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INTERPRETING CONTINUOUS GLUCOSE MONITORING DATA IN NON-DIABETIC INDONESIANS: A PHENOMENOLOGICAL STUDY OF MEANING-MAKING AND LIFESTYLE DECISIONS

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ABSTRACT

The rising prevalence of type 2 diabetes highlights the need for early metabolic awareness strategies. Continuous glucose monitoring (CGM), originally developed for diabetes management, is increasingly used by non-diabetic individuals seeking personalized health insights. However, evidence remains limited regarding how users interpret CGM data and apply it to lifestyle decisions, particularly in low- and middle-income countries **Objective:** This study explored the experiences of non-diabetic adults in Indonesia using CGM. **Method:** This phenomenological study involved six adults with CGM experience. Data were collected through HBM-informed interviews and analyzed using directed qualitative content analysis combining deductive and inductive approaches. **Results:** Four themes emerged: (1) emotional and cognitive sense-making of glucose visibility; (2) CGM as a reflective learning and validation tool; (3) personal and social context shaping meaning; and (4) navigating structural and contextual constraints. **Discussion:** The CGM use among non-diabetic Indonesian individuals generated complex emotional, cognitive, social, and cultural responses that shaped how glucose data were interpreted and translated into lifestyle behaviors. CGM enhanced metabolic awareness and motivated preventive actions; however, anxiety related to glucose fluctuations, limited healthcare guidance, device reliability issues, and sociocultural barriers influenced the sustainability and meaning of its use. **Conclusion:** CGM shapes how individuals perceive and respond to metabolic signals. Findings highlight the need for education, culturally responsive guidance, and CGM integration into preventive care. Nurses play an important role in supporting accurate interpretation and reducing anxiety. Policy efforts should support regulatory guidance, standardized education, and safe CGM integration into preventive and digital health systems.

Keyword*s*: continuous glucose monitoring, health promotion, lifestyle behavior, non-diabetic population prevention

BACKGROUND

Diabetes mellitus (DM) continues to rise globally. Around 589 million adults (20–79 years) had diabetes in 2024, projected to increase to 853 million by 2050. Indonesia accounts for about 20.4 million adults with diabetes, or 11.3% prevalence (Cho *et al*., 2018; Magliano & Boyko, 2021). The increase in type 2 diabetes mellitus (T2DM) is linked to lifestyle changes, urbanization, physical inactivity, and unhealthy diets (Kolb & Martin, 2017). Recent reports show low- and middle-income countries, including Indonesia, are facing a rapid rise in diabetes. Many cases involve delayed diagnosis and limited preventive care access (Meiya *et al*., 2024; Muharram *et al*., 2025).

In Indonesia, a substantial proportion (73%) of individuals with diabetes remain undiagnosed or are diagnosed at a late stage (Ferdina *et al*., 2025), frequently after complications have developed. As early hyperglycemia is often asymptomatic, many individuals are unaware of their condition (Haryanti, 2026). Consequently, diabetes is commonly detected only during routine medical check-ups or when individuals seek care for unrelated conditions (Alrossies *et al.,* 2026; Lee *et al*., 2023). This silent progression highlights a critical gap in early detection and preventive strategies, especially among individuals who do not perceive themselves to be at risk (Alrossies *et al*., 2026; Lee *et al*., 2023).

Traditionally, T2DM prevention relies on periodic glucose tests, risk questionnaires, and lifestyle counseling. While beneficial, these methods often fail to capture the daily fluctuations of glucose regulation (Liashko *et al*., 2025). Single-point tests, like fasting plasma glucose and glycated hemoglobin (HbA1c), only partially reflect glycemic variability, post-meal spikes, and the short-term effects of diet and activity (Sun *et al.,* 2023). This can make it difficult for people to link risk information to practical lifestyle changes (Jane Ling *et al*., 2024).

