Paidéia
2023, Vol. 33, e3335.doi:https://doi.org/10.1590/1982-4327e3335
ISSN 1982-4327 (online version)

Self-Care and Resilience in People with Diabetes Mellitus in the COVID-19 Pandemic

Bárbara Aparecida Binhardi[1]
Maria Teresa da Costa Gonçalves Torquato[1]
Fabio Scorsolini-Comin[1]
Maria Lúcia Zanetti[1]
Laércio Joel Franco[1]
Carla Regina de Souza Teixeira[1]

Abstract: Isolation and social distancing imposed adjustments in the lifestyle of people with diabetes mellitus (DM), who are more likely to develop more severe forms of COVID-19. This study aimed to analyze the relationship between self-care and resilience in people with DM during the COVID-19 pandemic. This is an observational-cross-sectional web survey with 1,475 Brazilian adults with DM. An instrument of sociodemographic and clinical variables and the DSC and CD-RISC 10 scales were used from March to October 2020. An increase in average resilience was observed with increasing age and that it was higher among proper self-care behaviors. The highest averages of resilience were found for men, with T2DM, under oral medication, no change in DM control during the pandemic, those who had telemedicine consultations, and were isolated. The development of resilience is suggested as a protective factor in clinical practice in DM.

Keywords: diabetes mellitus, COVID-19, resilience psychological, self care

Autocuidado e Resiliência em Pessoas com Diabetes Mellitus na Pandemia da COVID-19

Resumo: O isolamento e o distanciamento social impuseram ajustes no estilo de vida de pessoas com diabetes mellitus (DM), que têm maiores chances de desenvolverem formas mais graves de COVID-19. Este estudo teve por objetivo analisar a relação entre autocuidado e resiliência em pessoas com Diabetes Mellitus (DM) durante a pandemia da COVID-19. Realizou-se um *websurvey* observacional-transversal com 1.475 brasileiros adultos com DM. Utilizou-se um instrumento de variáveis sociodemográficas e clínicas e as escalas QAD e CD-RISC 10 entre março-outubro de 2020. Observou-se aumento na média de resiliência com o aumento da idade e que ela foi maior entre os comportamentos de autocuidado realizados de forma adequada. As maiores médias de resiliência foram para homens, com DM2, medicação via oral, sem mudança no controle do DM durante a pandemia, que tiveram contato com profissional de saúde por telemedicina e que ficaram isolados. Sugere-se o desenvolvimento da resiliência como fator de proteção na prática clínica em DM.

Palavras-chave: diabetes mellitus, COVID-19, resiliência psicológica, autocuidado

Autocuidado y Resiliencia en Personas con Diabetes Mellitus en la Pandemia del COVID-19

Resumen: El aislamiento y distanciamiento social han definido el estilo de vida de las personas con diabetes mellitus (DM), quienes tienen más probabilidades de desarrollar una forma más grave de COVID-19. Este estudio tuvo como objetivo analizar la relación entre el autocuidado y la resiliencia en personas con Diabetes Mellitus (DM) durante la pandemia de COVID-19. Encuesta web observacional-transversal con 1475 adultos brasileños con DM. Se utilizó un instrumento de variables sociodemográficas-clínicas y las escalas QAD, CD-RISC 10 entre marzo-octubre 2020. Hubo un aumento de la resiliencia media con el aumento de la edad y que fue mayor entre las conductas de autocuidado adecuada. Los promedios de resiliencia más altos fueron, con DM2, medicación oral, sin control de DM durante una pandemia, tuvieron contacto con un profesional de salud a través de telemedicina y fueron aislados. El desarrollo de la resiliencia se sugiere como factor protector en la práctica clínica en DM.

Palabras clave: diabetes mellitus, COVID-19, resiliencia psicológica, autocuidado

[1]*Universidade de São Paulo, Ribeirão Preto-SP, Brazil*

Article derived from the first author's master's thesis under the supervision of the last author, defended in 2022, in the Postgraduate Program in Fundamental Nursing at the Escola de Enfermagem de Ribeirão Preto, Universidade de São Paulo. Support: PROEX Program (CAPES) under process No. 88887.512146/2020-00.

Correspondence address: Bárbara Aparecida Binhardi. Universidade de São Paulo. Av. Bandeirantes, 3900, Monte Alegre, Ribeirão Preto-SP, Brazil. CEP 14.040-902. E-mail: babinhardi@usp.br

The literature indicates that psychological and social factors have significant implications for the quality of life of individuals with Diabetes Mellitus (DM), who must adjust their lifestyle and behavior in response to the condition. Acceptance and a favorable prognosis are linked to an individual's assessment and personal coping mechanisms when dealing with the disease. The anxiety, depression, stress, and emotional distress unique to the

disease are psychosocial elements that may pose challenges for individuals in managing their condition (McCoy & Theeke, 2019).

