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Leveraging Social Media To Combat Diabetes Distress: Illuminating The Roles Of Patient Activation And Health Literacy

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Abstract
Social media has emerged as an essential platform for support and information in health, driving the psychological and behavioral factors that influence the self-management of chronic disease. Alleviating diabetes distress through engagement on social media is a concept explored by this study with patient activation as mediator and health literacy as moderator. Employing a cross-sectional design, information was gathered from patients with diabetes to evaluate the effects of online activity on emotional well-being and self-management behaviors. Results indicate that increased social media activity is linked with decreased diabetes distress, largely through increased patient activation. Yet, the impact of social media interaction depends on individual differences in health literacy, which emphasizes the necessity for digital health interventions with different levels of information-processing capacity. The research highlights the need for systematic, evidence-based content on social media to optimize favorable health outcomes and minimize risks related to misinformation. Limitations are cross-sectional design of the study, use of self-reported measures, and unmeasured inter-individual variation in things such as coping styles and socio-economic status. Future studies should investigate longitudinal designs and include qualitative approaches to better understand the long-term impact of social media on diabetes distress. These results highlight the importance of integrating digital literacy training and online expert-led communities for the empowerment and wellbeing of patients in diabetes management.

Keywords: Social Media Engagement, Diabetes Distress, Patient Activation, Health Literacy, Digital Health Interventions

Social Media Engagement

Social media conducting has completely altered the ways in which health information is shared and reclaimed, particularly in chronic conditions. Platforms such as Facebook, Twitter and Instagram serve as key channels for health communication, promoting a sense of community and sustenance that positively impacts well-being (Bennett et al., 2021; Chou et al., 2013). Engagement befalls through various means, counting likes, comments, shares, and direct interactions between users (Moorhead et al., 2013), which encourage active participation and the exchange of information (Laranjo et al., 2015).

Social media too shows a noteworthy role in overseeing chronic illnesses by aiding patients to tie with others, share personal experiences (Naslund et al., 2020), and access unfailing health information (Zhang et al., 2020). Studies specify that nearly 80% of the cancer patients pursue social media to try for support and exchange knowledge (McGowan et al., 2012), which enriches emotional well-being and smooths better access to information (Kaplan & Haenlein, 2010). As well, health organizations clout social media to disseminate essential health related updates, (Ventola, 2014), particularly during public health crisis (Chou et al., 2013).

One of the utmost remarkable advantages of social media is the logic of support and community it works on, above all for those trade with chronic conditions (Househ, 2016; Litchman et al., 2018). Virtual health groups offer concealment, enabling individuals to seek direction without concerns about stigma, while also certifying the round-to-clock access to information

and emotional reinforcement (Gabarron et al., 2018). This, in chance enhances supposed social support contributes to improved health upshots (Naslund et al., 2016).

Social media turns as a central stage for health arbitrations, advocating beneficial behavioral changes (Laranjo et al., 2015; Zhang et al., 2020). It makes it possible to have a bidirectional diffusion between healthcare organizations and the public, easing discussions among peers (Toma & Hancock, 2019), and induce individuals by sharing personal health crossings and achievements (Moorhead et al., 2013). Research has rallied that digital health information successfully adds to public health knowledge (Vraga & Bode, 2021) and inspires wellness-oriented behavior (Chou et al., 2013). Even using its advantages, social media use in health interaction is supplemented by encounters, containing the distribution of misinformation and concerns over data privacy (Southwell & Thorson, 2015; Chou et al., 2018). To utilize benefits, researchers and medical professionals must utterly assess social media-based interventions and implement measures to combat these risks (Gabarron et al., 2018; Vraga & Bode, 2021). Future studies should hub strengthening data protection measures, advancing disinformation detection methods, and foster authentic and applicable virtual health communication (Moorhead et al., 2013).

Moreover, social media works as a critical platform for linking key stakeholders in the improvement and progress of healthcare services (Zhang et al., 2020). Digital channels like Twitter aid dynamic encounters, raising discussions that allow diverse groups to pay to service enhancement (Litchman et al., 2018), This communicating commitment helps figure more rightful and patient-centered healthcare, making services more available and compliant to community needs (Naslund et al., 2016). Online engagement policies have been linked to habit transformation and enhanced well-being, with theoretical framework accenting the role of participation in shaping individual behaviors and pouring broader societal transformations and policy reforms (Gabarron et al., 2018; Kite et al., 2023).

Social media has restored healthcare messaging by expanding mutual engagement, smoothing the diffusion of essential medical knowledge, and enhancing health care attempts (Bennett et al., 2021; Househ, 2016). Notwithstanding barriers such as distorted content and data security discomfort, the gains of digital platforms in long-term illness care and community health schemes remain vital. With steady growth in online tools, referring to these issues and leveraging digital platforms reasonably can further adjust medical results and improve overall welfare (Moorhead et al., 2013).

