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Patient Perspectives on Lifestyle Changes Following a Diabetes Diagnosis

Ayşe Şahin[1], Dilek Soylu[1*]

[1] Manavgat Faculty of Social and Human Sciences, Akdeniz University, Antalya, Turkey

*** Corresponding author email address**: dileksoylu@akdeniz.edu.tr

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A B S T R A C T

Diabetes mellitus poses significant health risks and managing it effectively involves substantial lifestyle changes. This study aimed to explore the personal experiences and perceptions of individuals diagnosed with diabetes in regard to the lifestyle changes they undertook following their diagnosis, with the objective of understanding the emotional, behavioral, and health impacts of these changes. A qualitative research design was employed, involving semi-structured interviews with 20 participants who had been diagnosed with diabetes within the past five years. Data collection aimed at achieving theoretical saturation and was analyzed using NVivo software through thematic analysis, focusing on identifying and understanding themes and patterns in participants' responses. The analysis revealed three main themes: Emotional Responses, Lifestyle Modifications, and Health Outcomes. Emotional Responses included initial reactions such as shock and denial, various coping mechanisms, and long-term emotional adjustments. Lifestyle Modifications encompassed dietary changes, increased physical activity, medication adherence, and health monitoring. Health Outcomes were reflected in improvements in physical and psychological well-being, better management of complications, enhanced quality of life, increased knowledge and awareness about diabetes, and varied perspectives on future health prospects. The findings underscore the complexity of diabetes management post-diagnosis and highlight the need for personalized support systems that address both the emotional and practical aspects of lifestyle changes. Effective management strategies should be holistic, incorporating emotional support, practical lifestyle adjustment guidance, and ongoing health monitoring.

Keywords: *Diabetes management, lifestyle changes, qualitative research, emotional responses, health outcomes, patient perspectives.*

1. Introduction

The escalating global prevalence of diabetes poses a significant public health challenge, necessitating urgent intervention strategies focused on prevention and effective management. Lifestyle modifications, including dietary changes and increased physical activity, are widely recognized as foundational elements in both the prevention and management of diabetes, particularly type 2 diabetes (Aghayousefi et al., 2020; Behzadi et al., 2021; Keramati, 2021; Rahimi et al., 2023; Sidi et al., 2022).

Diabetes, a chronic metabolic disorder characterized by elevated blood glucose levels, significantly increases the risk of serious health complications such as cardiovascular disease, kidney failure, and vision loss (Liu et al., 2018; Liu et al., 2023). According to Liu et al. (2018), lifestyle factors profoundly influence the incidence of cardiovascular diseases among diabetic patients, emphasizing the critical role of dietary and exercise patterns in mitigating such risks (Liu et al., 2018). Further, Liu et al. (2023) highlight that adherence to a healthy lifestyle is closely associated with reduced microvascular complications in individuals with type 2 diabetes, underscoring the importance of sustained lifestyle interventions (Liu et al., 2023).

Despite the known benefits of lifestyle changes, numerous barriers exist that hinder effective implementation. Bekele et al. (2020) systematically reviewed the challenges faced by individuals in Africa, identifying cultural and socioeconomic factors that impede the adoption of dietary and lifestyle recommendations (Bekele et al., 2020). Similarly, Robles and Kuo (2022) discuss how provider-patient interactions can influence lifestyle behaviors, suggesting that effective communication and supportive relationships with healthcare providers are crucial in fostering lifestyle modification (Robles & Kuo, 2022).

Motivation to adhere to these changes is another significant factor. As described by Schmidt et al. (2020), maintaining lifestyle changes post-intervention remains challenging for many patients with type 2 diabetes, with motivation and perceived barriers playing a pivotal role (Schmidt et al., 2020). Sebire et al. (2018) found that individuals newly diagnosed with type 2 diabetes often undergo a profound transformation in their lifestyle, driven by a strong initial motivation, which can, however, diminish over time (Sebire et al., 2018). The initial reaction to a diabetes diagnosis can be a powerful motivator for change, as Youngs et al. (2016) note, with the diagnosis of pre-diabetes often serving as a 'wake-up call' that can lead to significant behavioral adjustments (Youngs et al., 2016).

