2010). These findings confirm that environmental pressures are not neutral, but rather interact with individual characteristics.

Food environment pressure also strengthens emotional eating as a maladaptive response to stress and negative emotions. Emotional eating has been linked to emotional dysregulation, impulsivity, and depressive symptoms in a variety of cultural contexts, including in college students in China and individuals with anxiety disorders (da Fonseca et al., 2023; Yang et al., 2023). Furthermore, the relationship between stress and the consumption of sugary foods or sweetened beverages is mediated by a failure of self-regulation in eating (Ling & Zahry, 2021). A permissive and tempting eating environment accelerates the transition from stress to emotional eating behavior.

In the Global South's food and urban food study, the pressure of the food environment is increasingly complex with the presence of digital food environments, such as food delivery applications and aggressive promotion on social media (Granheim et al., 2022; Gupta et al., 2023). In Indonesia, this phenomenon has the potential to exacerbate eating dysregulation by increasing access to unhealthy foods and normalizing impulsive consumption as part of the modern lifestyle. Based on the DPSIR framework and socio-ecological framework, food environment pressure can be understood as structural pressure that indirectly weakens the capacity for individual self-regulation and increases eating dysregulation (Salm et al., 2025).

Therefore, this study proposes the following hypothesis:

Hypothesis 5: Food Environment Pressure has a Significant Positive Effect on Negative

Emotional Eating

Hypothesis 6: Food Environment Pressure has a Significant Positive Effect on Self-Regulation Failure

3.4. The Effect of Negative Emotional Eating on Healthy Eating Behavior Deviation

Negative Emotional Eating (NEE) refers to an individual's tendency to eat in response to negative emotions—such as stress, anxiety, depression, and anger—rather than out of physiological hunger (Frays & Knäuper, 2018; Pérez, 2020). In this context, food often functions as a maladaptive emotion regulation strategy, as it can provide temporary comfort through hedonic reward mechanisms, but negatively impacts the quality of diet (Songsamoe et al., 2019). NEE contributes directly to deviations in healthy eating behaviors through increased consumption of foods high in sugar, fat, and salt, as well as decreased intake of fruits, vegetables, and nutrient-dense foods (Dakanalis et al., 2023; Hill et al., 2022). Cross-contextual empirical studies show this pattern is relatively consistent. In college students in Saudi Arabia, for example, stress and emotional eating are negatively related to adherence to a healthy diet, especially the consumption of whole fruits, vegetables, and grains (Shatwan & Alzharani, 2024). Similar findings were also reported in individuals with severe mental disorders, where NEE correlated with poorer diet quality and irregular diets (Tuncer & Çetinkaya Duman, 2020). The underlying mechanisms of this deviation involve difficulty in emotion regulation and experiential avoidance, which makes individuals more likely to avoid negative emotions through eating, rather than managing them adaptively (Barnhart et al., 2021). Physiologically, the activation of the HPA axis and changes in heart rate variability during stress also reinforce emotional eating urges (Chang et al., 2022; Fuentes et al., 2023).

Based on the existing literature and empirical evidence, this study proposes the following hypothesis:

Hypothesis 7: Negative Emotional Eating has a significant positive effect on Healthy Eating Behavior Deviation

3.5. Self-Regulation Failure and the Intention-Behavior Gap in Healthy Eating

Self-regulation failure is a condition in which individuals are unable to align intentions with actual behaviors, resulting in an intention-behavior gap in a healthy diet (Chin & Stanton, 2020). Although individuals have strong intentions to eat healthy,

failure to self-regulate often leads to food choices that conflict with those long-term goals, such as the consumption of high-calorie, low-nutrient foods (Hagger *et al.*, 2009). Several frameworks explain the mechanism of this gap. The strength model of self-regulation views self-regulation as a limited resource that can be exhausted by repetitive regulatory demands, making individuals more susceptible to food temptations (Ghorbani *et al.*, 2014). Meanwhile, the justification-based account emphasizes the role of cognitive rationalization, in which individuals justify dietary violations as “worthy exceptions”, which ultimately widens the gap between intentions and behaviors (De Witt Huberts *et al.*, 2014). From a neurocognitive perspective, self-regulation failure occurs when the subcortical reward system is more dominant than the prefrontal executive control in responding to food cues (Lopez *et al.*, 2017). Empirical evidence suggests that context and psychological conditions greatly influence this gap. A study in the Netherlands found that self-regulation was lower at dinner time and outside the home, especially when individuals felt tired or distracted (Bouwman *et al.*, 2022). In patients with type 2 diabetes, depletion of self-regulatory resources is associated with low dietary adherence and self-care (Wang *et al.*, 2018). In addition, high stress in healthcare workers during the COVID-19 pandemic in Singapore has also been linked to an increase in unhealthy eating behaviors (Z. Huang *et al.*, 2022).

Based on the conceptual literature and empirical evidence above, this study proposes the following hypothesis:

Hypothesis 8: Self-Regulation Failure has a Significant Positive Effect on Healthy Eating Behavior Deviation

3.6. Gender as a Moderating Factor in Stress-Induced Eating Dysregulation

The literature shows that gender plays a vital role as a moderating factor in the relationship between stress and dysfunction of eating regulation. Conceptually, gender often moderates the relationship between negative affectation and dysfunctional eating behavior, with women tending to show higher levels of eating psychopathology than men, particularly in emotional and cognitive aspects (Marques *et al.*, 2019). These findings are consistent with biological evidence that prenatal and postnatal hormonal differences contribute to women’s susceptibility to eating disorders (Klump *et al.*, 2006).

Empirically, patterns of gender moderation are seen in a variety of contexts. A study in Japan in young adults showed that stress and low coping

ability were associated with unhealthy eating in men, but not significantly in women (Horiguchi *et al.*, 2016). Conversely, women are more prone to emotional eating and increased visual attention to food cues when experiencing stress or negative affectation (Hummel *et al.*, 2018). Neurocognitive studies have also found that women with weight concerns often don’t experience self-control conflicts when choosing foods, so stress reinforces automatic, unhealthy eating decisions (van der Laan *et al.*, 2014).

In addition to biological and psychological factors, gender roles are also shaped by social and cultural norms. Surveys in Germany show strong gender stereotypes in food preferences—men are associated with heavy meals and meat, while women are associated with snacks and plant-based foods—which can influence eating responses under stress (Scheer *et al.*, 2025). Research in gender-diverse populations confirms that gender expression, not just biological sex, influences emotional and uncontrolled eating patterns (Meneguzzo *et al.*, 2025).

This study proposes that the influence of stress on eating regulation dysfunction is not universal but is somewhat moderated by gender through the interaction among biological, psychological, and sociocultural factors.