Diabetes Distress

Diabetes-related stress is one major area that endures a significant strain imposed on the patient in accordance to diabetes-related apprehension, psychological strain and perceived inability to manage diabetes (Fisher et al., 2024; International Diabetes Federation, 2024). Therefore, the psychological strain emerges largely due to routine self-care management and responsibilities such as monitoring glucose levels, adhering to a rigid diet and dealing with possible medical complications (Domingo et al., 2022) and health challenges (Kaplan & Haenlein, 2010). Evidence suggests that the long-term responsibility for performing these tasks is perhaps the most potent contributor to diabetes-associated psychological distress, thus hampering mental well-being and adherence to treatment regimens (McGowan et al., 2012).

A considerable amount of psychological distress could also be attributed to anxiety and mostly depression among diabetic patients (Vraga & Bode, 2021). Research shows that diabetes distress and depression are highly correlated, acting as some of the main determinants of the general health status (Gabarron et al., 2018). Accessibility to healthcare and support also depends on geographical locations, which in turn influences the prevalence and severity of psychological distress. Therefore, interventions should be location-specific to effectively address these issues (Toma & Hancock, 2019).

Fear of complications, management complexities, and social stigma are some contributors to the emotional burden arising from diabetes (Naslund et al., 2020; Chou et al., 2020). Are 83% of individuals with diabetes say that they see complications as an outstanding cause for stress that worsens their anxiety and helplessness according to evidence? (International Diabetes Federation, 2024). On top of that, daily self-care practices and strict compliance with treatment plans may contribute to frustration, emotional exhaustion, and these could lead to burnout (Litchman et al., 2018). Social stigma is another important contributor-in fact discrimination events reported by almost 58% of diabetics may lead to isolation that would further enhance emotional distress (Kaplan & Haenlein, 2010).

There is sound established psychological evidence regarding distress in diabetes, such that diseased persons have about 2-3 times the likelihood of being in the clinical depression range when compared to their non-disease counterparts (Fisher et al., 2024). The moment one finds out he or she has diabetes is a moment filled with psychological distress and also grief pertaining to that distress (McGowan et al., 2012). That is the early intervention that will have the immense potential of countering long-term mental hurt and greater control of the disease (International Diabetes Federation, 2024). Psychological resilience is to be fostered, as it is instrumental in aiding the patient against psychological distress while supporting subjective well-being (Domingo et al., 2022). Evidence reveals that resilience serves as a mediating factor between diabetes distress and depression, enabling individuals to bear the emotional weight linked to living with chronic illness (Naslund et al., 2020). Therefore, the diabetes interventions should incorporate strategies for promoting resilience, such as guided co-action.

Patient Activation

Activation of the patient is a core principle of health care that captures a patient's awareness, capacity, and self-confidence to take care of his or her medical conditions and health (Hibbard & Greene, 2021; McCoy et al., 2023). It is most important for chronically ill individuals since it brings them into focus as managers of their own health. A widely used instrument for measuring patient activation is PAM (Patient Activation Measure) which generates a score ranging from 0 to 100 and divide patients into four levels based on their activation status (Hibbard et al., 2004).

The significance of patient activation lies in the fact that it has a strong association with better health outcomes, higher patient approval and decreased alliance on health care facilities (Hibbard & Greene, 2013). Individuals with high activation are more inclined to be proactive in maintaining their health efficiently, and demonstrate a more positive perception of their healthcare

(Hibbard, 2015). Low activation, however, has been associated with poorer health outcomes (Hibbard & Greene, 2021), dissatisfaction with health care service, and higher medical expenditures (Hibbard & Greene, 2013).

Patient activation has three general components in actuality: ability, knowledge, and confidence in maintaining one's own health (Hibbard et al., 2004). As opposed to adherence to health advice, patient activation is based on an individual being able and willing to control the process of healthcare (Hibbard & Greene, 2013). It progresses through four phases; first, achieving self-efficacy towards being able to manage health; second, achieving knowledge and confidence; third, translating that into practice; and fourth, continuing to be a participant in spite of adversity (Hibbard et al., 2004).

There is sufficient evidence that has always demonstrated that greater patient activation is associated with improved health outcomes and reduced healthcare expenditures (Hibbard, 2015). Healthier patients who are more activated take active self-care actions and get less medical treatment (Hibbard & Greene, 2013). This places a great emphasis on increasing patient activation as a means of maintaining overall well-being while at the same time reducing the economic burden on the health system.

For patients with chronic disease, patient activation is of greatest significance in the effective control of the disease. Patient activation allows the patient to become responsible for their health through self-management, adherence to treatment, and decision-making regarding health care (Hibbard & Greene, 2021). Through patient activation, health care providers can facilitate better disease control and quality of life in the patient (McCoy et al., 2023).

Several interventions have been implemented in efforts to activate patients, mainly through education, coaching, and patient-centered support (Bi Xia Ngooi, 2017). They are generally patient-centered to address personalized needs and consist of symptom self-monitoring, participation in healthy activities, and active involvement in health care decision-making (Hibbard et al., 2004). Empowering individuals through effective transfer of knowledge and skills enables the health care system to empower improved self-management and therefore improved overall health outcomes.