Continuous glucose monitoring (CGM) technology has transformed diabetes management by enabling real-time visualization of glucose trends. CGM has been shown to improve glycemic control, reduce hypoglycemic episodes, and enhance self-management among individuals with diabetes, particularly those who are on insulin therapy (Reddy & Oliver, 2024). CGM provides continuous feedback, which allows individuals to understand how specific foods, activities, stress, and sleep may affect their glucose levels, fostering greater engagement and self-awareness. As such, CGM has increasingly been recognized not only as a monitoring tool but also as a behavioral and educational modality (Engler *et al.,* 2022).

In recent years, CGM has gained popularity among individuals without diagnosed diabetes, expanding beyond its original clinical indications (Liao *et al.,* 2026). This growing interest reflects a broader shift toward preventive health, self-tracking, and personalized lifestyle management. Previous studies suggest that CGM use among non-diabetic individuals may help identify individual glucose response patterns, reveal previously unrecognized glucose variability, and increase awareness of metabolic health (Liao *et al*., 2026). These insights may support earlier behavioral adjustments aimed at preventing prediabetes or diabetes.

However, the use of CGM in non-diabetic populations remains controversial and underexplored, predominantly in low- and middle-income settings (Liao *et al.,* 2026). Existing clinical guidelines do not recommend routine CGM use for individuals without diabetes. Therefore, evidence regarding its long-term benefits for prevention is still limited (Liao *et al.,* 2026). Overinterpretation of normal glucose fluctuations, potential anxiety, and the lack of structured guidance to support data interpretation, alarm the use of CGM in those without diabetes (Barnard-Kelly *et al*., 2024).

Despite the increasing adoption of CGM among non-diabetic populations, several critical gaps remain. First, existing evidence has predominantly focused on physiological outcomes and glycemic metrics, with limited attention to how individuals interpret and make meaning of CGM data in their daily lives. Second, there is a lack of contextualized evidence from low- and middle-income countries, including Indonesia, where sociocultural practices, health literacy, and access to professional guidance may substantially influence data interpretation and behavioral responses. Third, current literature has not sufficiently examined the experiential and behavioral mechanisms through which CGM may influence preventive health decision-making among individuals without diabetes. Therefore, there is a need for in-depth qualitative inquiry to explore how non-diabetic individuals perceive, interpret, and respond to CGM data within their lived contexts. Addressing this gap is essential to inform the appropriate, ethical, and effective use of CGM as a preventive and educational tool beyond its traditional clinical application.

The uniqueness of the Indonesian social, cultural, and health care system context may shape how CGM data are interpreted and applied. Dietary patterns are strongly influenced by traditional cuisine, social eating practices, and family roles (Jayasinghe, Byrne, & Hills, 2025; Pugra *et al*., 2025). Furthermore, in Indonesia, health literacy regarding glucose regulation and preventive care remains variable, and access to structured health counseling is often limited (Herlina *et al.,* 2023; Sigit *et al*., 2022). In such contexts, CGM data may be perceived as a powerful and authoritative source of health information, potentially influencing awareness and behavior more strongly than conventional advice.

Understanding how non-diabetic individuals experience and interpret CGM data is therefore critical. Exploring the lived experiences of CGM use can provide valuable insight into how awareness, meaning-making, and behavioral intentions are formed rather than focusing solely on clinical outcomes. Such understanding is particularly important for nursing and preventive care, where patient education, empowerment, and self-management play central roles.

This study is among the first to explore CGM use as a meaning-generating technology in non-diabetic populations within a low- and middle-income context. By examining emotional, cognitive, social, and contextual dimensions of CGM use, this research aims to contribute evidence on the potential role of CGM as a tool in preventive and educational interventions outside traditional diabetes care. The findings are expected to inform the ethical and effective integration of CGM into preventive strategies, digital health interventions, and patient-centered education, mainly within constrained resources and culturally diverse settings.

METHODS

This study employed a phenomenological approach to explore the lived experiences of non-diabetic adults using CGM monitoring. This approach was chosen to gain an in-depth understanding of how participants perceive and make meaning of real-time glucose data within a preventive health context. A phenomenological approach was selected to gain an in-depth understanding of how participants perceive and make meaning of their experiences (De Boer & Zeiler, 2024).