Hypothesis 9: Gender moderates the relationship between Perceived Daily Stress and Negative Emotional Eating

Hypothesis 10: Gender moderates the relationship between Perceived Daily Stress and Self-Regulation Failure

Hypothesis 11: Gender moderates the relationship between Time Scarcity and Negative Emotional Eating

Hypothesis 12: Gender moderates the relationship between Time Scarcity and Self-Regulation Failure

Hypothesis 13: Gender moderates the relationship between Food Environment Pressure and Negative Emotional Eating

Hypothesis 14: Gender moderates the relationship between Food Environment Pressure and Self-Regulation Failure

3.7. The Moderating Role of Cultural Eating Norms in Stress-Related Eating Behaviors

The literature shows that culture-based eating norms play an essential role as a moderator in the relationship between stress and eating behavior. These norms shape what is considered “appropriate”, “sufficient”, and “reasonable” to eat, so that it can reinforce or even reduce the tendency to overeat due to stress. Cross-contextual empirical

studies show that perceptions of social norms – both descriptive and injunctive – consistently influence food intake, especially in situations of uncertainty or psychological distress (Hawkins et al., 2020; Sharps & Robinson, 2017). In stressful conditions, individuals tend to adapt their eating behaviors to what their social group does or approves of (Schüz et al., 2018).

Social and cultural identities reinforce this effect. The influence of eating norms is more substantial when individuals feel that they have a close identity with the reference group, so stress triggers not only biological responses, but also normative responses (J. Liu et al., 2019). Cross-country studies show variations in stress-related eating motivations: health factors are more dominant in Portugal, while emotional and economic factors are more prominent in the United States and the Baltic states (Kalnina et al., 2022).

Indonesia has a collectivist culture and communal eating practices, such as *megibung* in Bali or *bajamba* eating in West Sumatra, that form an eating norm that emphasizes togetherness and social compliance (Pramezwarly et al., 2024). This norm can suppress stress-induced overeating through social controls, but it also has the potential to encourage overconsumption in ritual or celebratory situations. In addition, the concept of “not eating if you haven’t eaten rice” reflects cultural norms that can moderate eating responses under stress, including among vulnerable groups such as people with diabetes or families with stunted children (Diana et al., 2022; Sari et al., 2022).

From conceptual and empirical evidence, the study predicts that stress does not directly determine eating behavior, but instead works through the lens of cultural eating norms that shape the meaning, response, and boundaries of eating behaviors

Hypothesis 15: Cultural Eating Norms Moderate the Relationship Between Perceived Daily Stress and Negative Emotional Eating

Hypothesis 16: Cultural Eating Norms moderate the relationship between Perceived Daily Stress and Self-Regulation Failure

Hypothesis 17: Cultural Eating Norms Moderate the Relationship Between Time Scarcity and Negative Emotional Eating

Hypothesis 18: Cultural Eating Norms Moderate the Relationship Between Time Scarcity and Self-Regulation Failure

Hypothesis 19: Cultural Eating Norms moderate the relationship between Food Environment Pressure and Negative Emotional Eating

Hypothesis 20: Cultural Eating Norms Moderate

the Relationship Between Food Environment Pressure and Self-Regulation Failure

4. METHODOLOGY

4.1. Research Design and Measures

This study adopts a quantitative research design using a cross-sectional survey approach to examine stress-related eating dysregulation among Indonesian Generation Z. A cross-sectional design is appropriate for capturing psychological states, perceptions, and behavioral tendencies at a specific point in time, particularly when investigating complex psychosocial mechanisms such as stress, self-regulation failure, and eating behavior deviations. The unit of analysis is Generation Z in Indonesia, defined as individuals born between 1997 and 2012, corresponding to an age range of approximately 13–28 years in 2025. This cohort is strategically essential, as Generation Z constitutes a substantial proportion of Indonesia’s productive population and will play a central role in achieving the national vision of Indonesia Emas 2045, which coincides with the country’s demographic bonus period (Sitoayu et al., 2023). Ensuring the health, productivity, and well-being of this generation – particularly in relation to lifestyle-related behaviors such as eating – is therefore critical not only at the individual level but also for long-term national development outcomes.

Data were collected using a structured self-administered questionnaire employing a 7-point Likert scale (1 = strongly disagree to 7 = strongly agree), allowing for greater sensitivity and variance in capturing psychological constructs. Measurement instruments were primarily adapted from established scales in prior literature, ensuring theoretical grounding and content validity. However, recognizing the contextual specificity of eating behavior in Indonesia, the instruments were refined through a focus group discussion (FGD) involving academics, nutrition experts, and representatives from relevant government institutions. This process ensured cultural relevance, conceptual clarity, and policy alignment. Before the primary survey, a pilot test was conducted with 30 Indonesian Gen Z university students to assess item clarity, reliability, and response patterns. Feedback from the pilot study informed minor wording adjustments and confirmed the instrument’s feasibility.

Each construct was operationalized as a multi-dimensional latent variable. Perceived Daily Stress was measured using 15 indicators capturing perceived control, emotional regulation, coping

strategies, psychological capital, social support, spiritual buffering, and affective-behavioral stress responses (Arcand et al., 2025; Magin et al., 2024; Pourshahriar et al., 2024; Whitehead & Blaxton, 2021). Time Scarcity comprised 15 indicators reflecting perceived time pressure, time-management ability, temporal well-being, and chronic time pressure (Denovan et al., 2024; Nguyen et al., 2024; Satterwhite et al., 2024; Soares & Elmashhara, 2022). Food Environment Pressure was measured with 15 indicators encompassing personal (accessibility, affordability, convenience, desirability) and external environmental dimensions (availability, pricing, outlet density, and digital food marketing exposure) (Choudhury et al., 2025; García-Salirrosas et al., 2025; Granheim et al., 2022). Negative Emotional Eating was assessed using 10 indicators covering emotional over-eating, under-eating, emotional triggers, and stress-linked eating contexts (Barnhart et al., 2021; Dixit et al., 2025; He et al., 2020; Hooper et al., 2025). Self-Regulation Failure comprised 10 indicators addressing cognitive control breakdown, emotional dysregulation, impulse dominance, self-licensing, and stress-induced behavioral lapses (De Witt Huberts et al., 2014; Rodzeń & Gajda, 2025; ten Broeke & Adriaanse, 2023). Finally, Healthy Eating Behavior Deviation was measured with 10 indicators capturing unhealthy food choices, irregular meal patterns, emotional eating shifts, situational cues, and loss-of-control eating (Geraets & Heinz, 2023; Jiang & Hwang, 2025; D. Liu et al., 2021), while Cultural Eating Norms were operationalized through 10 indicators reflecting social influence, commensality, traditional food orientation, religious-ritual values,

and culturally grounded health perceptions (How et al., 2024; Pourabbasi et al., 2021). In addition, gender was measured as a demographic variable and incorporated into the analytical model as a moderating factor, consistent with prior research on stress-related eating and self-regulation.