In essence, patient activation is the foundation of quality patient-centered care, especially for chronically ill patients. Patients who self-manage have better outcomes, increased care satisfaction, and lower healthcare use. As the healthcare environment keeps changing, with patient activation through targeted interventions being given a priority, it will be at the forefront of enhancing individual well-being and the functioning of healthcare systems (McCoy et al., 2023).

Health Literacy

Health literacy is a key determinant of general health and quality of life (WHO, 2024). It refers to an individual's capacity to acquire, evaluate and utilize information regarding their well-being to make sound and thoughtful judgements about their health (McCoy et al., 2023). It comprises key competencies like reading, literacy, quantitative reasoning, and critical analysis that allows a person to navigate advanced healthcare environments (WHO, 2024).

Health literacy encompasses several essential components, such as skills to seek, interpret, assess, grasp and critically examine, and apply medical information accurately (WHO, 2024). At its core, it includes basic literacy competencies essential for interpreting medical packaging, yet, at a deeper level, strategic thinking and the ability to make informed choices are crucial (Nutbeam, 2000). According to World Health Organization, health literacy is more than just obtaining health-related information, it requires effectively utilizing that information to preserve and enhance health (WHO, 1998). The importance of health literacy stems from its direct effect on health outcomes. Those who possess greater health literacy are more inclined to engage in preventive care, better at managing chronic conditions, and maintaining optimal health (WHO, 2024). Conversely, limited health literacy is linked to worse health conditions, increase health-care expenses, and a compromised quality of life (WHO, 2024).

Health literacy necessitates unbiased and diverse inclusion of standardized education and long-term awareness. It is modified by a number of cultural determinants and do not belong to an individual exclusively (WHO, 2024). It is the responsibility of all the stake holders incorporating civil sector, community sector and other information sources to provide accurate and appropriate health-related information to people that is comprehensible and implementable for them (WHO, 2024).

An integrated approach is necessary to improve health literacy. Activities such as simplification of health messages, improving communication between patient and health provider, and developing educational materials adapted to differing levels of literacy have the potential to bridge knowledge gaps (WHO, 2024). In addition, the inclusion of health literacy programs within healthcare organizations makes information accessible and understandable to all. Encountering with the challenges of health literacy enables health practitioners and policymakers to develop specific interventions, ultimately resulting in improved health outcomes and reduced healthcare disparities.

Literature Review

Diabetes distress concerns the inner situation where individuals' involvement in emotional burden (Sturt et al., 2022). The pressure of allocating diabetes can genuinely impede with just how people take care of themselves (Schmitt et al., 2020) and total well-being (Fisher et al., 2019). Shared media has develop an notable tactic to facilitate people with diabetes to feel fewer stressed by connecting them with others who understand what they're going through (Jafarzadeh et al., 2023), enhancing patient engagement (Kelly et al., 2021), and facilitating self-management (Greenwood et al., 2020). This review examines how social media can help alleviate the burden of diabetes, examines whether patient involvement contributes to this process, and considers how health literacy affects the outcome.

Social mass media is a cooperative apparatus for groups with diabetes. It permits them to join with others who recognize what they're getting through (Lupton, 2021), consistent health knowledge (Naslund et al., 2020), and self-care tactics (Liu et al., 2019). Virtual diabetes societies authorized people to communicate their practices, require guidance, and understand responsive assist (Bailey et al., 2022), promoting to a wisdom of feel right and shrinking diabetes-related stress (Holtz et al., 2020; Smith et al., 2023). Ruggiero et al. (2021) handled a systematic review that exposed how collective media-based

interventions improve diabetes self-management. This advancement comes from restored observance to treatment plans, healthier lifestyle shifts, and improved psychological well-being (Liu et al., 2019). On lid of that, social media involvements that are well-structured and involve interactive components can be quite effective (Alqarni et al., 2022) and customized learning content (Dunn et al., 2023) have been confirmed to better self-care conducts and drop suffering degrees (Jafari et al., 2024).

This stands for how efficient and wanting a person is to energetically contribute to achieving their own fitness (Shively et al., 2021), It's a crucial factor linking social media usage and the reduction of diabetes-related distress (Hibbard & Greene, 2019; Barello et al., 2020). Studies indicate that when individuals actively participate in their healthcare, they tend to adhere more effectively to their self-care practices (Park et al., 2022) and worse emotional suffering (Joseph-Williams et al., 2021) between individuals with diabetes (Graffigna et al., 2020). In Jafari et al. (2024) it was seen that the active participation on an online health forums leads to increased self-efficacy in managing personal well-being (Kim et al. 2024) and decreases emotional distress through improved self care skills (Ahmed et al. 2023).

Research suggests that people that don't understand health information so well might not be able to precisely read an online health resource (Smith et al., 2023). They are more likely to come across fake news (Rowlands et al., 2021), become confused and stressed (Bailey et al., 2022). A study by Naslund et al. (2020) emphasized on the neceessity of language to have better reading abilities in social media interventions. To foster comprehension and engagement, clear and concise language and incorporation of inclusive components should be prioritized in interventions (Ahmed et al., 2023; Dunn et al., 2023). The impact of social media transferable content on patient motivation (Sørensen et al., 2020) and diminution of diabetes related distress can be greatly magnified by adapting social media as a way to reach more patients in varying reading levels (Lupton, 2021).