Participants were initially recruited through a university's teaching hospital in Depok, West Java. This hospital was selected because a trial of CGM use was being conducted among several staff members. The first participant was identified based on information provided by the hospital staff member who was responsible for coordinating a trial of CGM use on the hospital's staff. Following this initial recruitment, additional participants were recruited using a snowball sampling method, whereby the initial participant referred other eligible individuals who met the inclusion criteria, which included being at least 17 years of age, having no history of diabetes, experience of using CGM, and being able to read, write, and communicate in the Indonesian language. This approach allowed the identification of participants with direct experience using CGM while facilitating access to a relatively limited and specific group of users of CGM in the non-diabetic population in Indonesia.

Data were collected through in-depth, semi-structured interviews conducted in the Indonesian language after participants completed the CGM use period, which typically lasted around 7-10 days. An interview guideline was developed within the framework of the Health Belief Model (HBM) (Alamer, 2024; Green, Murphy, & Gryboski, 2020) to explore emotional responses, cognitive interpretations of glucose data, perceived impacts on lifestyle behaviors, and social and contextual influences related to CGM use. The interview guide was pilot tested with one participant to assess clarity, relevance, and flow of questions, resulting in minor refinements in wording and sequencing.

Data collection was conducted iteratively, allowing emerging insights from early interviews to inform subsequent questioning and deepen exploration of relevant themes. A flexible probing strategy was employed to elicit rich, in-depth data, including follow-up questions such as "can you tell me more about that?" and "what made you feel that way?" to further explore participants' experiences and meaning-making processes.

Some of the guiding questions included: (1) how would you describe your overall experience using a CGM device; (2) what are your perceptions of the information provided by the CGM regarding your blood glucose levels; (3) have you experienced any changes in how you attend to your health or bodily awareness while using CGM?; (4) how do you feel when you observe your blood glucose levels in real time?; (5) how do you interpret the blood glucose values displayed by the CGM?; and (6) are there any cultural values or beliefs that influence how you interpret CGM data?"

Interviews were conducted by the principal researcher in a private setting to ensure privacy and minimize potential discomfort. Each interview lasted approximately 45–60 minutes and was audio-recorded with informed consent. Participants were assured of confidentiality, the voluntary nature of participation, and their right to withdraw at any time. All recordings were securely stored and anonymized prior to analysis.

The principal researcher was acquainted with the participants through prior professional interactions as colleagues during the supervision of nursing students in clinical practice at the hospital. The researcher did not have any direct managerial, supervisory, or evaluative role over the participants. To minimize potential bias and power imbalances, participation was entirely voluntary, and participants were explicitly informed that their decision would not affect their professional relationships. In addition, reflexivity was maintained throughout the research process, with the researcher acknowledging and bracketing prior assumptions. Data interpretation was further supported through peer debriefing to enhance credibility.

This study adopted a phenomenological approach to explore the lived experiences of non-diabetic CGM users. While grounded in phenomenology, data analysis was conducted using a directed qualitative content analysis, allowing both deductive coding based on HBM constructs and inductive identification of emergent meanings. Reflexivity and bracketing were maintained throughout the analytic process. Audio recordings were transcribed verbatim before the data analysis. Transcripts were read repeatedly to achieve immersion and a thorough understanding of the data. Relevant meaningful units were identified, condensed, and coded using an NVivo data analysis application. To ensure analytical rigor, coding and categorization were conducted independently by two researchers, followed by discussion to resolve any discrepancies.

Codes were then grouped into categories based on conceptual similarity, and overarching themes were collaboratively generated to represent both shared and divergent experiences across participants. An iterative analytical process was conducted, involving constant comparison within and across transcripts. Data analysis followed a directed qualitative content analysis approach, integrating deductive coding guided by constructs of the HBM with inductive identification of emergent codes beyond the framework. HBM informed the initial coding structure (e.g., perceived susceptibility, perceived benefits, perceived barriers, and cues to action), while allowing flexibility for new meanings to emerge from the data.