The relatively large number of indicators employed for each construct reflects a deliberate methodological choice rather than measurement redundancy. The focal constructs in this study – such as perceived daily stress, time scarcity, and food environment pressure – are conceptually complex and multidimensional, encompassing cognitive, emotional, behavioral, and contextual facets that cannot be adequately captured by a small set of items. Consistent with best practices in PLS-SEM, a broader indicator set was used to ensure comprehensive content coverage and construct validity, particularly in theory-extension research and culturally specific contexts. To mitigate potential concerns regarding redundancy or multicollinearity, all measurement items underwent expert review, pilot testing, and empirical validation. The results of reliability, AVE, HTMT, and VIF assessments confirm that the indicators capture distinct yet complementary aspects of each construct, supporting their inclusion in the final model.

Collectively, these constructs and their operational measures were designed to empirically test the hypothesized relationships and moderating mechanisms specified in the proposed research framework (Figure 1), which integrates stressors, self-regulatory breakdown, and contextual influences to explain deviations in healthy eating behavior among Indonesian Generation Z.

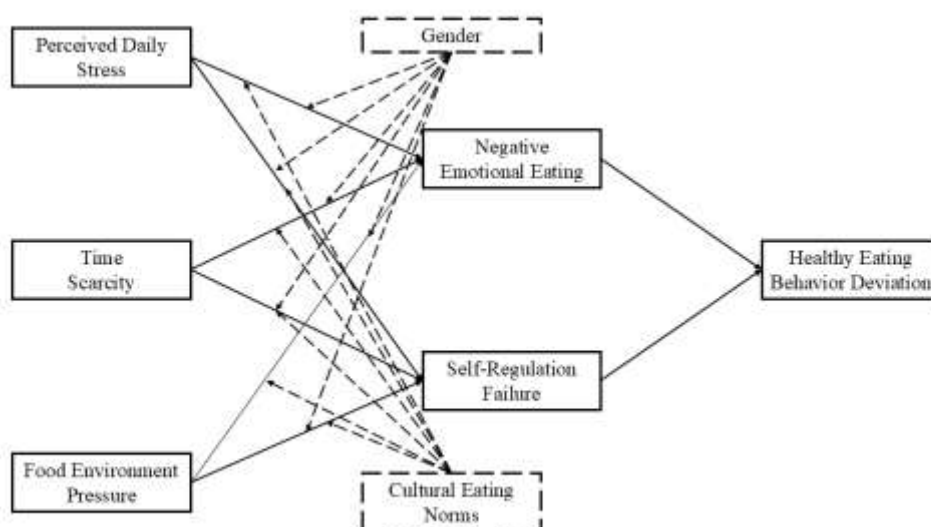


Figure 1: Usulan Model Penelitian

4.2. Sample and Data Collection

Characteristic	Category	n	%
Gender	Male	238	47.6
	Female	262	52.4
Age Group (years)	13-17	78	15.6
	18-22	174	34.8
	23-25	147	29.4
	26-28	101	20.2
Generation Z Status	Early Gen Z (1997-2002)	248	49.6
	Late Gen Z (2003-2012)	252	50.4
Educational Attainment	Junior High School or equivalent	62	12.4
	Senior High School	189	37.8
	Diploma (D1-D3)	71	14.2
	Bachelor's Degree (S1)	158	31.6
	Postgraduate (S2 or higher)	20	4.0
Current Status	Student	261	52.2
	Employed (full-time/part-time)	173	34.6
	Both studying and working	42	8.4
	Unemployed / seeking work	24	4.8
Monthly Personal Income (IDR)	No personal income	182	36.4
	< 2,000,000	121	24.2
	2,000,000 - 4,999,999	132	26.4
	≥ 5,000,000	65	13.0
Place of Residence	Urban	323	64.6
	Semi-urban	112	22.4
	Rural	65	13.0
Region of Residence	Java	278	55.6
	Sumatra	97	19.4
	Kalimantan	42	8.4
	Sulawesi	51	10.2
	Bali & Eastern Indonesia	32	6.4
Living Arrangement	With parents/family	312	62.4
	Student dormitory/boarding house	108	21.6
	Living independently	80	16.0
Self-Rated Health Status	Poor	31	6.2
	Fair	146	29.2
	Good	243	48.6
	Very good	80	16.0
Perceived Daily Stress Level	Low	84	16.8
	Moderate	261	52.2
	High	155	31.0
Primary Food Decision Maker	Self	287	57.4
	Parents/family	168	33.6
	Shared	45	9.0
Frequency of Eating Outside/Home Delivery (per week)	≤ 1 time	96	19.2
	2-3 times	183	36.6
	4-5 times	142	28.4
	≥ 6 times	79	15.8

This study focused on Generation Z in Indonesia, defined as individuals born between 1997 and 2012,

corresponding to an age range of approximately 13-28 years in 2025. A purposive sampling strategy was applied to ensure alignment between the research objectives and respondent characteristics. Participants were required to meet several predefined criteria: (1) Indonesian nationality, (2) inclusion within the Generation Z cohort, (3) current residence in Indonesia, and (4) the ability to comprehend and complete an online questionnaire independently. The use of purposive sampling was deemed appropriate, as the study aimed to examine stress-related and eating behavior mechanisms within a specific generational and socio-cultural context rather than to achieve population-wide representativeness. The minimum sample size was established based on the guidelines proposed by Hair et al., (2019) for multivariate and structural modeling analyses, which recommends a minimum ratio of five respondents per measurement indicator. Given that the proposed research model comprised 75 observed indicators, the minimum sample size threshold was set at 375 valid responses to ensure sufficient statistical power for subsequent analyses.

Data were collected using a fully online survey method to facilitate broad regional participation across Indonesia. Questionnaire distribution was conducted in collaboration with a formally registered Indonesian telecommunications provider that offers specialized survey dissemination services to the public, thereby supporting controlled access, respondent verification, and data reliability. The data collection phase was carried out over three months, from September to November 2025. In terms of ethical considerations, the research procedures adhered to the WHO-CIOMS ethical standards for health-related research involving human participants. Ethical clearance was granted by a reputable ethics review board affiliated with a medical faculty in Indonesia, confirming that principles of informed consent, anonymity, voluntary participation, and data confidentiality were strictly observed throughout the study.

A total of 500 respondents were successfully collected during the three-month data collection period. Table 1 shows that respondents were relatively balanced by gender, with 52.4% female and 47.6% male. The majority are in the 18-25 age range, reflecting the almost equal dominance of early- and late-Generation Z. In terms of education, most respondents are high school or undergraduate graduates, and more than half are students. Economically, 36.4% have no personal income, while most of the rest are in the low- to middle-income group. The majority live in urban areas and on the

island of Java, and still live with their parents. The perception of daily stress is dominated by moderate-to-high levels, with more than half of respondents being the primary decision-makers in food choices and having a relatively high frequency of eating out.