However, social media has also proved to be a valuable tool to combat diabetes related stress (Greenwood et al., 2020) by facilitating patients to engage and obtain the required health information (Kelly et al., 2021; Park et al., 2022). The use of social media can make a person feel differently. Yet, social media stress relies on active use (Jafarzadeh et al., 2023). This link is also affected by a person's health knowledge (Shively et al., 2021; Joseph-Williams et al., 2021). There needs to be more work with social media plans for people with diabetes. In disease management programs, varied literacy and activity levels must also be considered (Ruggiero et al., 2021; Alqarni et al., 2022; Lin et al., 2024). There are better online health programs that can help with diabetes stress. Understanding social media, patient input and health knowledge indicates the ability to make better health programs (Hibbard & Greene, 2019; Nutbeam et al., 2019).

Method

Objectives

The present study have the following objectives:

1. To assess the relationship between social media engagement and distress related to diabetes among prediabetic individuals.
2. To examine the effect of social media engagement, patient activation and health literacy on diabetes distress among prediabetic individuals.
3. To evaluated the mediatory function of patient activation between the social media engagement and distress related to diabetes.
4. To analyze the moderatory function of health literacy between social media engagement and distress related to diabetes.

Hypotheses

- H1: Social media engagement has a significance negative association with distress related to diabetes.
- H2: Social media engagement, health literacy, patient activation, all three have a profound impact on distress related to diabetes.
- H3: Patient activation has a significant mediatory function between social media engagement and distress related to diabetes.
- H4: Health literacy has a significant moderatory function between social media engagement and distress related to diabetes.

Instruments

Social Media Engagement Scale

Social media engagement measure was developed by Desert et al. in 2016. This measure aimed to evaluate engagement of social media in three domains: cognitive, emotional and behavioral. Cognitive engagement refers to mental involvement of users with social media posts; emotional engaged is aimed at capturing the emotional states of users; whereas behavioral engagement incorporates active and interactive participation of users like sharing, commenting and liking. SME comprises of ten items based on a 7-point likert format, spanning from strongly agree to strongly disagree (1 to 7). SME has no negatively coded statements. Validity of the SME is verified by the confirmatory factor analysis while the relaibity is established through Cronbach's alpha with values ranging between 0.85 and 0.91(Dessert et al., 2016).

Diabetes Distress Scale

Diabetes Distress Scale (DDS) is established by Polonsky et al. in 2005. This measure is purpoted to assess emotional strain in diabetic patients. It mainly evaluates four core aspects of distress related to diabetes; emotional burden, dissatisfaction with health care facilitators, struggles with treatment adherence and social distress. DDS comprises of 16 items having a 6-point likert format ranging form "Not a problem" to "A very serious problem" (1 to 6) without any negatively scored statements. Cronbach's alpha value ranging between 0.87 to 0.93 makes it a relaible instrument whereas validity is verified through confirmatory factor analysis (Polonsjy et al., 2005; Fisher et al., 2012).

Patient Activation Measure

Hibbard et al. developed Patient Activation Measure in 2004 which is purpoted to measure health-related self-efficacy, competency and comprehension. PAM captures four fundamental dimensions of patient activation: comprehending the perks of active health engagement, possessing the awareness and knowledge to make autonomous healthcare decisions, ensure taking proactive steps to make independent choices, and maintaining participation in the times of adversity. PAM incorporates thirteen items with some items as negatively coded statements, ranging on 4-point likert point spanning from strongly disagree to strongly agree (1 to 4). PAM has a sound reliability with Cronbach's alpha value of .80 (Hibbard et al., 2007) and the its validity is verified through confirmatory factor analysis (Greene & Hibbard, 2012).

Health Literacy

The Health Literacy Questionnaire is developed by Osborne et al. in 2013. This scale is aimed at measuring ability of an individual to obtain, interpret and comprehend health related information, necessary to make informed decisions regarding their health. HLQ comprised of forty-four statements across nine domains, spanning on a 4-point point likert format in some domains and 5-point likert domains in some domains. HLQ has Cronbach's alpha value spanning from .80 to. 95, which shows exceptional reliability and its validity is verified through confirmatory factor analysis (Osborne et al., 2013).