Member checking was conducted by returning summaries of findings to selected participants to validate the accuracy of interpretations. Data triangulation was not undertaken in this study, which may limit the breadth of perspectives captured. However, given the phenomenological focus on in-depth exploration of lived experiences, emphasis was placed on depth of understanding rather than multiple data sources.

Trustworthiness was ensured through strategies addressing credibility, dependability, confirmability, and transferability, including peer debriefing, reflexivity, and an iterative analytical process (Flanagan & Beck, 2024). Credibility was enhanced through prolonged engagement with the data, peer debriefing among research team members, and member checking with selected participants. The principal researcher was a female, trained in qualitative research and CGM technology, conducted all interviews, maintaining reflexivity throughout the study by acknowledging and bracketing prior assumptions.

Data saturation was achieved when no new themes or meaningful variations emerged from the data across successive interviews. Dependability was maintained through an audit trail documenting analytic decisions and the coding process. Transferability was supported by providing rich descriptions of participants, context, CGM use, and participants' perceptions of diabetes risk based on prior knowledge.

A coding tree illustrating the progression from raw data to codes, categories, and themes, and its linkage to HBM constructs, is presented in Table 1 to enhance transparency and analytical rigor.

This study report adheres to the COREQ (32-item) checklist for reporting qualitative research (Tong, Sainsbury, & Craig, 2007). Ethical approval was obtained from the Ethics Committee of Rumah Sakit Universitas Indonesia (RSUI Hospital) under approval number S010/KETLIT/RSUI/I/2025.

All participants provided written informed consent before participation. Confidentiality and anonymity were maintained by using code and removing identifying information. Participants were informed of their right to withdraw at any stage of the study without consequences.

RESULTS

Six non-diabetic Indonesian adults aged 34–53 years who actively used CGM devices were included in this phenomenological study, as data collection reached saturation and the sample showed sufficient demographic variation. Four participants were female, and two were male. Educational backgrounds varied from bachelor's to doctoral degrees in Nursing and Biochemistry. Most participants used Dexcom G7, while one used the Sinocare commercial brand. Recorded various glucose readings, with some participants experiencing fluctuations up to 216–227 mg/dL ≈ 12.0–12.6 mmol/L despite having no diabetes diagnosis. Participants also differed in their perceptions of diabetes risk, which were categorized as high, moderate, or low according to their prior knowledge. Overall, the sample represented well-educated adults with varying levels of perceived risk and diverse interpretations of their glucose recorded from the CGM they used (Table 2).

Eight initial themes (Table 3) were refined and consolidated into four overaching themes: (1) emotional and cognitive sense-making of glucose visibility; (2) CGM as a reflective learning and validation tool; (3) personal and social context shaping meaning; and (4) navigating structural and contextual constraints. Consistent with phenomenological methodology, participant narratives are treated as primary data and are presented through selected excerpts to convey the depth and meaning of lived experiences. The analysis emphasizes the convergence of meanings across participants, rather than focusing on the triangulation of individual statements, consistent with a phenomenological approach (Smith, Flowers, & Larkin, 2009; De Boer & Zeiler, 2024). Quotations are presented as illustrative exemplars of shared experiential patterns that inform the development of themes.

Theme 1: Emotional and cognitive sense-making of glucose visibility

Participants described a range of emotional responses when interacting with CGM data records. The continuous visibility of glucose data produced feelings that shifted between curiosity, reassurance, nervousness, and occasional frustration. For many participants, seeing real-time glucose values created excitement because it revealed physiological processes that were previously invisible. At the same time, unexpected glucose fluctuations sometimes trigger mild anxiety or uncertainty about what the numbers might mean for their health. As one of the participants noted,

> *"I felt a bit nervous when my glucose dropped below 80, but also excited to see the numbers" (P2).*

Emotional responses were also influenced by practical experiences with the device. For example, minor aesthetic concern such as the appearance of the adhesive patch created mild discomfort for a male participant aged 53 years:

> *"The patch became dirty over time, and that felt unpleasant" (P1).*

Glucose levels through CGM triggered heightened emotional vigilance toward bodily signals. Even participants who initially perceived themselves to be at low risk for diabetes described feeling uneasy when the glucose readings did not align with their expectations. For one female participant aged 50 years, this heightened awareness created a sense of urgency to monitor the numbers until they returned to what she expected to be a normal range.