Table 1: Demographic and Socioeconomic Characteristics of Respondents (N = 500).

4.3. Data Analysis Procedures

This study was analyzed using Partial Least Squares-Structural Equation Modeling (PLS-SEM) with SmartPLS version 4 as the analytical platform. This technique was chosen because it is well-suited for theory extension and prediction-oriented research, particularly when dealing with complex models comprising multiple latent variables, moderating effects, and a relatively large number of indicators (Hair, Risher, et al., 2019). In addition, PLS-SEM is robust against deviations from multivariate normality and appropriate for behavioral research involving diverse respondent characteristics (Hair et al., 2017) such as Generation Z. The analysis was conducted using a systematic two-step approach. The first step involved assessing the measurement (outer) model, including indicator loadings, internal consistency reliability (Cronbach's alpha and composite reliability), convergent validity (average variance extracted), and discriminant validity using the HTMT criterion. The second step evaluated the structural (inner) model by examining path coefficients, coefficients of determination (R^2), effect sizes (f^2), and predictive relevance (Q^2) using

bootstrapping. To enhance analytical rigor, several advanced analyses were incorporated. The moderating effect of gender was examined using interaction modeling, complemented by Multi-Group Analysis (MGA) to identify structural differences between genders. Furthermore, FIMIX-PLS was applied to detect potential unobserved heterogeneity, while PLSpredict was used to assess the model's out-of-sample predictive capability.

4.4. Results

4.4.1. Measurement Outer Model

External model testing aims to ensure that each latent construct is reliably and validly measured by its indicators, according to the theoretical framework of reflective measurement. Theoretically, the convergent validity is evaluated through outer loadings and Average Variance Extracted (AVE) values, construct reliability via Cronbach's Alpha (CA) and Composite Reliability (CR), and potential multicollinearity issues via Variance Inflation Factor (VIF). The results in Table 2 show that all indicators have outer loadings above the threshold of 0.70 (Hair, Risher, et al., 2019) indicating the contribution of a strong indicator to its respective construct. AVE values for all variables ranged from 0.693 to 0.783, exceeding the minimum criterion of 0.50 (Hair et al., 2021) so that convergent validity is met. Internal reliability is also excellent, as reflected in the values of CA (0.956–0.978) and CR (0.962–0.980), which exceed the standard of 0.70 (Hair, Risher, et al., 2019). In addition, the overall VIF value is below the critical limit of 5, indicating no multicollinearity issues.

Table 2: Convergent Validity, Reliability, and Multicollinearity.

Variable	Outer Loadings	AVE	CA	CR	VIF
Perceived Daily Stress		0,747	0,976	0,978	
PDS1	0,871				3,260
PDS2	0,882				2,474
PDS3	0,867				2,815
PDS4	0,860				2,664
PDS5	0,860				2,579
PDS6	0,886				2,630
PDS7	0,875				3,096
PDS8	0,863				2,732
PDS9	0,866				2,796
PDS10	0,843				2,280
PDS11	0,800				2,933
PDS12	0,852				2,842
PDS13	0,882				2,636
PDS14	0,876				2,492
PDS15	0,874				1,992
Time Scarcity		0,762	0,978	0,980	
TS1	0,888				2,516
TS2	0,853				1,618
TS3	0,888				2,405
TS4	0,870				2,887
TS5	0,883				3,235

TS6	0,853				2,713
TS7	0,827				3,117
TS8	0,866				1,992
TS9	0,893				2,742
TS10	0,874				3,080
TS11	0,871				2,828
TS12	0,863				3,043
TS13	0,897				2,761
TS14	0,895				2,727
TS15	0,874				2,888
Food Environmental Pressure		0,693	0,968	0,971	
FEP1	0,866				3,199
FEP2	0,847				2,918
FEP3	0,856				2,486
FEP4	0,846				2,515
FEP5	0,743				2,301
FEP6	0,771				2,567
FEP7	0,858				1,669
FEP8	0,771				2,883
FEP9	0,781				2,746
FEP10	0,855				1,504
FEP11	0,838				1,415
FEP12	0,876				3,081
FEP13	0,860				2,516
FEP14	0,852				2,765
FEP15	0,850				2,744
Negative Emotional Eating		0,761	0,965	0,969	
NEE1	0,898				2,424
NEE2	0,884				2,832
NEE3	0,891				3,100
NEE4	0,871				2,569
NEE5	0,886				2,962
NEE6	0,896				3,284
NEE7	0,882				2,752
NEE8	0,890				2,388
NEE9	0,780				2,331
NEE10	0,836				2,957
Self-Regulation Failure		0,718	0,956	0,962	
SRF1	0,851				1,144
SRF2	0,857				2,203
SRF3	0,805				2,707
SRF4	0,826				2,826
SRF5	0,842				2,963
SRF6	0,866				2,619
SRF7	0,865				2,620
SRF8	0,856				3,212
SRF9	0,831				3,172
SRF10	0,875				2,583
Healthy Eating Behavior Deviation		0,783	0,969	0,973	
HEBD1	0,883				2,857
HEBD2	0,894				3,223
HEBD3	0,878				2,708
HEBD4	0,851				3,188
HEBD5	0,895				1,252
HEBD6	0,883				2,164
HEBD7	0,902				2,574
HEBD8	0,888				2,961
HEBD9	0,903				2,530
HEBD10	0,871				2,605
Cultural Eating Norms		0,736	0,960	0,965	
CEN1	0,837				3,006
CEN2	0,885				2,148

CEN3	0,880						1,855
CEN4	0,862						2,365
CEN5	0,842						2,110
CEN6	0,869						2,632
CEN7	0,859						2,655
CEN8	0,843						2,260
CEN9	0,858						2,475
CEN10	0,844						2,356
Gender							1,000
Male							
Female							

In this study, the testing of discriminant validity used the Heterotrait-Monotrait ratio of correlations (HTMT) approach, which was chosen because it was considered more sensitive and robust than traditional criteria such as Fornell-Larcker, especially in models with conceptually adjacent constructs (Henseler et al., 2015). HTMT is recommended in PLS-SEM to detect potential problems of lack of discriminant validity more accurately. Based on the results in Table 3, all HTMT values between constructs are in the range of 0.670 to 0.798, all of which are below the conservative limit of 0.85. This shows that each construct, including Cultural Eating Norms, Food Environmental Pressure, Perceived Daily Stress, Time Scarcity, as well as behavioral variables such as Negative Emotional Eating, Self-Regulation Failure, and Healthy Eating Behavior Deviation, exhibits adequate empirical differences from the others.

Table 3: Discriminant Validity-HTMT.