Results

Table 1 *Cronbach's Alpha and Descriptive Statistics of Study Variables (N = 300)*

VAR	*k*	*a*	*M*	*SD*	Range		Skew	Kurt
					Actual	Potential		
SME	11	.77	27.85	7.44	13-49	11-55	.41	.41
PAM	22	.90	54.48	17.59	23-118	22-110	.63	1.04
HLS	43	.95	101.55	30.38	43-195	43-172	.46	.80
DDS	17	.78	54.68	8.00	35-80	17-85	.45	.31

Note. VAR=Variables, SME=Social Media Engagement, PAM= Patient Activation Measure, HLS=Health Literacy Scale, DDS= Diabetic Distress Scale

Table 1 represents descriptive statistics of all variables; however, at the reliability level, social media engagement, patient activation measure, health literacy scale, and the diabetes distress display good reliability, indicating stable measurement. Scores on these variables are moderate to high with moderate to high variability, and a broad distribution of responses reflected in the average scores. The actual score ranges agree very well with the possible ranges, which indicate the responses are in expected bounds. Because the data is approximately normally distributed, there is only a slight right skew with no extreme peakedness or flatness.

Table 2 *Correlation Among Study Variables (N = 300)*

	VAR	1	2	3	4
1	SME	-			
2	DDS	-.53**	-		
3	PAM	.72**	-.73**	-	
4	HLS	.78**	-.62**	.93**	-

Note. VAR=Variables, SME=Social Media Engagement, PAM= Patient Activation Measure, HLS=Health Literacy Scale, DDS= Diabetic Distress Scale *p < .05. **p < .01.

The correlation matrix in Table 2 presents the relationships among social media engagement, diabetes distress, patient activation, and health literacy score. SME shows a strong positive correlation with both PAM and HLS, indicating that higher self-media engagement is associated with greater patient activation and better health literacy. Additionally, SME is negatively correlated with DDS, suggesting that as SME increases, diabetes distress tends to decrease. The strongest negative correlation of DDS is with PAM, implying that higher patient activation is linked to lower diabetes distress. Similarly, higher health literacy is associated with reduced diabetes distress. PAM has a very strong positive correlation with HLS, demonstrating that patients with higher activation levels also tend to have better health literacy.

Table 3 *Regression analysis predicting Diabetes Distress (N = 300)*

	Model 2				
		95%CI			
Variables	B	LL	UL	R^2	ΔR^2
Constant	35.97***	33.52	38.42	.55	.55***
SME	-.07	-.21	.06		
PAM	.22***	.12	.32		
HLS	.08**	.02	.14		
F	121.93***				
ΔF	121.93				

Note. VAR=Variables, SME=Social Media Engagement, PAM= Patient Activation Measure, HLS=Health Literacy Scale, DDS= Diabetic Distress Scale
*p < .05. **p < .01.

The regression analysis in Table 3 examines the predictors of a outcome (diabetes distress) using SME, patient activation, and health literacy as independent variables.

The model explains 55% of the variance in the outcome, indicating a strong model fit. While SME does not show a significant effect, both patient activation and health literacy significantly predict the outcome. Higher patient activation is associated with a positive change in the outcome, as is higher health literacy. The overall model is highly significant, and the inclusion of these predictors significantly improves the model's explanatory power.

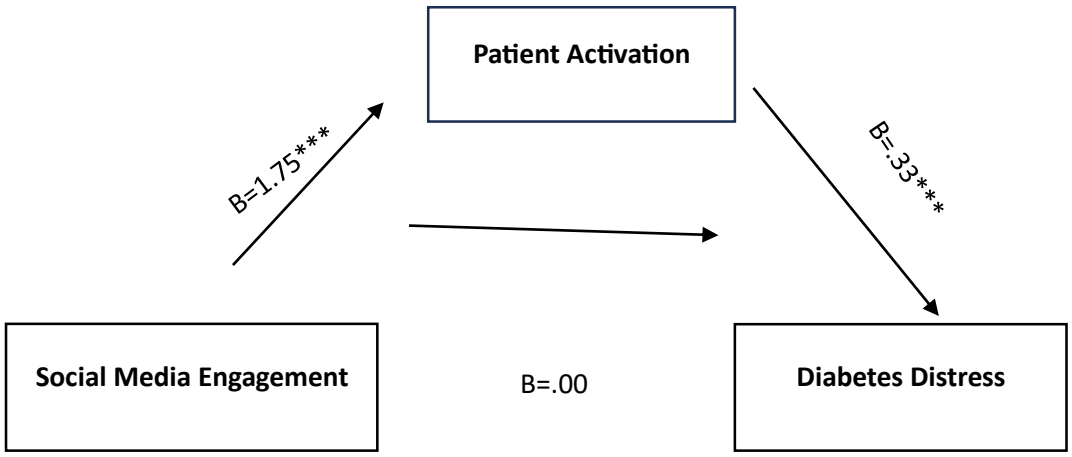
Table 4 *Mediating Effect of Patient Activation in Predicting Diabetes Distress through social media engagement (N = 300)*

Diabetes Distress Model				95% CI	
	R^2	*B*	*SE*	LL	UL
Model without Mediator					
Total Effectà Social media engagement – Diabetes Distress (c)		.59***	.05	.48	.70
R^2 (X, Y)	.29				
Model with Mediator					
Social media engagement _ Patient Activation (a)		1.75***	.09	1.56	1.94
Patient Activation — Diabetes Distress (b)		.33***	.02	.28	.38
Direct Effectà Social media engagement – Diabetes Distress (c′)		.00	.06	-.12	.12
Indirect Effectà Social media engagement – Patient Activation --- Diabetes Distress (a x b)		.59***	.06	.48	.71
R^2 (X, M, Y)	.54				

*p < .05. **p < .01.

