

Social Media and Non Prescription Products and Behaviors of Diabetic Patients: Evidence of Smart Health Marketing by Pharmaceutical Companies

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ABSTRACT:

Social media has become deeply embedded in daily life, influencing individuals' personal and welfare decisions. Empirical evidence indicates that users spend over 30% of their daily time engaging with online social platforms, where influencers and peer interactions shape behavioral choices. This influence extends to health-related domains, as patients increasingly encounter and respond to the marketing of non prescription medical products through social media. Evaluating the appropriateness of these products requires specialized medical knowledge that most users do not possess, potentially compromising public health and patient safety. This descriptive review investigates the role of social media in shaping patients' behaviors throughout illness management. Related studies were systematically examined to identify patterns of influence. Findings reveal that a proportion of diabetic patients adjust aspects of their therapeutic practices based on information obtained via social networks. The results underscore the growing significance of health marketing in the expansion of complementary healthcare products.

Pharmaceutical companies appear to adopt intelligent, data driven marketing approaches on social media platforms to increase engagement and product reach.

ARTICLE HISTORY

Received: 01/04/2026

Accepted: 01/08/2026

KEY WORDS:

Smart health marketing; social media; Diabetic patient therapeutic behavior; Complementary healthcare products.

1. Introduction

In general, the occurrence of disease will impose significant costs on the patient and society. Apart from the financial burden imposed on individuals, these costs bring numerous non-financial hardships for the community. Accordingly, societies always pursue policies to minimize these costs, while individuals affected by illnesses seek to return to the normal life they had before. This situation causes patients to follow unusual instructions in medical routines and processes that make life easier for them. In this process they receive a set of habits and recommendations from others, which we know as non-prescriptive instructions and programs. For example, family and friends may influence patients' dietary habits and teach them certain things.

This situation is very common for nutrition-related diseases such as diabetes. In other words, because diabetes directly affects a patient's eating behaviors and normal life, it causes the patient to be more likely to follow others' recommendations in order to control life and return to usual habits. With this introduction, while further explaining diabetes and the effects of family and society on patients' behaviors, we seek a more comprehensive view. In the conclusion section we will introduce a model of influence. Then we will discuss the role of pharmaceutical companies in intervening in this influence.

II. Literatur review and problem statement:

Diabetes (especially type 2) is a group of metabolic diseases characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both [1]. Type 2 diabetes is the most common form of diabetes, accounting for more than 90% of all diabetes cases worldwide; it is non-communicable, but its prevalence globally continues to rise [2]. Today, diabetes is considered one of the major public health challenges, and its effective control requires patients' strict adherence to dietary regimens and self-care behaviors [3]. Despite the availability of appropriate treatments, many patients are still unable to adequately follow dietary and medical recommendations, and nonadherence is recognized as one of the main barriers to diabetes management [4]. In this context, the family plays a key role in shaping, reinforcing, or undermining patients' self-care behaviors and treatment adherence, and family support is considered one of the fundamental factors for treatment success [5]. Patients' adherence to a prescribed diet is not a simple, individual matter, but rather a multidimensional process influenced by a set of practical and environmental factors.

The family, by providing emotional support, daily supervision, and an accommodating food environment, plays one of the most important roles in sustaining healthy behaviors. On the other hand, the quality of the patient's relationship with healthcare providers (including education,

guidance, and follow-up) can be effective in better understanding the importance of the diet and motivation to comply with it. Furthermore, the level of patient knowledge and awareness about the nature of the disease and the consequences of dietary choices is also a determining part of this process and can make a significant difference in the degree of treatment adherence. Thus, success in following a diet is possible when these three domains—family, the care system, and patient knowledge—operate in harmony and facilitate the patient's behavior change. Alongside individual factors, a set of external factors also affect individuals' adherence to a diabetic diet. The patient's living environment, including access to healthy foods and family dietary patterns, provides an important context for the formation of their daily behaviors [6,7].