	CEN	FEP	HEBD	NEE	PDS	SRF	TS
CEN							
FEP	0,766						
HEBD	0,682	0,673					
NEE	0,677	0,685	0,781				
PDS	0,686	0,775	0,679	0,786			
SRF	0,765	0,706	0,763	0,798	0,774		
TS	0,777	0,670	0,779	0,784	0,796	0,745	

4.4.2. Inner Model Structural

The inner model or structural model stage aims to test the causal relationships among latent constructs and to evaluate the empirical support for the proposed hypothesis. Path significance testing was performed using a bootstrapping procedure with

5,000 resamples, which is recommended in PLS-SEM to produce stable parameter estimation, robust confidence intervals, and reliable t-statistics and p-values (Streukens & Leroi-Werelds, 2016). Based on Figure 2, the value of the determination coefficient (R^2) indicates the explainability of a powerful structural model. The Negative Emotional Eating construct has an R^2 of 0.944, indicating that the combination of Perceived Daily Stress, Time Scarcity, Food Environmental Pressure, and control variables explains 94.4% of the variance in negative emotional eating behavior. Furthermore, Self-Regulation Failure shows an R^2 of 0.799, indicating the strong predictive ability of exogenous constructs in explaining self-regulation failures. Meanwhile, the Healthy Eating Behavior Deviation has an R^2 value of 0.902, indicating that Negative Emotional Eating and Self-Regulation Failure together explain more than 90% of the variation in healthy eating behavior deviation. Referring to the criteria of Hair et al., the R^2 value is substantial, thus confirming that the model has excellent explanatory power and is worthy of further causal interpretation.

The results of direct hypothesis testing in Table 4 indicate that Perceived Daily Stress has significant effects on Negative Emotional Eating ($\beta = 0.345$; $p = 0.003$) and Self-Regulation Failure ($\beta = 0.610$; $p = 0.001$), with moderate effect sizes. Food Environmental Pressure also showed a significant positive influence on both variables, especially on Negative Emotional Eating ($\beta = 0.380$; $p < 0.001$). In contrast, Time Scarcity has no considerable effect on Negative Emotional Eating, but it does have a significant negative effect on Self-Regulation Failure. In addition, Negative Emotional Eating had a powerful influence on Healthy Eating Behavior Deviation ($\beta = 0.892$; $f^2 = 2.013$), while the direct effect of Self-Regulation Failure was not significant.

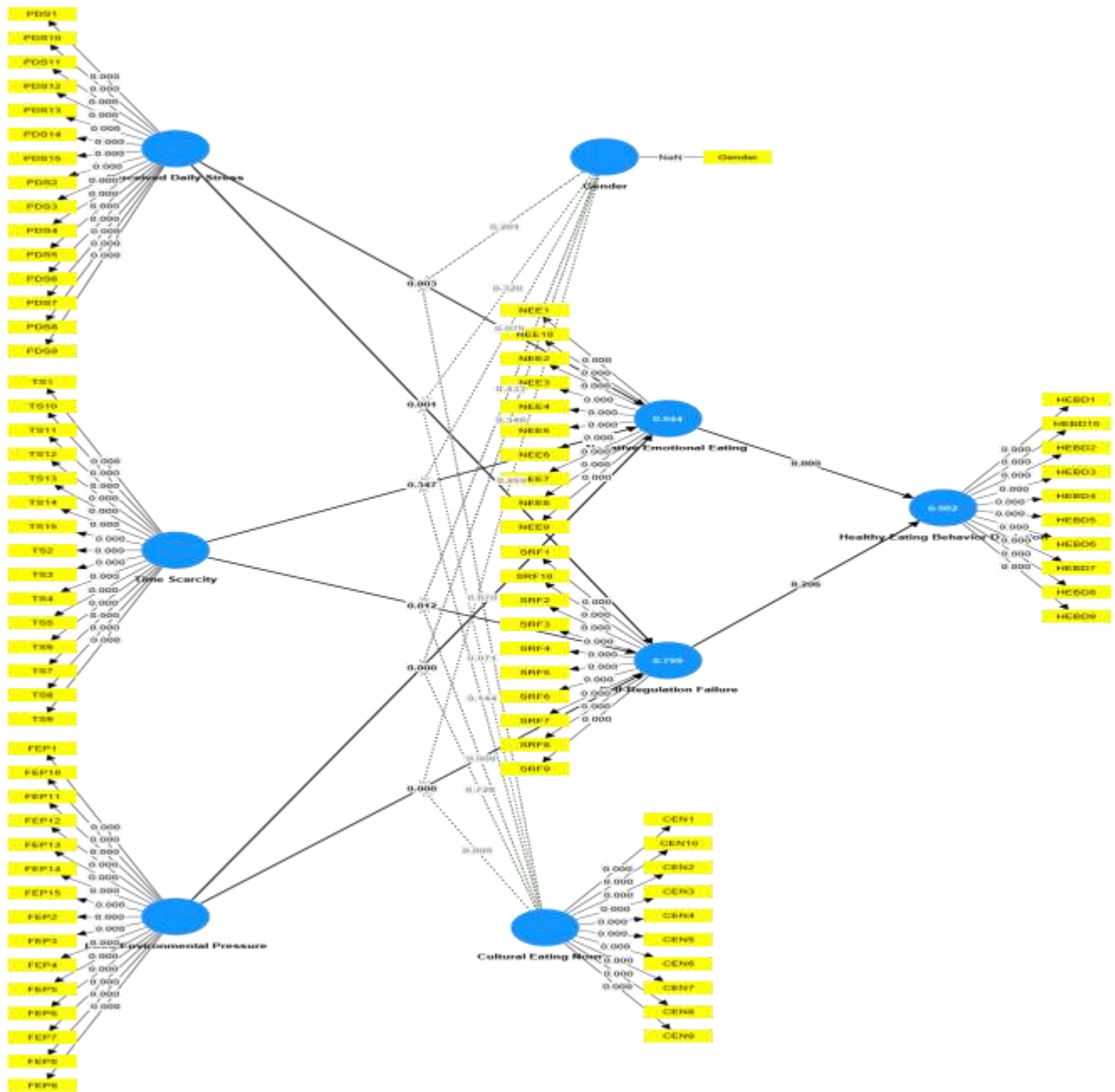


Figure 2: Bootstrapping Result's.
Table 4: Direct Hypothesis Results.