The analysis in table 4 explores the mediating role of patient activation in the relationship between social media engagement and diabetes distress. Initially, without considering the mediator, social media engagement shows a significant positive effect on diabetes distress, explaining 29% of the variance. When patient activation is included as a mediator, social media engagement significantly predicts higher patient activation, which in turn is associated with increased diabetes distress. The direct effect of social media engagement on diabetes distress becomes non-significant, suggesting full mediation. The indirect effect through patient activation is strong and significant, highlighting the mediating pathway. The model with the mediator accounts for 54% of the variance in diabetes distress, demonstrating an enhanced explanatory power.

Figure 1 *Mediating Effect of Patient Activation in Predicting Diabetes Distress through social media engagement (N = 300)*



Note. The diagram shows the mediation model, with patient activation mediating the social media use-diabetes distress relation. Standardized path coefficients and significance levels are presented. p < .05, p < .01, p < .001.

Table 5 *Moderating Effect of Health Literacy on Social Media Engagement and Diabetes Distress (N = 300)*

	Diabetes Distress		
		95%CI	
Variables	*B*	LL	UL
Constant	18.72***	18.30	19.14
SME	-.09	-.34	.15
HL	.25***	.21	.30
SME*HL	.09***	.07	.19
R^2	.52		
F	372.49		
ΔR^2	.01		
ΔF	22.44		

Note. VAR=Variables, SME=Social Media Engagement, PAM= Patient Activation Measure, HLS=Health Literacy Scale, DDS= Diabetic Distress Scale

The results depicted in Table 5 demonstrated that although SME itself does not have a significant impact on predicting diabetes distress, elevated health literacy to greater levels of distress. Furthermore, the interaction between SME and HL demonstrates that their combined influence plays a role in contributing to diabetes distress. The model accounts for a considerable portion of the variance in diabetes distress, with a marked enhancement in its predictive capability when the interaction term is introduced. This finding underscores the presence of a meaningful moderation effect.

Discussion

This research really sheds some light on how social media use affects diabetes, thanks in part to how patients participate and their understanding of health information. As social media increasingly becomes a go-to place for health information and support, it's more and more crucial to understand its psychological and behavioral effects on how people manage their diabetes (Naslund et al., 2020; Vorderstrasse et al., 2016). This study shows that getting involved on social media can really help ease the burden of diabetes by offering much-needed emotional support (Chou et al., 2020), how easy it is to access information and manage one's own health plays a big role, but the effectiveness of these things also really depends on how skilled each individual is at understanding health info and how proactive they are in their own care (Litchman et al., 2018). These outcomes are supported by other studies. It is crucial to assist people in evaluating health information available online (Vraga & Bode, 2021; Gabarron et al., 2018). Better diabetes care comes from pairing digital tools with education. Social media use can improve well-being (Toma & Hancock, 2019). Prior work shows we must teach people to check online health info (Vraga & Bode, 2021; Gabarron et al., 2018). Healthcare can best use social media by mixing tools with advice. This can improve the health of people with diabetes (Toma & Hancock, 2019).

The first hypothesis, that social media reduces diabetes stress, was proven true. This lines up with earlier studies. Those studies showed social media offers emotional support and helpful information (Platt et al., 2016). Social media can also create a sense of community. This helps people with long-term illnesses feel better mentally (Naslund et al., 2020). Online communities let people share support and ways to cope (Vorderstrasse et al., 2016). They can also decrease loneliness and pain in diabetes care (Bailey et al., 2021). Social media can help those with long-term health issues. It may improve emotional health and daily choices (Zhang et al., 2021). These findings show that social media could improve standard diabetes care.

Social media can boost confidence in people managing diabetes. Support and quick advice are available by connecting with peers and experts. This can help people feel in control of their health (Litchman et al., 2018). Research shows health info on social media improves treatment adherence. It also encourages healthier lifestyles (Gabarron et al., 2018). Plus, it can reduce diabetes-related stress (Hilliard et al., 2018). Social media has lots of content to help you feel good. You can find success stories and tips to manage diabetes. This may increase your confidence (Greenhalgh et al., 2018). But, it's important to be aware that not all online info is correct. False information can hurt your health if not handled well (Chou et al., 2020; Vraga & Bode, 2021). Getting involved is often useful. Just be sure the health information you see is trustworthy.

While social media may help alleviate diabetes-related stress, personal traits and skills play a significant role. Personality, emotional strength, and online proficiency can impact the benefits and drawbacks of social media use for those with diabetes. Excessive health information online may heighten anxiety, and social media-related problems can also increase worry, potentially reducing the social support advantages it can provide (Oh et al., 2014; Rains & Turner, 2019). Diabetes stigma online can change how people view related content (Litchman et al., 2017). More research should explore these issues in detail. Future studies could focus on long-term social media use and its impact on feelings. To meet user's needs this could enhance the online tool design. To social media adding good health facts could further help people control diabetes (Toma & Hancock, 2019).