Diabetes and its complications reduce the quality of life of the patient and their family and impose a heavy economic burden on society and the individual. Due to its complications, diabetes is an expensive disease [8,9]. The family plays a central role in the lives of diabetic patients and in many cases is recognized as their main source of social support. The presence and accompaniment of family members can significantly affect the patient's ability to adapt to treatment. The practical family support, such as preparing healthy foods, reminding medication intake, or attending to treatment prescriptions, can help improve adherence and establish regularity in the patient's treatment program. Conversely, unhealthy dietary patterns, excessive criticism, or family tension may impede adherence to the treatment regimen and even increase the patient's stress [10,11,12]. The negative consequences resulting from unresolved problems of poor family support and low adherence include clinical outcomes such as cardiovascular disease, kidney disease, vision problems, and neuropathy [13] and poor glucose control.

Also, in the absence of effective culturally appropriate and family-centered interventions, not only are opportunities for preventing complications lost, but long-term care costs and emergency visits increase, imposing a heavy burden on patients, families, and health systems. The family emotional support plays an important role in reducing stress, anxiety, and psychological pressure. Higher-quality physical activity is pursued [5,14]. Family emotional support plays an important role in reducing patients' stress, anxiety, and psychological pressure; factors that themselves can lead to blood sugar fluctuations and disease exacerbation. The mental calm and sense of security created by the family provide a basis for increasing the patient's self-efficacy and make them more capable of daily disease management [17]. Improvement in self-care behaviors ultimately leads to a reduction in the incidence of chronic diabetes complications, fewer frequent hospitalizations, and a decrease in treatment costs [3,15]. Overall, family involvement not only makes diabetes management more effective but also significantly improves patients' overall quality of life. For

this reason, many studies emphasize the vital role of family-centered interventions in the success of treatment programs and consider them one of the main pillars of sustainable diabetes care [16,18].

The factors influencing this issue are diverse. One factor is that the “type” of family members’ behavior matters. Encouraging, empathetic, and practical behaviors—such as reminding about medication, helping to buy healthy food, or accompanying the patient to doctor visits—are associated with increased adherence; but critical, humiliating, or controlling behaviors can have the opposite effect and deter the patient from continuing the regimen (that is, a strong mediating variable). A mixed-methods study reported this relationship directly and showed that the patient’s perception of “non-supportive” behaviors correlates with lower medication adherence and, consequently, higher A1C [5].

The other Studies have shown that family-centered self-management programs enhance self-efficacy and improve self-care behaviors, although effects on clinical indicators may not be consistent across all studies [17,18]. Therefore, the family’s level of knowledge modifies the strength of the supportive effect [5,14].

Cultural structures and gender-role expectations determine who in the family assumes caregiving responsibilities, what types of support are acceptable, and how daily interactions are shaped. These factors can moderate the effect of support; meaning the same family-centered intervention may be effective in one cultural context and less so in another [16,19].

This dimension is measurable and is examined as the primary outcome in many studies [17]. The psychological-motivational dimension includes self-efficacy, motivation, depression or anxiety, and the sense of mastery over health status; this dimension is an important mediator between family support and observable behaviors [18]. The clinical dimension includes outcomes such as blood pressure and long-term complications that are influenced through behavior and adherence; studies show this [14,18]. And finally, the systemic economic dimension includes treatment costs, access to self-management education, and health policies that enable or limit the implementation of family-centered programs [19].

Historically, attention to the family as a determinant of diabetes treatment adherence began many years ago, but only in recent decades, with the growth of self-management education programs and increasing empirical evidence of family interventions, has its real importance been better understood. More recent studies show that structured family interventions improve self-care behaviors and can also produce long-term changes in clinical control [18]. In the 1970s and 1980s, with the expansion of the concept of self-care and behavioral models such as the Health Belief

Model and self-efficacy theory, researchers realized that diabetes control is not only a medical process but a behavioral-social process.

The family, especially in certain cultures, can play a more decisive role than the healthcare system in reinforcing patient adherence. But that same family, if it lacks sufficient knowledge or displays high-stress behaviors, can disrupt treatment. This dual situation shows that family support is not a fixed factor but a dynamic, multi-layered variable whose quality, type, and cultural context ultimately determine whether it benefits the patient or not[16].

On the other hand, the emergence of family-centered interventions in the past decade—such as group educational programs, collaborative models, and approaches based on self-management—has shown that by increasing the family's level of knowledge and self-efficacy, disease outcomes can be meaningfully improved. Consequently, the history of this problem reflects a fundamental shift: from a time when diabetes was regarded purely as a physiological phenomenon, we have reached a point where it is seen as a “biopsychosocial” phenomenon—one that cannot be managed without understanding the role of the family and the social context. With the rapid rise in incidence and the very heavy economic burden from complications, scientific examination of the family's role and mediating variables is essential.