Online support and digital health interventions have emerged as important tools in supporting individuals with diabetes. Hansen et al. (2021) report that participation in online groups significantly correlates with improved lifestyle adjustments among those diagnosed with type 2 diabetes, suggesting that digital platforms can provide essential support and information, enhancing patient engagement and empowerment.

Cultural and personal factors also play a crucial role in how lifestyle interventions are perceived and implemented. Shakya et al. (2023) explored the experiences of individuals with prediabetes in Nepal, revealing that cultural beliefs and social structures significantly influence dietary changes and physical activity. This highlights the need for culturally tailored interventions that consider the specific needs and circumstances of different populations (Shakya et al., 2023).

Furthermore, Jallinoja et al. (2008) discuss the notion of self-responsibility in lifestyle change among participants in an intervention to prevent type 2 diabetes, indicating that personal responsibility and self-efficacy are key drivers of successful lifestyle modification (Jallinoja et al., 2008). This is complemented by Chong et al. (2017), who examined lifestyle changes following a diagnosis of type 2 diabetes and found that a comprehensive understanding of the disease and its management strategies is vital for patients to effectively engage in self-care behaviors (Chong et al., 2017).

This study aims to expand on these findings by exploring patient perspectives through qualitative research, specifically focusing on the lived experiences of individuals who have undergone lifestyle changes following a diabetes diagnosis. By examining personal narratives and the complexities involved in adjusting to a new lifestyle, this study seeks to contribute valuable insights into the effectiveness of current strategies and the potential need for more personalized, context-sensitive approaches in diabetes management.

2. Methods and Materials

2.1. Study Design and Participants

This study employed a qualitative research design to deeply explore patient perspectives on lifestyle changes following a diabetes diagnosis. The qualitative approach was selected due to its strength in uncovering rich, detailed

descriptions and understanding of individuals' experiences and perceptions.

Participants were recruited using purposive sampling to include a diverse range of individuals diagnosed with diabetes within the past five years. This timeframe was chosen to ensure that participants had sufficient experience in managing their condition through lifestyle adjustments. The inclusion criteria were adults aged 18 years and older, diagnosed with either Type 1 or Type 2 diabetes. Exclusion criteria included individuals with gestational diabetes or those diagnosed more than five years ago.

The study aimed to achieve theoretical saturation, where no new themes emerged from data collection, indicating that the exploration of the topic was sufficiently thorough. This approach ensures comprehensive coverage of participants' perspectives within the scope of the study.

The study was conducted in accordance with ethical standards of the institutional research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Informed consent was obtained from all individual participants involved in the study. Participants were informed of the study's purpose, the voluntary nature of their participation, the confidentiality of their responses, and their right to withdraw from the study at any time without penalty.

2.2. Measures

2.2.1. Semi-Structured Interview

Data was collected through semi-structured interviews, which allowed for flexibility in exploring the experiences and reflections of the participants while still providing some structure to compare responses. Each interview began with open-ended questions regarding the participant's initial reaction to the diagnosis and progressed to more specific questions about lifestyle changes they had implemented. Probes were used to encourage elaboration on important topics such as diet, physical activity, and medication adherence.

2.3. Data analysis

All interviews were audio-recorded, transcribed verbatim, and anonymized to maintain confidentiality. The transcriptions were then imported into NVivo, a qualitative data analysis software, which facilitated the organization, coding, and analysis of data. A thematic analysis was conducted following Braun and Clarke's methodological framework, which involved generating initial codes, searching for themes among codes, reviewing themes, defining and naming themes, and producing the final report. This iterative process allowed for the identification of common patterns and themes related to lifestyle changes after a diabetes diagnosis.

3. Findings and Results

In this qualitative study, we engaged 20 participants who had been diagnosed with diabetes within the past five years. The demographic composition of the participants included 12 females and 8 males, reflecting a gender distribution within our sample. The age range of participants was broad, spanning from 28 to 65 years, with the majority (60%) falling within the 40-55 age bracket. Education levels varied, with 30% having completed college degrees, 45% possessing high school diplomas, and 25% holding postgraduate degrees.