> *"I found it difficult to sleep until I saw that my glucose level on the CGM had returned to the normal range." (P6)*

These experiences suggest that interacting with CGM involves not only interpreting physiological data but also provoking emotional responses that emerged as participants engaged with both the information and the technology itself.

Theme 2: CGM as a Reflective Learning and Validation Tool

Participants consistently described CGM as a tool that enhanced their understanding of the relationship between food, physical activities, and glucose responses. Observing real-time glucose fluctuations enabled participants to link specific dietary choices with physiological outcomes, making nutritional concepts more tangible in everyday life. Through this process, participants became more attentive to how common foods influenced their glucose levels. One male participant aged 43 years, who has a chemistry educational background, explained.

> *"I became more aware that certain foods—like white bread or fruit—raise my glucose so quickly" (P3).*

For others, CGM served to confirm or refresh their knowledge of nutrition and glycemic effects. As a lecturer in nursing, the participant noted,

> *"It confirmed what I already knew about glycemic index and load, like how instant coffee sachets or chocolates affect glucose." (P1)*

Another participant portrays her experience on CGM to function as a validation of existing habits or as a catalyst for lifestyle modification. The participant said,

> *"I reduced portion sizes, avoided sweet drinks, and walked more because I saw the spikes" (P2).*

These accounts indicate that CGM functioned not only as a monitoring device but also as an experiential learning tool that helped participants validate, revisit, and apply nutritional knowledge in their daily lives.

Theme 3: Personal and Social Context Shaping Meaning

This theme reflects how participants' interpretations of CGM data were not formed in isolation, but were shaped by their prior knowledge, personal health beliefs, and social environments. Participants actively drew on existing understandings of nutrition and metabolism to make sense of glucose fluctuations, often using CGM feedback to confirm what they already believed. As one participant explained,

> *"I already had nutrition knowledge, and CGM proved it correct… simple carbohydrates cause glucose spikes and drops rapidly" (P3)*

The excerpt suggests that prior knowledge provided a framework for interpreting glucose patterns. For others, family history of chronic conditions increased the personal relevance of CGM data and influenced how results were interpreted in terms of perceived health risk. One participant noted,

> *"My family was supportive, since my father has diabetes and both parents have hypertension" (P5),*

while another reflected,

> *"I know uncontrolled glucose damages the pancreas, and CGM confirmed my risk" (P4).*

These excerpts account that familial health experiences shaped not only awareness but also the meaning attributed to CGM feedback. Participants also used CGM data to interpret bodily sensations, linking physiological experiences with glucose fluctuations. For instance, one participant shared,

> *"It explains why I felt dizzy or tired—because my glucose had dropped" (P2),*

The excerpt above demonstrates how CGM facilitated embodied understanding by connecting abstract data with lived experience. Social influences also shaped this interpretive process, as interactions with peers and online networks influenced participants' perceptions and understanding of CGM use, and in some cases contributed to misinterpretation or unintended labeling. As one participant described,

> *"When I posted on WhatsApp, some friends assumed I was sick or diabetic" (P2).*

While some participants reported supportive responses, these interactions rarely developed into deeper discussions or shared learning, suggesting that meaning making remained largely individual despite occurring within

Overall, meaning making emerged as a socially embedded and interpretative process in which CGM data was filtered through both individual cognitive frameworks and broader social narratives. These findings highlight that meaning making is not only an individual cognitive process but also a socially situated one. Therefore, these experiences are situated within the theme of personal and social context shaping meaning, as they reflect how individuals interpret CGM data through both personal and socially mediated lenses.