No	Hypothesis	Path Coefficient (β)	Confidence Interval (2.5%-97.5%)	t-value	p-value	Decision	f ²
H1	Perceived Daily Stress → Negative Emotional Eating	0,345	[0,116 ; 0,574]	2,946	0,003	Supported	0,148
H2	Perceived Daily Stress → Self-Regulation Failure	0,610	[0,253 ; 0,967]	3,353	0,001	Supported	0,142
H3	Time Scarcity → Negative Emotional Eating	0,121	[-0,132 ; 0,374]	0,941	0,347	Not supported	0,006
H4	Time Scarcity → Self-Regulation Failure	-0,467	[-0,832 ; -0,102]	2,512	0,012	Supported	0,075
H5	Food Environment Pressure → Negative Emotional Eating	0,380	[0,227 ; 0,533]	4,889	0,000	Supported	0,118
H6	Food Environment Pressure → Self-Regulation Failure	0,531	[0,263 ; 0,799]	3,885	0,000	Supported	0,064
H7	Negative Emotional Eating → Healthy Eating Behavior Deviation	0,892	[0,800 ; 0,984]	19,161	0,000	Supported	2,013
H8	Self-Regulation Failure → Healthy Eating Behavior Deviation	0,065	[-0,037 ; 0,167]	1,263	0,206	Not supported	0,011

4.4.3. Moderation Analysis

The moderation analysis evaluated the role of gender and cultural eating norms in strengthening or weakening the relationship between the primary constructs. The results in Table 5 show that the overall effects of the interactions involving gender (H9–H14) were not significant, with p-values above 0.05 and very small effect sizes, indicating that gender did not play a moderating role in this model.

In contrast, cultural eating norms show the role of selective moderation. The interaction between Time Scarcity and Cultural Eating Norms had a significant effect on Self-Regulation Failure ($\beta = 0.601$; $p < 0.001$; $f^2 = 0.080$), as well as the interaction of Food Environment Pressure with Cultural Eating Norms ($\beta = 0.345$; $p = 0.009$). These findings indicate that the pressure of eating culture reinforces the impact of time constraints and food environment on self-regulation failure.

Table 5: Moderation Hypothesis Results.

No	Hypothesis (Interaction Effect)	Path Coefficient (β)	Confidence Interval (2.5%–97.5%)	t-value	p-value	Decision	f^2
H9	Perceived Daily Stress \times Gender \rightarrow Negative Emotional Eating	-0,199	[-0,505 ; 0,107]	1,279	0,201	Not supported	0,008
H10	Perceived Daily Stress \times Gender \rightarrow Self-Regulation Failure	-0,284	[-0,843 ; 0,275]	0,995	0,320	Not supported	0,004
H11	Time Scarcity \times Gender \rightarrow Negative Emotional Eating	0,297	[-0,031 ; 0,625]	1,781	0,075	Not supported	0,019
H12	Time Scarcity \times Gender \rightarrow Self-Regulation Failure	0,259	[-0,390 ; 0,908]	0,784	0,433	Not supported	0,004
H13	Food Environment Pressure \times Gender \rightarrow Negative Emotional Eating	-0,099	[-0,303 ; 0,105]	0,954	0,340	Not supported	0,004
H14	Food Environment Pressure \times Gender \rightarrow Self-Regulation Failure	0,051	[-0,559 ; 0,661]	0,165	0,869	Not supported	0,000
H15	Perceived Daily Stress \times Cultural Eating Norms \rightarrow Negative Emotional Eating	0,113	[-0,011 ; 0,237]	1,809	0,070	Not supported	0,011
H16	Perceived Daily Stress \times Cultural Eating Norms \rightarrow Self-Regulation Failure	0,226	[-0,019 ; 0,471]	1,805	0,071	Not supported	0,012
H17	Time Scarcity \times Cultural Eating Norms \rightarrow Negative Emotional Eating	-0,102	[-0,239 ; 0,035]	1,461	0,144	Not supported	0,008
H18	Time Scarcity \times Cultural Eating Norms \rightarrow Self-Regulation Failure	0,601	[-0,852 ; -0,350]	4,685	0,000	Supported	0,080
H19	Food Environment Pressure \times Cultural Eating Norms \rightarrow Negative Emotional Eating	-0,019	[-0,127 ; 0,089]	0,348	0,728	Not supported	0,001
H20	Food Environment Pressure \times Cultural Eating Norms \rightarrow Self-Regulation Failure	0,345	[0,084 ; 0,606]	2,596	0,009	Supported	0,048

4.4.4. PLS Predict Analysis

An out-of-sample predictive power evaluation was performed using the PLSPredict procedure to assess the model's predictive ability relative to the linear model (LM) benchmark. Conceptually, the model is said to have good predictive ability if the $Q^2_{predict}$ value is positive and the PLS-SEM prediction error (rmse and MAE) is lower than LM in most indicators (Shmueli et al., 2019). The results in Table 6 show that all indicators in the Healthy Eating Behavior Deviation and Negative Emotional Eating

constructs have positive, relatively high $Q^2_{predict}$ values (mostly > 0.70), with RMSE and MAE PLS-SEM values consistently lower than LM. This indicates high predictive power in both constructs. Meanwhile, the Self-Regulation Failure construct exhibits a wide range of predictive capabilities, from low-medium to medium-high, with some indicators showing relatively greater prediction errors. These findings confirm that the model has strong predictive capabilities, particularly in predicting deviations in healthy eating behavior and negative emotional eating.

Table 6: PLSPredict Results.

Indicator	$Q^2_{predict}$	PLS-SEM_RMSE	PLS-SEM_MAE	LM_RMSE	LM_MAE	Predictive Power
Healthy Eating Behavior Deviation						
HEBD1	0,732	0,653	0,570	0,715	0,573	High
HEBD2	0,740	0,668	0,573	0,771	0,609	High
HEBD3	0,698	0,725	0,605	0,818	0,634	High
HEBD4	0,669	0,748	0,615	0,869	0,658	Medium-High
HEBD5	0,747	0,654	0,571	0,722	0,592	High
HEBD6	0,724	0,705	0,586	0,881	0,649	High
HEBD7	0,746	0,692	0,593	0,710	0,587	High
HEBD8	0,750	0,670	0,584	0,715	0,577	High
HEBD9	0,760	0,647	0,573	0,709	0,589	High
HEBD10	0,704	0,722	0,609	0,822	0,650	High
Negative Emotional Eating						
NEE1	0,763	0,659	0,560	0,728	0,580	High
NEE2	0,732	0,684	0,584	0,726	0,597	High
NEE3	0,741	0,654	0,557	0,723	0,580	High
NEE4	0,715	0,665	0,571	0,755	0,601	High
NEE5	0,750	0,640	0,551	0,738	0,588	High
NEE6	0,745	0,665	0,572	0,733	0,590	High
NEE7	0,748	0,645	0,560	0,703	0,570	High
NEE8	0,730	0,698	0,591	0,805	0,634	High
NEE9	0,574	0,874	0,620	0,916	0,682	Medium
NEE10	0,636	0,752	0,609	0,845	0,631	Medium-High
Self-Regulation Failure						
SRF1	0,620	0,821	0,658	0,955	0,708	Medium
SRF2	0,591	0,849	0,664	0,930	0,686	Medium
SRF3	0,419	1,057	0,738	0,967	0,703	Low-Medium
SRF4	0,631	0,775	0,622	0,817	0,634	Medium-High
SRF5	0,630	0,794	0,638	0,825	0,631	Medium-High
SRF6	0,531	0,926	0,678	0,957	0,696	Medium
SRF7	0,530	0,913	0,656	0,957	0,717	Medium
SRF8	0,523	0,943	0,702	1,013	0,745	Medium
SRF9	0,468	1,023	0,734	0,962	0,719	Low-Medium
SRF10	0,558	0,901	0,677	0,889	0,675	Medium

4.5. DISCUSSION AND IMPLICATION

4.5.1. Discussion

This study was designed to empirically test models of self-regulation failures triggered by stress

and cultural context to explain why healthy eating intentions often fail to translate into actual behavior in Indonesia. Using the Partial Least Squares Structural Equation Modeling (PLS-SEM) approach, this study enables the exploration of complex, simultaneous psychological relationships among

situational stress, affective responses, and self-control mechanisms. The findings of H1 and H2 provide a strong conceptual foundation for understanding why healthy eating intentions often fail in the daily lives of Indonesian people.