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Table 1

The Results of Thematic Analysis

Categories	Subcategories	Concepts (Open Codes)
Emotional Responses	1. Initial Reaction	Shock, Denial, Fear, Acceptance, Relief, Overwhelm
	2. Coping Mechanisms	Seeking support, Information gathering, Avoidance, Spiritual coping, Therapy, Self-education
	3. Long-term Adjustment	Resilience, Adaptation, Frustration, Motivation, Resignation, Acceptance, Routine development
	4. Impact on Mental Health	Anxiety, Depression, Stress, Positivity, Emotional stability
	5. Relationship Dynamics	Family support, Social isolation, Misunderstandings, Strengthened bonds, Dependency
Lifestyle Modifications	1. Dietary Changes	Portion control, Sugar reduction, Carbohydrate management, Incorporating vegetables, Meal planning, Reading food labels
	2. Physical Activity	Regular exercise, Activity tracking, Sedentary lifestyle reduction, Joining a gym, Using fitness apps
	3. Medication Adherence	Routine setting, Alarm use, Medication tracking apps, Physician consultation
	4. Health Monitoring	Blood sugar testing, Regular check-ups, Use of health monitoring apps, Keeping a health diary
Health Outcomes	1. Physical Well-being	Improved energy levels, Weight management, Blood sugar control, Decreased medication dependence
	2. Psychological Well-being	Increased confidence, Improved self-esteem, Mental clarity, Sense of control
	3. Complications Management	Eye health, Kidney function, Nerve health, Cardiovascular health
	4. Quality of Life	Lifestyle satisfaction, Activity levels, Social engagement, Independence
	5. Knowledge and Awareness	Understanding of diabetes, Nutritional knowledge, Awareness of body signals, Risk factor identification
	6. Future Outlook	Optimism, Concerns, Planning for health, Preventive measures

In the qualitative analysis of semi-structured interviews conducted with diabetes patients, three main themes emerged regarding the impact of lifestyle changes post-diagnosis: Emotional Responses, Lifestyle Modifications, and Health Outcomes. Each theme comprised several subthemes and associated concepts, revealing a complex array of personal experiences and behavioral adjustments.

3.1. Emotional Responses

Participants articulated a range of initial reactions to their diabetes diagnosis, including shock ("I was completely blindsided"), denial ("I just couldn't accept it at first"), and acceptance ("I knew I had to deal with it"). Coping mechanisms varied widely, with many seeking support from family or friends ("My family was my rock"), engaging in information gathering ("I read everything I could find about

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diabetes"), and some adopting spiritual practices or therapy ("Prayer helped me cope"). Over time, long-term adjustments became evident as patients spoke of developing resilience ("It got easier to handle with time"), though some also expressed feelings of frustration and resignation ("Sometimes it feels like too much"). The emotional journey often impacted mental health, leading to anxiety or depression ("It's overwhelming at times"), but also to positive feelings of emotional stability and positivity ("I've found a new sense of balance"). Changes in relationship dynamics were also notable, with increased dependency on others or strengthened bonds ("My spouse and I are closer now").

3.2. Lifestyle Modifications

Interviews revealed significant changes in personal habits and routines. Dietary changes were common, involving portion control ("I watch my portions much more"), sugar reduction ("I've cut out most sugars"), and careful meal planning ("Planning meals helps avoid temptations"). Physical activity increased for many, with participants joining gyms or using fitness apps ("I started using an app to track my steps"). Medication adherence was crucial, facilitated by routines and technology aids ("I set alarms to remember my medications"). Regular health monitoring became a part of daily life, including frequent blood sugar testing and check-ups ("I check my blood sugar first thing every morning").

3.3. Health Outcomes

Participants reported varied physical well-being outcomes, such as improved energy levels and effective weight management ("I've lost weight and feel better overall"). Psychological well-being also improved for many, with increases in confidence and mental clarity ("I feel more in control of my health now"). Management of complications was a critical concern, with ongoing monitoring of potential issues like eye health and kidney function ("I keep a close eye on my health indicators"). Improvements in quality of life were frequently mentioned, with better social engagement and independence ("I go out more and enjoy things"). Enhanced knowledge and awareness about diabetes was another positive outcome, helping patients manage their condition more effectively ("I understand my body's signals much better now"). The future outlook was generally optimistic, though some concerns about long-term health remained ("I'm hopeful but still cautious about the future").