In the current situation, the burden of diabetes worldwide has become so heavy that it has turned into a public health crisis. According to the International Diabetes Federation's Diabetes Atlas report in 2024, about 589 million adults (aged 20–79 years) worldwide had diabetes; that is, one in every nine adults[20]. This alarming statistic is accompanied by worrying projections: the IDF estimates that by 2050 the number of adults with diabetes will reach 853 million, i.e., one in every eight adults[21]. One important and less-noticed dimension of this crisis is the global share of low- and middle-income countries: nearly 81% of people with diabetes live in these countries[20].

There is another statistic: of the 589 million adults with diabetes, about 252 million still do not know they have diabetes[21]. This discovery has major implications, since late diagnosis of diabetes increases the risk of serious complications and heavy care costs. The economic dimension of this disease is very large: estimates indicate that health-related costs of diabetes in 2024 exceeded 1 trillion U.S. dollars[21]. At a more local level, the situation in some countries is very serious. For example, an up-to-date meta-analysis of all data from 1996 to 2023 in Iran showed that the prevalence of type 2 diabetes in the Iranian adult population is about 8.10%[22,23]. The study also reported an increasing trend in prevalence across different time intervals: for instance, between 2013 and 2017 this rate reached about 15%[24]. In an epidemiological study in Tehran,

it was estimated that 16.7% of adults in the Tehran region have type 2 diabetes [25]. If this trend continues, the pressure on the healthcare system, costs, and diabetes complications in the country will increase substantially.

These statistics (global and local) display a clear reality: diabetes is no longer a disease confined to certain countries but a global problem that not only threatens individuals' health but also places a large economic burden on health systems. Because a substantial percentage of those affected remain undiagnosed, the need for prevention programs, early diagnosis, long-term care, and family-centered interventions is felt more than ever.

What has been examined so far has made it clear that the family plays a very key role in diabetic patients' adherence to therapeutic regimens. Supportive family behaviors help strengthen the patient's self-efficacy, and this self-efficacy is an important mediator that accelerates the path from family support to adherence and clinical control[14,18]. Conversely, non-supportive behaviors such as criticism can reduce the patient's motivation and have the opposite effect [5]. This complex relationship between family and patient becomes even more complicated by moderating variables such as the family's health knowledge and economic conditions; in other words, the effect of family support depends on the quality of interactions, the family members' level of awareness, and the family's socio-cultural and economic context[5,16].

However, despite strong evidence, several fundamental gaps in the research literature prevent the full utilization of the family's potential to improve outcomes for diabetic patients. Studies have used different instruments to measure "family support" and "treatment adherence," so their results are not fully comparable. This heterogeneity has limited the possibility of precise pooled analyses and has made it difficult to extract general patterns[16]. Some studies report optimistic results, but differences among populations, time periods, and cultures have made final conclusions difficult[16]. Many studies have been conducted in countries or cultures with individualistic values. In contrast, there is insufficient data from societies with collectivist cultures or where gender-role differences in the family—such as caregiving responsibilities and role distribution—exist. This makes interventions designed with incomplete contextualization less effective in some communities [16]. The economic analysis in the short and medium term also helps estimate the cost–benefit ratio of the intervention [15]. Focusing on the local population, producing native data, and designing interventions appropriate to the cultural and familial context have been made possible and can guide policy and DSME programs [3,18].

Another factor influencing patients' dietary and treatment behaviors is social networks, which alongside family — and perhaps more than families — affect these patients' habits and behaviors. Social media have changed and influenced how people access health information, how they engage

in health-promoting behaviors, and how they form attitudes toward wellness. By providing access to diverse information resources beyond traditional referrals to patients, social media have transformed decision-making about health care. (25) Over the past few years, social media platforms such as Facebook, Telegram, WhatsApp, Twitter/X, Instagram, Snapchat, and TikTok have become important parts of daily life worldwide and have influenced how individuals access, share, and normalize health-related information. Currently, with more than 5 billion users around the world, the impact of social media on health behaviors includes mental health, physical activity, diet, body image, and substance use [26,27]. In Iranian society (including diabetic patients), a combination of social networks, domestic and foreign messaging apps, and specialized groups and channels are usually used to search for information, share experiences, educate, and provide support. One of the most important platforms and messaging apps and social networks in Iran is Telegram, which, despite being filtered and blocked in Iran, is widely used and hosts numerous educational and support channels and groups for patient (28). Patients typically participate in topic-related channels and groups such as diabetes and nutrition, diabetes self-care, or healthy diets to share dietary information and advice with each other and to benefit from one another's treatment experiences.