H1's findings show that perceived daily stress plays a significant role in driving negative emotional eating, indicating that daily stress not only functions as external stress, but also as an affective trigger that shifts eating function from nutritional goals to emotion regulation. These findings are consistent with cross-cultural literature suggesting that perceived daily stress increases the tendency to emotional eating in response to negative emotions. Perceived stress prompts individuals to ignore physiological hunger signals and use food as a short-term emotion regulation strategy, particularly foods high in sugar and fat (Okumus & Ozturk, 2021; El-Zayat *et al.*, 2025; Sporea *et al.*, 2025). In Indonesian culture, where food is a source of social and emotional comfort, stress tends to be diverted through the consumption of high-sugar, high-fat, or simple-carbohydrate foods as an instant coping mechanism. This reinforces the view that failure to eat healthily is not caused by a lack of knowledge, but rather by the dominance of affective impulses over cognitive control. H2, meanwhile, deepens this understanding by showing that daily stress has a more substantial impact on self-regulation failure. These results are consistent with the ego depletion theory, which states that daily stress drains self-regulatory resources and weakens cognitive control. Chronic psychological stress interferes with executive function and working memory, thereby increasing impulsivity and impairing the maintenance of healthy eating behaviors (Benson *et al.*, 2023; Chowdhury & Bhattacharyya, 2023; Salahuddin *et al.*, 2025). These findings confirm that stress not only triggers emotional responses but also weakens cognitive self-control systems. In Indonesia's urban life, which is characterized by work pressure, congestion, and family demands, resources for self-regulation are constantly depleted. As a result, individuals experience ego depletion, making them susceptible to impulsive decisions, including impulsive food choices.

Furthermore, the unsupported H3 indicates that time scarcity does not directly encourage negative emotional eating. These findings are, in part, contradictory to the literature suggesting that time scarcity can trigger emotional eating through increased stress and negative emotions (Fuentes *et al.*, 2023; Ling & Zahry, 2021). However, some studies also confirm that time pressure does not always

produce affective distress; instead, it more often operates as a structural limitation that affects practical choices rather than as a direct emotional response (Jabs & Devine, 2006; Venn & Strazdins, 2017). Conceptually, this indicates that time constraints are not the primary affective triggers of negative emotions, which are then vented through eating. In Indonesian culture, time pressure is often normalized as part of everyday life—especially in urban environments—so that it is not always perceived as a source of emotional stress, but rather as a structural condition that “must be accepted”. As a result, the scarcity of time does not automatically translate into emotional distress that triggers emotional eating. On the other hand, H4 shows that time scarcity actually plays a significant role in increasing self-regulatory failure, although its influence on self-regulatory capacity is negative. These results are consistent with the literature, which posits time scarcity as the primary driver of self-regulation failure, due to increased cognitive load and tunneling effects. Time constraints narrow the capacity for reflection and planning, so individuals rely on quick heuristics and instant choices that weaken self-control, including in healthy eating behaviors (van der Veer *et al.*, 2024; Lai & Gershman, 2024; Venn & Strazdins, 2017). This interpretation emphasizes that limited time works through cognitive pathways, not affective pathways. When individuals feel short of time, they tend to operate in an automated mode and short-term efficiency, ignoring long-term health considerations. In this context, failure to eat healthily is not caused by negative emotions, but by a narrowing of the space for reflection and planning. Indonesia's collectivist culture, which places social and family obligations above self-needs, further reinforces this effect: limited time is allocated to meet external demands, while self-regulation in food consumption becomes a secondary priority. Thus, H3 and H4 together show that time scarcity is a trigger for structural and cognitive, not emotional, self-regulation failure.

Support for H5 shows that food environmental pressure significantly encourages negative emotional eating. These findings are in line with the literature showing that the environmental stress of obesogenic foods increases emotional eating through constant exposure to food cues and affectively charged food cues. The widespread availability of foods high in sugar and fat activates the reward system and reinforces the use of eating to regulate maladaptive emotions, particularly in individuals with emotional vulnerability (Medina *et al.*, 2024; da Fonseca *et al.*, 2023; Yang *et al.*, 2023). Interpretively, constant

exposure to cheap, accessible, and socially meaningful foods, such as snack foods, comfort foods, and communal dishes, creates internal affective conflicts. Individuals who intend to eat healthily experience tension between personal health norms and socio-cultural norms of shared consumption. This tension gives rise to negative emotions such as guilt, frustration, or feelings of “marginalization,” which are then resolved through food consumption as a form of emotional regulation and social reintegration. H6 expands on this understanding by showing that food environmental pressures also directly weaken self-regulation. These results are consistent with research that confirms that food environmental pressure weakens self-regulation by increasing inhibition demands and cognitive load. Repeated exposure to food cues depletes self-control and promotes regulatory collapse, especially when healthy options are less available or less socially supported (de Ridder et al., 2013; Luszczynska et al., 2013; Salm et al., 2025). The food environment in Indonesia is not only tempting, but also persuasive and normative: food rejection is often interpreted as a rejection of social relations. In these conditions, self-control is no longer an autonomous individual decision, but must be socially negotiated. This negotiation process drains cognitive resources and increases the likelihood of regulatory collapse. Thus, failure to eat healthily cannot be reduced to a weakness of personal will, but rather to a consequence of the “subtly coercive” food environment. Conceptually, H5 and H6 affirm that the good intentions of individuals are dealing with a food system that is emotionally and structurally not neutral, so that the failure of self-regulation becomes a response that looks rational in the context of Indonesian culture.