4. Discussion and Conclusion

The qualitative analysis of the data collected through semi-structured interviews with 20 participants diagnosed with diabetes revealed three main themes: Emotional Responses, Lifestyle Modifications, and Health Outcomes. Each theme was subdivided into several categories that captured a wide range of experiences and responses related to lifestyle changes following a diabetes diagnosis.

The Emotional Responses theme encapsulated the psychological impact of a diabetes diagnosis and subsequent lifestyle changes. Within this theme, five categories were identified: Initial Reaction, Coping Mechanisms, Long-term Adjustment, Impact on Mental Health, and Relationship Dynamics. Initial Reaction included concepts such as shock, denial, and acceptance. Coping Mechanisms featured strategies like seeking support and information gathering. Long-term Adjustment highlighted resilience and adaptation over time. Impact on Mental Health reflected changes in emotional states including anxiety and depression, while Relationship Dynamics focused on how relationships were affected by the diagnosis, showing changes in family support and social interactions.

The Lifestyle Modifications theme detailed the changes participants made in response to their diagnosis, divided into four categories: Dietary Changes, Physical Activity, Medication Adherence, and Health Monitoring. Dietary Changes encompassed concepts like portion control, sugar reduction, and meal planning. Physical Activity included regular exercise and the use of activity tracking devices. Medication Adherence was characterized by the establishment of routines and the use of reminders, while Health Monitoring involved regular medical check-ups and the use of health apps to monitor various physiological parameters.

The Health Outcomes theme described the consequences of the lifestyle changes on participants' health, segmented into six categories: Physical Well-being, Psychological Well-being, Complications Management, Quality of Life, Knowledge and Awareness, and Future Outlook. Physical Well-being included improved energy levels and weight management. Psychological Well-being highlighted increased confidence and mental clarity. Complications Management focused on the monitoring and management of diabetes-related health issues. Quality of Life discussed the

enhancement in daily living and independence. Knowledge and Awareness explored the increased understanding of diabetes management, and Future Outlook reflected optimism and concerns about future health.

Participants' initial emotional responses ranged from shock and denial to acceptance, aligning with findings from Sebire et al. (2018) who noted that a diabetes diagnosis often triggers a significant emotional journey, which can profoundly impact motivation and engagement with lifestyle changes (Sebire et al., 2018). This study further highlighted the importance of coping mechanisms, such as seeking support and information gathering. These findings are supported by O'Brien et al. (2016), who emphasized that patient perceptions about diabetes significantly influence their preferences for and approaches to diabetes prevention (O'Brien et al., 2016).

The lifestyle modifications adopted by participants, including dietary changes and increased physical activity, are crucial for managing diabetes effectively. These results are consistent with the systematic review by Bekele et al. (2020), which emphasized barriers and strategies to dietary and lifestyle interventions (Bekele et al., 2020). Furthermore, the role of digital platforms in supporting these lifestyle changes, as reported by Hansen et al. (2021), was also echoed in our study where some participants benefited from online support groups and health management apps, suggesting a growing reliance on digital health resources for continuous support and guidance (Hansen et al., 2021).

The health outcomes reported by participants varied, with many noting improvements in physical well-being and quality of life. These improvements are similar to those observed by Liu et al. (2018), who documented the positive influence of lifestyle on cardiovascular disease incidence among diabetic patients (Liu et al., 2018). Moreover, adherence to a healthy lifestyle was linked to reduced microvascular complications as found by Liu et al. (2023), reinforcing the long-term benefits of consistent lifestyle management (Liu et al., 2023).