Theme 4: Navigating Structural and Contextual Constraints

This theme captures how participants' engagement with CGM was embedded within broader structural and contextual conditions that shaped their ability to interpret and act upon glucose data. While CGM provided real-time insights into glycaemic responses, participants often encountered challenges related to limited access to professional guidance, technical issues with the device, and competing demands in everyday life. Participants perceived a limited healthcare system readiness to support CGM use. Healthcare providers were described as having insufficient familiarity with CGM data, and follow-up support after device use was minimal. Participants also believed that better system integration and professional training would allow clinicians to access CGM data and provide more personalized preventive guidance.

> *"Even healthcare staff don't really understand CGM." (P4)*
>
> *"Healthcare services don't yet support CGM; they need more dissemination and training." (P5)*

These accounts illustrate participants' perception that the healthcare system in Indonesia has not yet fully integrated CGM into routine practice, limiting its potential as a preventive and clinical decision-support tool.

Importantly, participants' efforts to translate glucose awareness into sustained behavioural changes were frequently mediated by social norms, family dynamics, and situational constraints. These factors constrained the extent to which individuals could act on the knowledge gained, highlighting that CGM use is not merely an individual cognitive process, but a contextually situated experience requiring ongoing negotiation between health intentions and real-world circumstances.

Participants described how lifestyle changes were shaped by broader social and environmental contexts. Work routines, cultural food traditions, and daily responsibilities influenced their ability to adjust behaviors after observing CGM data. These contextual factors could both constrain and support lifestyle modification.

> *"Padang food [Padangnise -West Sumatra, Indonesia] culture makes it hard to avoid unhealthy choices." (P2)*
>
> *"Social eating at meetings challenged me, but I tried to choose fruit." (P1)*

"As a nurse, I don't have time to select special food; exercise is easier." (P5)

These accounts indicate that environmental and cultural contexts played a significant role in shaping participants' capacity to translate CGM insights into sustainable lifestyle changes.

In summary, participants' engagement with CGM emerged as a dynamic iterative process in which real-time glucose feedback prompted emotional and cognitive appraisal, supporting reflective learning and behavioral experimentation. This process was neither linear nor purely individual but shaped by prior knowledge, embodied experience, and social context. Participants' ability to translate glucose awareness into sustained lifestyle change was further constrained by structural and contextual factors, including healthcare system readiness, cultural norms and everyday demands. Overall, CGM use among non-diabetic individuals functions not merely as a self-monitoring tool but as a contextually embedded mechanism for meaning-making and self-regulation.

DISCUSSION

This study explored the lived experiences of non-diabetic Indonesian participants using continuous glucose monitoring (CGM) devices. Findings revealed a complex interplay of emotional, cognitive, social, and cultural responses that shaped participants' interpretation of glucose data and subsequent lifestyle decisions.

This discussion synthesizes the findings through an interpretive lens informed by the Health Belief Model (HBM). The discussion is therefore organized around broader conceptual domains that transcend individual themes and capture the dynamic interplay between emotional responses, reflective learning, sociocultural influences, and structural conditions shaping participants' experiences with CGM. This integrative approach enables a more theoretically grounded interpretation of the findings. Below, these results are discussed in relation to existing literature and theoretical frameworks (Figure 1).