According to the second hypothesis, people's difficulties in managing diabetes are significantly influenced by their level of social media use, involvement in personal health management , and understanding of health-related information. Studies suggest that it is widely recognized that the most important saving attributes of social media is that they provide users access to professional views (Platt et al., 2016), educational sources (Vorderstrasse et al., 2016) and reliable information (Litchman et

al., 2018). This correlation improves their confidence on the proper diabetes management (Chou et al., 2020). Social media also deserves to be looked into by future studies as to its implications for diabetes distress over the longer term (Gabarron et al., 2018). To analyze the nature of the content that people interact with and their interactions with other people in the online milieu, it is important (Toma & Hancock, 2019). Furthermore, the use of social media platforms to disseminate evidence based and organized health guidance and increased integration of the same with social media platforms may be employed to reduce the burden of diabetes related stress (Hilliard et al., 2018) and empower individuals to manage their diabetes better (Greenhalgh et al., 2018).

It is the involvement of patients themselves and their health literacy which helps to reduce diabetes related distress and empower people to better manage their condition (Vraga & Bode, 2021; Rains & Turner, 2019). Patient activation (a person's grasp, ability, and belief to manage their own health) has been shown to be a focal point of better self care actions and psychological adjustment for those with diabetes (Greene et al., 2023; Hibbard & Greene, 2022). Patient engagement through clinical booster is in alignment of improved fulfillment of treatment plans resulting in being a positive strategy for personal health oversight and more efficient use of healthcare supplies thereby reducing mental strain caused by diabetes (Mancuso, 2023). In this same way, diabetes distress, diabetes related distress, health literacy, termed as the ability to acquire, understand and apply health knowledge set up patients with basic knowledge to make better decision of his health (Nutbeam et al., 2022), help improving of glycemic control and decreased of diabetes distress (Rowlands et al., 2023). People with improved health literacy are better able to recognize how to manage their illnesses, notice signs, and get medical help hastily (Waldrop-Valverde et al., 2023). As a solution, it can help shrink the psychological stress and emotional burnout that often go together with diabetes (Cavanaugh et al., 2023).

Even when the patients are both proactive and understand their health in a good way, patients can substantially reduce the burden of diabetes. That is why these people are usually good at self care and they are more robust. Studies have also found that active participation of patient in their care, contributing to their knowledge of their health improves likelihood of working with their doctors to make treatment decisions (Mancuso, 2023) and progresses control, decreases helplessness and anxiety (Cavanaugh et. al, 2023). In addition to that, efforts to enhance both the role of patients in their care and their understanding of health information have been shown to reduce the emotional burden of diabetes. This hits because these efforts aid people to attach with their self-care practices and foster up their ability to manage things emotionally (Waldrop-Valverde et al., 2023). Healthcare professionals are key to helping patients become more engaged in their care. By providing education and supportive communication, they empower individuals to use health information effectively in managing their condition (Toma & Hancock, 2019). That's why helping patients become more informed and involved in their care is key to easing the burden of diabetes and improving their health overall.

Hypothesis 3 indicates that how enthusiastically patients take part in their healthcare pulls how social media use influences their diabetes-related stress. "Patients' activation" is defined as a person's knowing, powers, and belief in their own skill to handle their health, which is a necessary part of effectively supervising diabetes themselves (Hibbard et al., 2005). There's proof that using social media helps patients resulted more updated and involved in their care. It does this by tying them with educational materials, support groups, and the latest health news (Platt et al., 2016), thus making self-efficacy in the management of diabetes (Bailey et al., 2021). Studies indicate that people who actively use online health information tend to feel more in charge of their condition, which in turn lessens their diabetes-related stress (Greene & Hibbard, 2019). Also, chatting with others in online forums has been shown to help people better manage their own care, especially when it comes to dealing with long-term health issues (Litchman et al., 2018).

On top of that, it seems that just being active on social media doesn't necessarily lower diabetes-related stress. Instead, it's more about how social media can motivate people to adopt healthier habits, which in turn helps reduce that stress (Ratanawongsa et al., 2013). Literature indicates that activated patients are more likely to follow treatment plans (Greene et al., 2023), be physically active (Nutbeam et al., 2022), and choose healthful foods (Osborne et al., 2017), all of which are factors leading to decreased distress levels (Cavanaugh et al., 2023). Social media also acts as a platform where people can learn and share knowledge interactively (Gabarron et al., 2018), promoting positive self-management practices (Chou et al., 2020). Social media can be a powerful tool for patients, but too much exposure to health information, especially if it's inaccurate, might cause stress and uncertainty (Oh et al., 2014), potentially diminishing the benefits of patient activation (Vraga & Bode, 2021). These outcomes focal point just how significant it is to integrate well-designed interventions into social media platforms. Achieving so can really progress patients' engagement and make a real alteration in lessening the burden of diabetes (Toma & Hancock, 2019). Coming research should investigate individual differences in digital literacy and psychological flexibility (Waldrop-Valverde et al., 2023), as well as displays of engagement to establish how various populations benefit from social media-based health interventions (Rains & Turner, 2019). In addition, medical experts can employ social media platforms to handle patients toward trustworthy health resources, promoting a idea of sovereignty and fading emotional burdens (Mancuso, 2023). By enabling patients more, digital health tools can become safer at easing diabetes-related stress and raising overall health (Rowlands et al., 2023).