This study's findings contribute to the broader understanding of diabetes management, particularly highlighting the importance of personalized, culturally sensitive interventions that consider patients' unique circumstances and emotional states. This approach is supported by Shakya et al. (2023), who pointed out the influence of cultural contexts on lifestyle change experiences among prediabetic individuals (Shakya et al., 2023). Furthermore, the study underscores the importance of supportive provider-patient interactions in fostering effective lifestyle modifications (Robles & Kuo, 2022).

This study provided comprehensive insights into the personal experiences and challenges faced by individuals diagnosed with diabetes, regarding lifestyle changes. The findings revealed three main themes: Emotional Responses, Lifestyle Modifications, and Health Outcomes. Emotional responses varied widely but often started with shock and progressed towards acceptance, facilitated by diverse coping mechanisms. Significant lifestyle modifications were noted, particularly in diet and physical activity, supported by digital tools and online community engagement. Health outcomes related to these changes were generally positive, with improvements in both physical and psychological well-being, demonstrating the effectiveness of sustained lifestyle management.

The results of this study highlight the intricate relationship between a diabetes diagnosis and subsequent lifestyle changes. They underline the critical role of emotional support and the effective use of digital tools in managing diabetes. The study reinforces the notion that understanding and addressing the emotional and practical challenges faced by patients can significantly enhance their ability to manage the disease effectively, leading to improved health outcomes.

This study is limited by its qualitative nature and the small sample size, which may not capture the full spectrum of diversity in diabetes experiences across different populations and cultures. Additionally, the reliance on self-reported data could introduce bias in the interpretation of the findings. The insights gained are deeply contextual and may not be universally applicable.

Future research should focus on expanding the demographic and geographic diversity of participants to include a broader range of cultural perspectives. Quantitative studies could complement this qualitative research to provide statistical validation of the findings and assess the impact of specific interventions. Longitudinal studies could also be beneficial to track changes over time and evaluate the long-term effectiveness of lifestyle modifications on health outcomes.

The findings suggest significant implications for clinical practice, particularly in enhancing patient-provider communications and tailoring interventions to meet the individual needs of patients. Healthcare providers should consider integrating more comprehensive emotional support systems and leveraging technology to support patients in managing their condition. The study also emphasizes the

importance of culturally sensitive approaches to healthcare, ensuring that interventions are adaptable to the diverse cultural backgrounds of patients to improve engagement and outcomes.

Authors' Contributions

Authors contributed equally to this article.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

Data are available for research purposes upon reasonable request to the corresponding author.

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Declaration of Interest

The authors report no conflict of interest.

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Ethical Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants.

References

Aghayousefi, A., Safari, Y., Ahmadi, S., & Abaspour, P. (2020). Studying the Effectiveness of Coping Therapy on Psychological Markers (Stress, Quality of Life and Coping Strategies) in Type II Diabetic Patients. *Health Psychology*, *9*(34), 25-40. https://doi.org/10.30473/hpj.2020.41833.4104

Behzadi, S., Tajeri, B., Sodagar, S., & Shariati, Z. (2021). The comparison of the effectiveness of acceptance, commitment, and reality therapy on life satisfaction and self-care behaviors of the elderly with type II diabetes. *Applied Family Therapy Journal (AFTJ)*, *2*(4), 483-501. https://journals.kmanpub.com/index.php/aftj/article/view/827

Bekele, H. B., Asefa, A., Getachew, B., & Belete, A. M. (2020). Barriers and Strategies to Lifestyle and Dietary Pattern Interventions for Prevention and Management of TYPE-2 Diabetes in Africa, Systematic Review. *Journal of Diabetes Research*. https://doi.org/10.1155/2020/7948712

Chong, S., Ding, D., Byun, R., Comino, E., Bauman, A., & Jalaludin, B. (2017). Lifestyle Changes After a Diagnosis of Type 2 Diabetes. *Diabetes Spectrum*. https://doi.org/10.2337/ds15-0044

Hansen, A., Wangberg, S. C., & Årsand, E. (2021). Lifestyle Changes Among People With Type 2 Diabetes Are Associated With Participation in Online Groups and Time Since Diagnosis. *BMC Health Services Research*. https://doi.org/10.1186/s12913-021-06660-5