The conceptual map shows how non-diabetic individuals derive meaning from CGM through dynamic interactions among emotional

Table 1. Coding tree

Raw Data (Excerpt)	Code	Category	Theme	HBM Construct
"I was surprised my glucose spiked after eating rice"	Surprise at glucose spike	Emotional response to data	Emotional and cognitive sense-making of glucose visibility	Perceived susceptibility
"Now I avoid certain foods after seeing the graph"	Behavior change based on CGM	Reflective learning	CGM as a reflective learning and validation tool	Perceived benefits
"My family influenced what I eat daily"	Family influence on diet	Social context	Personal and social context shaping meaning	Cues to action

Table 2. Participants' profile

CODE	SEX	AGE (YR)	EDUCATION	CGM	BGL (AVERAGE MMOL/L)	RISKS PERCEPTION
P1	M	53	Doctorate	Dexcom G7	4.4–12.0	High
P2	F	35	Bachelor	Dexcom G7	4.3–8.3	Moderate
P3	M	43	Doctorate	Dexcom G7	< 8.3	Low
P4	F	35	Bachelor	Dexcom G7	4.3 – 6.1	High
P5	F	35	Bachelor	Dexcom G7	Error	High
P6	F	50	Doctorate	Sinocare	5.6 – 12.6	Low

Table 3. Potential themes and categories

Categories	Potential Themes
Awareness of physiological response	1. Enhanced Bodily Awareness
Recognition of patterns	
Validation of knowledge	2. Cognitive Reframing & Meaning-Making
New health understanding	
Initial emotional reaction	3. Emotional Responses
Emotional adaptation	
Dietary adjustment	4. Data-Driven Behavior Change
Physical activity adjustment	
Self-experimentation	
Social perception	5. Social & Cultural Context
Cultural influence	
Internal barriers	6. Barriers & Facilitators
External barriers	
Facilitators	
Perceived usefulness	7. Technology Experience
Dependency	
Constraints	
Limited support	8. Health system and support
Note for support	

and cognitive sense-making, reflective learning and validation, personal and social contexts, and structural constraints. These interconnected processes influence how real-time glucose data is interpreted and translated into different behavioral responses, emphasizing that self-awareness from CGM is not solely data-based but also shaped by context and social factors.

Emotional Engagement and Self-Regulation

Participants reported a spectrum of emotional responses, ranging from excitement

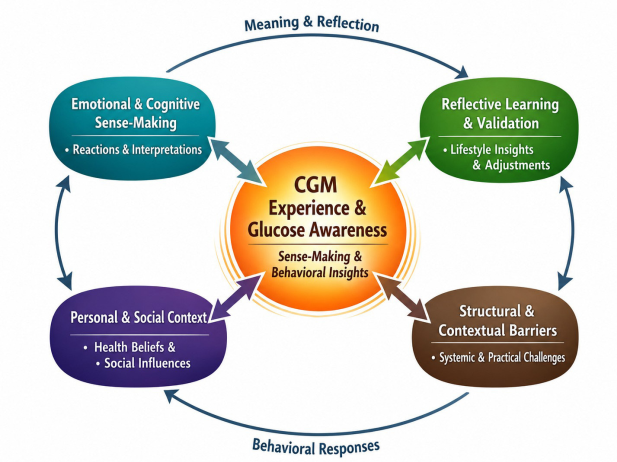

Figure 1. Conceptual map of meaning-making and behavioral responses to CGM use among non-diabetic individuals

and reassurance to anxiety and frustration. These findings align with self-regulation theory, which posits that feedback about one's behavior or physiological state can generate affective responses that subsequently guide action (Carver & Scheier, 2017). Negative emotions, such as frustration with device errors, reduced trust and motivation, while positive emotions reinforce engagement.

Recent commentary has raised concerns about CGM use in non-diabetic populations, warning that it may "pathologize normal post-prandial glucose excursions" and provoke unnecessary anxiety (Guess, 2023). This risk was reflected in participants who felt nervous when glucose levels fluctuated. Conversely, when the device was reliable, CGM provided reassurance and motivation for preventive action.

Across cases, participants emphasized that CGM enhanced their awareness of food–glucose relationships. For some, this validated existing nutrition knowledge; for others, it recalled forgotten health advice. These findings support the Health Belief Model, which underscores the role of perceived susceptibility and seriousness in shaping preventive behaviors (Taflinger & Sattler, 2024).