Another popular platform for visual and video-based education and sharing in Iran is Instagram, where many posts about health and nutrition are uploaded. Other platforms for health information and education in Iran include domestic messaging apps such as Rubika, Soroush, Eitaa, and Bale. In addition to social networks, some patients use websites, educational videos, forums, and online webinars to obtain information about dietary treatment and non-prescription therapies. Studies have shown that Iranians prefer to receive information from social networks, websites, and mobile apps in the form of images, instructional videos, and text use in these tools and to use them (29).

Over the past few years, patients have become significantly more interested in taking responsibility for managing their disease, but they need correct and accurate education (30). Therefore, education plays a very important role in increasing self-care capabilities in people with diabetes (31). Given the chronic and lifelong nature of this disease, self-care for patients is a time-consuming, complex, and challenging process (32). This requires lifestyle changes (33). This underscores the growing importance of self-care education (34).

In-person educational sessions, despite their inherent potential, have limitations such as impractical transportation for low-income groups, time and location constraints, and shortages of human and financial resources (35).

Social networks show the potential to become a place for health promotion, but they also carry the risk of spreading misinformation, exacerbating health inequalities, and reinforcing maladaptive behaviors such as eating disorders, substance misuse, or vaccine hesitancy (36,37).

Many studies have linked problematic or excessive social media use to adverse mental health outcomes; adolescents in particular are vulnerable to online imagery that depicts idealized lives, and this can lead to negative social comparisons, cyberbullying and harassment, and feelings of inadequacy (38).

Growing evidence indicates that platforms that promote appearance-based content, such as Instagram and TikTok, exacerbate symptoms of anxiety and depression, especially among women (39,40). However, some studies have shown moderate or context-specific benefits such as social connection, emotional expression, and belonging to a community [41]. The nuances in these views support public health messaging that emphasizes healthy engagement rather than avoidance and advocates design changes to reduce addictive features [42].

Reviews have shown that screen time and prolonged social media use are associated with sedentary behavior and reduced physical activity, especially among young people (43). Social media often exposes users to unhealthy dietary trends, such as detox teas, severe calorie restriction, or weight-loss supplements without supervision (44,45). The impact of “body-breathing” content is complex and may encourage exercise in some individuals but promote unrealistic body ideals and compulsive exercise in others (46,47). Furthermore, TikTok and Instagram algorithms that promote dietary restrictions, fasting trends, or “what I eat in a day” videos have been associated with eating disorders and body dissatisfaction (48,49).

These findings emphasize the need and importance of content regulation, algorithmic transparency, and inclusion of diverse, evidence-based health messages.

Social media have been associated with normalizing risky behaviors such as alcohol use, e-cigarette use, and drug use. Social media platforms that use viral “challenges” or influencer endorsements to display or glamorize substance use have been linked to increased adolescents’ willingness to use alcohol and nicotine and to actual use [50,51]. TikTok is one of the platforms criticized for lax moderation of such content [52]. Well-designed, targeted public health campaigns have shown potential to reduce risky behaviors and increase awareness [53]. It should be noted that although social media may play a role in creating this problem, when used purposefully they can also be a powerful tool for harm reduction.

III. Conclusion:

Reviews indicate that social networks between 2010 and 2025 have become an influential environment on health behaviors. This space can simultaneously promote health education, social support, and self-management while also posing risks such as psychological harm, body-image disorders, physical inactivity, substance use, and misinformation. The main goal is not to eliminate or absolutely praise social networks, but to manage them consciously and optimally.

To reduce harm and increase benefits, three key strategies are proposed:

- Promote digital health literacy in the community,
- Design platforms with a health-supportive approach and create restrictions for harmful content,
- Integrate social networks with health systems, education, and public health programs.

Special attention to adolescent mental health, algorithmic accountability regarding body image and nutrition, leveraging networks' capacity to prevent risky behaviors, and ensuring equity and accessibility for vulnerable groups are essential. Also, future research should go beyond cross-sectional studies and, using longitudinal and implementation methods, assess the real effects of this environment.