Jallinoja, P., Pajari, P., & Absetz, P. (2008). Repertoires of Lifestyle Change and Self-responsibility Among Participants in an Intervention to Prevent Type 2 Diabetes. *Scandinavian Journal of Caring Sciences*. https://doi.org/10.1111/j.1471-6712.2007.00551.x

Keramati, M. R. (2021). A Comparison of Health-Related Quality of Life and Job Satisfaction in Physically Active and Sedentary Faculty Members. *International Journal of Education and Cognitive Sciences*, *2*(3), 23-32. https://doi.org/10.22034/injoeas.2021.160725

Liu, G., Li, Y., Hu, Y., Zong, G., Li, S., Rimm, E. B., Hu, F. B., Manson, J. E., Rexrode, K. M., Shin, H. J., & Sun, Q. (2018). Influence of Lifestyle on Incident Cardiovascular Disease and Mortality in Patients With Diabetes Mellitus. *Journal of the American College of Cardiology*. https://doi.org/10.1016/j.jacc.2018.04.027

Liu, G., Li, Y., Pan, A., Hu, Y., Chen, S., Qian, F., Rimm, E. B., Manson, J. E., Stampfer, M. J., Giatsidis, G., & Sun, Q. (2023). Adherence to a Healthy Lifestyle in Association With Microvascular Complications Among Adults With Type 2 Diabetes. *JAMA Network Open*. https://doi.org/10.1001/jamanetworkopen.2022.52239

O'Brien, M. J., Moran, M., Tang, J., Vargas, M. C., Talen, M. R., Zimmermann, L., Ackermann, R. T., & Kandula, N. R. (2016). Patient Perceptions About Prediabetes and Preferences for Diabetes Prevention. *The Diabetes Educator*. https://doi.org/10.1177/0145721716666678

Rahimi, R., Ahadi, H., Tajeri, B., & Khoshlahjeh Sedgh, A. (2023). The effectiveness of acceptance and commitment therapy on perceived stress in diabetic elderly. *Journal of Personality and Psychosomatic Research (JPPR)*, *1*(1), 1-5. https://doi.org/10.61838/kman.jppr.1.1.1

Robles, B., & Kuo, T. (2022). Provider-Patient Interactions as Predictors of Lifestyle Behaviors Related to the Prevention and Management of Diabete. https://doi.org/10.20944/preprints202202.0184.v1

Schmidt, S. K., Hemmestad, L. B., MacDonald, C. J., Langberg, H., & Valentiner, L. S. (2020). Motivation and Barriers to Maintaining Lifestyle Changes in Patients With Type 2 Diabetes After an Intensive Lifestyle Intervention (The U-Turn Trial): A Longitudinal Qualitative Study. *International journal of environmental research and public health*. https://doi.org/10.3390/ijerph17207454

Sebire, S. J., Toumpakari, Z., Turner, K., Cooper, A. R., Page, A. S., Malpass, A., & Andrews, R. C. (2018). "I've Made This My Lifestyle Now": A Prospective Qualitative Study of Motivation for Lifestyle Change Among People With Newly Diagnosed Type Two Diabetes Mellitus. *BMC public health*. https://doi.org/10.1186/s12889-018-5114-5

Shakya, P., Bajracharya, M., Skovlund, E., Shrestha, A., Kulseng, B., Sen, A., Steinsbekk, A., & Shrestha, A. (2023). How Did People With Prediabetes Who Attended the Diabetes Prevention Education Program (DiPEP) Experience Making Lifestyle Changes? A Qualitative Study in Nepal.

International journal of environmental research and public health. https://doi.org/10.3390/ijerph20065054

Sidi, M., Mohammadi, M., Omidi, M., & Habibnia, M. R. (2022). The role of self-care on cognitive ability in diabetic elderly. *Applied Family Therapy Journal (AFTJ)*, *3*(5), 196-208. https://doi.org/10.61838/kman.aftj.3.5.12

Youngs, W., Gillibrand, W. P., & Phillips, S. (2016). The Impact of Pre-diabetes Diagnosis on Behaviour Change: An Integrative Literature Review. *Practical Diabetes*. https://doi.org/10.1002/pdi.2030