Emerging data from large non-diabetic cohorts in population-based studies have shown that transient glucose elevations are common, with normoglycemic adults spending nearly three hours per day above 140 mg/dL ≈ 7.8 mmol/L (Spartano *et al.,* 2025). Such normative data contextualize participants' concerns, highlighting the importance of framing glucose variability as part of normal physiology rather than an immediate health threat.

Family history of diabetes and hypertension strongly influenced participants' meaning-making, echoing evidence that personal and familial health contexts shape engagement with preventive technologies (Airikkala *et al.,* 2023; Vu *et al*., 2022).

Social and Cultural Context

Participants' social contexts produced ambivalent influences. Some family members and peers offered curiosity or support, while others showed indifference or stigma (e.g., assuming the participant was ill). Food culture, particularly rich traditional cuisines, emerged as a significant barrier to dietary change. This aligns with literature emphasizing that dietary behaviors are deeply embedded within cultural identities and social practices, making behavioral modification not merely a matter of knowledge but of negotiating culturally meaningful food traditions (Jayasinghe *et al*., 2025).

Technology adoption frameworks, such as the Unified Theory of Acceptance and Use of Technology (UTAUT), emphasize the importance of social influence in shaping technology use (Tamilmani *et al.,* 2021). In this study, limited social reinforcement reduced the sustainability of CGM-driven lifestyle change, even when participants valued the device personally.

Healthcare System Gaps and Device Reliability

A critical finding was the absence of structured healthcare support. Participants noted that healthcare professionals lacked knowledge of CGM and that follow-up was limited. This gap reduced the potential of CGM as a preventive tool. Previous studies demonstrate that CGM combined with education and counseling significantly improves outcomes in people with diabetes (Kim *et al.*, 2024; Yoo *et al.*, 2026). However, without similar support structures, non-diabetic users may derive only fragmented or short-term benefits.

Device errors, technical failures, and aesthetic concerns (e.g., the patch appearing dirty) further undermined engagement. These issues are consistent with broader findings that usability and reliability are critical determinants of sustained technology adoption (Yoo *et al.*, 2026).

Risks of Overemphasis and Health Anxiety

While CGM provided valuable insights, there is also a risk of overemphasis on glucose fluctuations. Recent reviews stress that widespread CGM use among healthy populations may promote excessive “glucocentric” thinking and unnecessary restriction of normal diets (Guess, 2023; Liarakos *et al*., 2024). Several participants in this study echoed this risk, reporting nervousness when encountering fluctuations that were likely within normal physiological ranges.

These findings have several important implications. For nursing practice, CGM can serve as a supportive educational and counseling tool to enhance patient engagement, risk awareness, and individualized lifestyle guidance; however, nurses require adequate training to interpret CGM data and to prevent misinterpretation among non-diabetic users.

For digital health policy, the rapid adoption of CGM outside clinical indications highlights the need for regulatory guidance, user education standards, and integration of CGM into structured preventive health programs to ensure safe and meaningful use. From a preventive medicine perspective, CGM may contribute to early metabolic awareness and behavior change, but its effectiveness depends on appropriate framing of glucose variability, integration with lifestyle counseling, and avoidance of unnecessary medicalization of normal physiological responses.

CONCLUSION

This study highlights the nuanced lived experience of CGM use among non-diabetic Indonesians. While CGM can enhance awareness and motivate lifestyle change, its impact is shaped by emotional responses, prior health beliefs, cultural food practices, social support, and systemic readiness. Without structured education and healthcare integration, CGM risks producing anxiety or fragmented behavior change. As the use of CGM expands beyond diabetes, careful framing and supportive infrastructures will be essential to maximize benefits while minimizing harm.

For clinical practice, these findings highlight the need for healthcare professionals, particularly nurses, to provide structured education and counseling to support accurate interpretation of CGM data and appropriate lifestyle adjustments among non-diabetic users. For policy, the expanding use of CGM beyond diabetes management underscores the importance of developing regulatory guidance, standardized user education, and integration of CGM into preventive health programs to ensure safe, ethical, and effective use within digital health systems.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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