Ultimately, social networks are neither inherently harmful nor entirely beneficial, but are steerable platforms. By improving digital literacy, redesigning platforms, supporting policy, and fostering multidisciplinary collaboration, a healthier, more trustworthy, and more effective environment for public health can be created (54).

The following model is developed based on factors affecting the behavior of diabetic patients, which we recognize as non-prescriptive recommendations and smart effort of pharmaceutical companies digital marketing.

In this context, pharmaceutical companies, emphasizing smart marketing strategies, have played and continue to play an important role in shaping patients' consumption behaviors. A study by Anis et al. (2022) shows that pharmaceutical companies, by being present on networks and social media, are testing direct strategies in online advertising, content production, and direct sales to patients. This is done by directly targeting patient groups and encouraging them to purchase non-prescription products. The branding these companies perform through social media is carried out by personalizing advertising campaigns via digital channels. This is done with an emphasis on insight-driven marketing obtained by analyzing customer data. Pharmaceutical companies, by focusing on data collected from the social behaviors of patients and their acquaintances, achieve smart strategies in marketing non-prescription treatments. Of course, self-medication behaviors

among patients are in no way recommended by physicians. But these behaviors and related treatments have always existed and are part of individuals' habits. On this basis, some patients with chronic diseases such as diabetes, by following social media, largely emphasize non-prescription dietary and medication behaviors as behavioral supplements. This has led pharmaceutical companies to play a greater role in non-prescription supplements along the course of individuals' illnesses.

The proposed conceptual model explores the impact of company-driven smart digital marketing strategies, alongside the direct and indirect influences of social networks on patient behavior in the context of nonprescription health practices. The model emphasizes variables related to data processing, information flow, and the strategic use of information in health marketing, illustrating how digitally mediated information shapes decision-making among patients with chronic conditions, particularly diabetes.

Within this framework, social networks, encompass both online social media platforms and peer-based networks in which pharmaceutical and health-related companies maintain an active and strategic presence. These environments function as key sites for information exchange, social learning, and behavioral normalization, especially among individuals managing chronic diseases who frequently rely on continuous, experience-based knowledge beyond formal clinical settings. Specifically, the social network component of the model includes:

- Online patient communities such as diabetes focused groups, Telegram channels, health education platforms, online forums, and WhatsApp groups, which facilitate collective learning and shared understandings of chronic disease management;
- Peer interactions, including experiential narratives, peer to peer recommendations, and observational learning derived from other patients' reported experiences with over the counter (OTC) medications, dietary supplements, and disease specific nutritional regimens;
- User generated content (UGC), comprising posts, stories, videos, comments, and reviews produced by patients or caregivers, which contribute to the construction of perceived efficacy, safety, and legitimacy of nonprescription health products.

In the context of diabetes and other chronic conditions, where long term self-management is central, these socially produced information streams play a critical role in shaping patients' therapeutic orientations and complementary consumption practices. Among the most influential corporate strategies operating within these digital ecosystems are content based marketing and influencer marketing, which leverage experiential authenticity, social endorsement, and algorithmic amplification to enhance credibility, foster engagement, and subtly integrate nonprescription products into patients' everyday self-care routines.

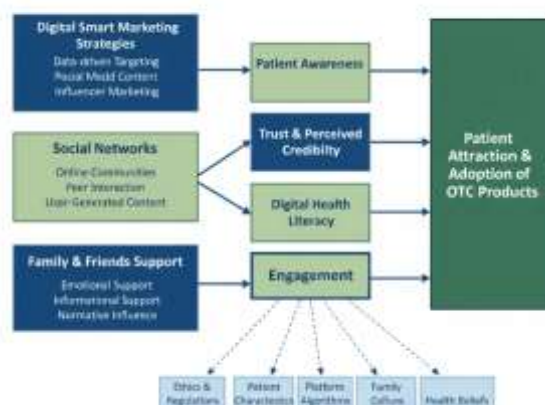


Fig1: Smart Health Marketing Behaviors of Patients

Collectively, the model demonstrates how smart digital marketing strategies, mediated by social and peer- based digital environments, contribute to the normalization and adoption of non- prescription health behaviors among patients with diabetes and other chronic diseases.

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