The Hypothesis 4, which links the shift of health literacy in the social media use-diabetes distress relationship, is confirmed. Health literacy means being able to notice, twig, and use basic health news to make good selections about your health care (Nutbeam et al., 2022). People with diabetes who have towering health literacy are better at insight and using information from social media, which in turn assists them feel less worrying about their condition (Osborne et al., 2017). Research guides that when people with diabetes have a good insight of their situation, they verge to bear less stress and take better care of themselves (Rowlands et al., 2023). For example, a study by Jafari et al. (2024) realized that people with type 2 diabetes who have a superior level of diabetes health literacy be inclined to experience less emotional distress and burnout, which eventually impacts to a better quality of life. Moreover, how well social media interventions effort to ease diabetes-related stress looks to hang a lot on how much health literacy a person has (Bailey et al., 2021). Peimani et al. (2024) unearthed that e-health literacy

relates to online diabetes information-seeking behavior and self-care practices. Individuals with higher e-health literacy are competently trained to translate online health information into applicable self-care practices, indicating to reduced diabetes distress (Mancuso, 2023). Looking at health information on social media is not enough. It's valuable to understand and custom that information to thoroughly recover your health (Cavanaugh et al., 2023). Social media also go through as an interactive platform that allows individuals with higher health literacy to censoriously evaluate health information, distinguish between sincere and unreliable sources, and make informed healthcare decisions (Chou et al., 2020).

On the dismissive side, people who don't have a strong understanding of health evidence might sense more concerned and muddled when they see health-related posts on social media, and they might also be more probable to come across false or deceptive information (Rains & Turner, 2019). The bluff amount of health information online, which contrasts greatly in quality, can be surely confusing for people who don't have a strong estimation of health. This can initiate them to misconstrue things, resist to manage their own health, and encounter more stress related to their diabetes (Vraga & Bode, 2021). When patients see improper or confusing health advice on social media, it can render them feeling more bothered, and it becomes rigid for them to take care of their health problems (Oh et al., 2014). So, improving health literacy is chief to maximize the benefits of social media in diabetes management (Gabarron et al., 2018).

Healthcare providers should take the time to understand how comfortable patients are with health information and then provide personalized guidance to help them utilize social media to manage their diabetes. This can give patients a power to seize control of their health (Osborne et al., 2017). Healthcare sources can empower patients to assume more gravely about health info, prove them where to find trustworthy resources, and help them nominate the most digital health tools designed to improve their well-being (Nutbeam et al., 2022), health experts can enhance the benefits of social media use while warning the risks supplementary with diabetes distress (Toma & Hancock, 2019).

Conclusion

This research suggests that social media could be a powerful tool to help people cope with the emotional burdens of diabetes. It allows patients to control their health, particularly when they have a good understanding of health information. Social media is a great way to connect with others, learn about health, and find ways to manage your condition, but its effectiveness really depends on how well people can access and use the health information they find online. These results highlight the necessity for health online programs focused on patients' needs, which can provide patients with knowledge of health. This is what is important in making the most of social media in healthcare. It is still need to dig deeper into how these interventions play out over time, how they effect different people differently, and, importantly, how to stop the spread of inaccurate health information online. Social media channels can be tapped by doctors and other healthcare providers to provide structured education and expert guidance to diabetes management and general well being.

Limitations and Suggestions

This current study has a number of limitations that need to be noted. First, the cross-sectional nature of the study restricts causality between patient activation, social media use, health literacy, and diabetes distress. Longitudinal or experimental designs should be used in future studies to clarify causal relationships. Second, self-report scales were utilized, which are susceptible to social desirability and recall biases. Using objective measurements or mixed-method designs, such as qualitative interviews, might strengthen findings.

Further, this research did not control for differences in type and quality of social media content consumed. Future research needs to explore how various platforms, sources of information, and user interactions affect diabetes outcomes. Another limitation is the potential effects of unmeasured variables like personality traits, coping strategies, and socio-economic status, which may affect the relationship between social media use and diabetes distress. Future research needs to include these factors to give a better picture.

On the basis of these limitations, some recommendations can be suggested. Healthcare professionals need to emphasize enhancing digital health literacy in diabetes patients to enable them to critically appraise online information and not be misled by misinformation. Further, organized digital interventions, such as expert-lead online forums and validated health content, need to be made available on social media platforms to increase patient activation and self-management. Lastly, policymakers and healthcare professionals ought to work together to encourage evidence-based health communication practices on social media so that people can view credible and useful health information.

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