Very strong support for H7 suggests that negative emotional eating is a proximal and dominant mechanism that directly drives deviations in healthy eating behavior. These findings are consistent with the literature, which considers negative emotional eating a direct predictor of deviations in healthy eating behavior. Emotional eating functions as a maladaptive emotion regulation strategy that systematically increases the consumption of foods high in sugar, fat, and salt and reduces diet quality, without engaging in deep cognitive consideration (Frayn & Knäuper, 2018; Hill et al., 2022; Dakanalis et al., 2023). Interpretively, when eating serves as a tool for emotion regulation, food choices are no longer guided by health considerations, but rather by urgent affective needs. In Indonesian culture, where food is often associated with comfort, togetherness, and

emotional recovery, emotional eating becomes a socially acceptable and psychologically effective response. As a result, any episode of negative emotions can directly translate into aberrations in eating behavior, without going through a long reflection process. In contrast, unsupported H8 suggests that self-regulation failure does not directly trigger deviations in healthy eating behavior. These results differ from some of the literature that shows a direct link between self-regulation failure and unhealthy eating behaviors (Hagger et al., 2009; Ghorbani et al., 2014). However, these findings are consistent with an approach that emphasizes the role of affective mediators, in which failure of self-regulation creates latent vulnerabilities that manifest as behavioral deviations when triggered by negative emotions or situational stress (Barnhart et al., 2021; Chang et al., 2022). These findings indicate that self-regulation failures are latent and do not automatically manifest in deviant behavior without affective mediators. In other words, weakening self-control creates a state of vulnerability, but it is not enough to encourage unhealthy acts of consumption unless negative emotions activate it. This interpretation strengthens the argument that, in the Indonesian context, eating behavior is more driven by emotional and relational logic than by individualistic self-discipline.

The moderation effect revealed that the failure to achieve healthy eating intentions in Indonesia was driven more by cultural dynamics than by gender differences. The insignificance of H9–H14 suggests that men and women respond to daily stress, time scarcity, and food environmental pressures through relatively similar emotional and regulatory mechanisms. Interpretively, this reflects the narrowing of gender roles in Indonesia’s urban life, where work demands, fast living rhythms, and exposure to the food environment are almost universal. Thus, vulnerability to emotional eating and failure to self-regulate is not a gender issue, but a structural condition experienced together.

On the contrary, support for H18 and H20 affirms the central role of cultural eating norms in the collapse of self-regulation. The interaction between time scarcity and cultural eating norms (H18) shows that when time is limited, cultural norms that emphasize eating together, abundance of dishes, and flexibility of choice actually accelerate the failure of self-control. In a state of haste, the individual does not have the cognitive space to negotiate the norm. Similarly, H20 indicates that environmental pressures of food become much more destructive when aligned with permissive cultural norms against

overconsumption. Conceptually, these findings confirm that culture is not just a background, but rather an "accelerator machine" that turns situational pressure into a failure of self-regulation. Thus, the good intentions of individuals become fragile not because of a lack of knowledge or discipline, but because they are trapped in a cultural system that makes unhealthy choices feel natural, even socially expected.

4.5.2. Theoretical Implications

This study makes an important theoretical contribution by proposing a Stress and Culture Induced Self-Regulation Breakdown Model that challenges the dominant assumption in the health behavioral literature that failure to eat healthy primarily stems from weak individual self-control. The findings suggest that negative emotional eating (NEE) serves as a primary proximal mechanism that bridges situational stress with deviations in healthy eating behaviors, while self-regulation failure (SRF) is latent and requires affective activation to manifest in behavior. This enriches self-regulation theory by asserting that self-control is not a direct determinant, but rather a condition of vulnerability that operates contextually.

Conceptually, the model also expands the stress-eating framework by emphatically distinguishing affective and cognitive pathways: daily stress and environmental stress work through emotional pathways, while time scarcity works through cognitive-structural pathways. This integration answers the inconsistencies of previous findings related to the role of time scarcity in emotional eating. Furthermore, the findings of moderation place cultural eating norms as an accelerator of self-regulation failure, confirming that eating regulation cannot be understood individualistically. Thus, this study encourages a paradigm shift from a personal will-based model to a socio-affective self-regulation approach, particularly relevant to the context of the Global South and collectivist cultures such as Indonesia.

4.5.3. Practical-Policy Implications

The findings of this study bring important practical and policy implications by challenging conventional approaches to promoting healthy eating that focus too much on nutrition education and strengthening individual willpower. The results show that the failure of healthy eating in Indonesia is mainly driven by negative emotional eating mechanisms and structural-cultural pressures, not by a lack of intention or knowledge. Therefore, effective

interventions must shift from the paradigm of "individual responsibility" to an emotion-sensitive, environment-aware, and culture-responsive approach.

At a practical level, health promotion programs need to integrate emotion regulation strategies as a core component. Interventions such as local culture-based mindfulness, non-eating emotional coping training, and emotional literacy in the workplace and community are crucial to break the pathway of stress → emotional eating → healthy eating deviations. Given that self-regulation failure is latent and only becomes destructive when activated by negative emotions, the most effective prevention is to manage emotions, not just strengthen self-discipline.

At the organizational and workplace levels, employee health policies need to reduce structural daily stressors—for example, through flexible working hours, the design of decent rest time, and the provision of accessible healthy food options. The finding that time scarcity weakens self-regulation underscores the importance of policies that protect workers' cognitive bandwidth, not just demand productivity.

At the public policy level, these outcomes demand food environmental reform. Regulations on unhealthy food advertising, incentives for healthy food MSMEs, digital food environment regulation (delivery applications), and the design of public spaces that support healthy choices are more realistic structural interventions than moralistic campaigns. Given that cultural eating norms reinforce the effects of environmental stresses, policies also need to engage community leaders, families, and social institutions to redefine the meaning of healthier "eating together" without losing the value of togetherness.

5. CONCLUSION

This study developed and empirically tested the Stress and Culture Induced Self-Regulation Breakdown Model to explain why healthy eating intentions often fail to be realized in the Indonesian context. The main findings show that unhealthy eating failure is not primarily caused by weak individual willpower, but rather by a combination of daily stress, an obesogenic food environment, time constraints, and permissive eating cultural norms. Negative emotional eating is a proximal and dominant mechanism that directly drives deviations in healthy eating behaviors. At the same time, self-regulation failure serves as a latent condition that increases susceptibility but does not automatically produce deviant behaviors without affective

activation. These results confirm that eating behavior in Indonesia is more driven by emotional and relational logic than individualistic self-discipline.

Although the model shows extreme explanatory power, this study has some limitations. First, the cross-sectional Design limits long-term causal inference. Second, self-report data are susceptible to perceptual bias and social desirability. Third, the focus on Indonesia's urban context limits generalization to different rural areas or subnational cultures. In addition, biological and physiological variables have not been integrated into the model.

Further research is suggested using longitudinal or experimental designs to capture the dynamics of self-regulation over time, and to explore additional mediator and moderator roles, such as emotion regulation skills, digital food exposure, and social support. Cross-cultural studies are also needed to test whether the dominance of these affective pathways is contextual or universal. Overall, this study enriches the literature by placing healthy eating intention failure as a systemic phenomenon embedded in stress, culture, and social structures.

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