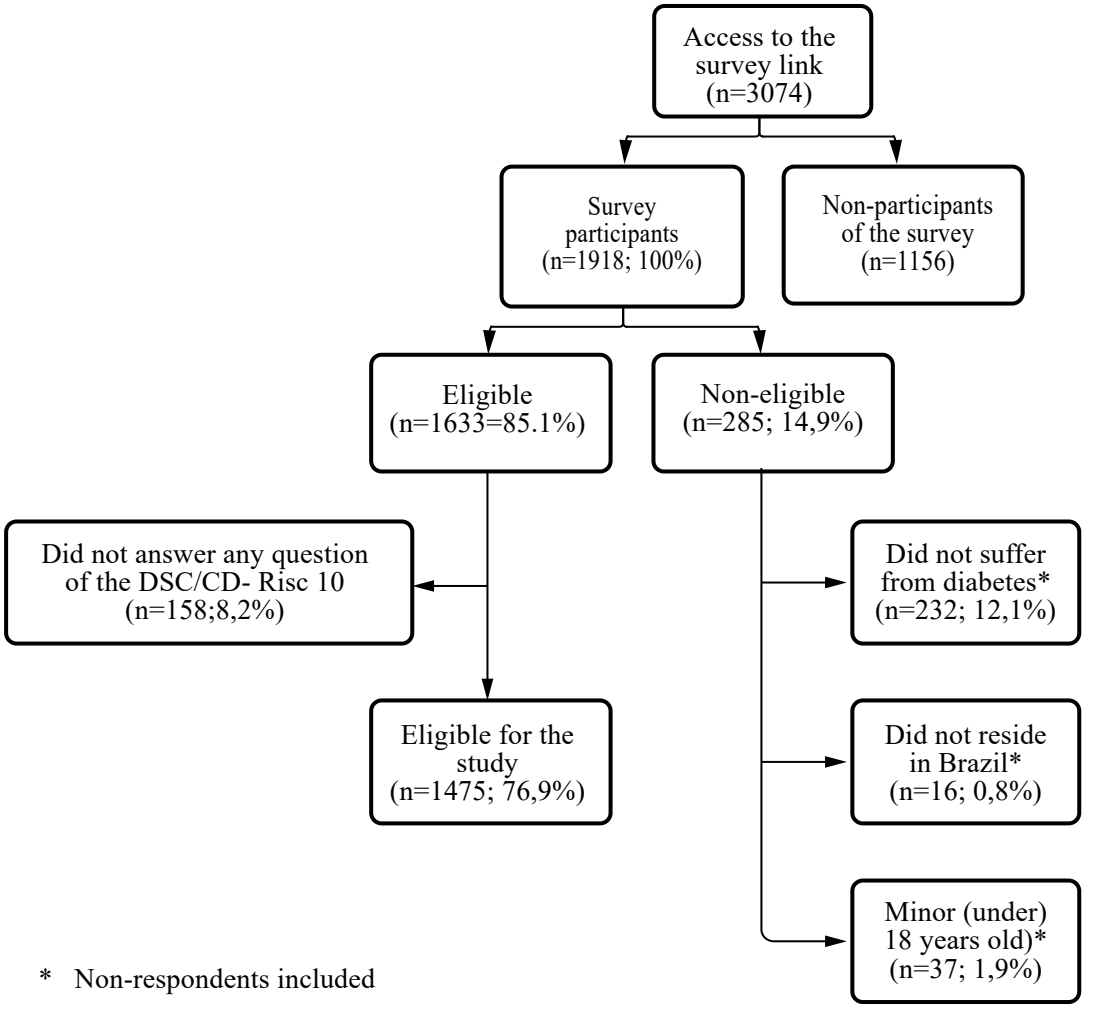
A cohort study involving 1,534,425 people revealed that psychosocial stress in adulthood is associated with an increased risk of Type 2 Diabetes Mellitus (T2DM), potentially influenced by behavioral and physiological factors such as resilience (Crump et al., 2016). Within scientific literature, there are several definitions of resilience. While consensus is lacking, several theorists view resilience as a dynamic process shaped by personal attributes, life context, and developmental factors, which relates to the capacity for adaptation, regeneration, and flexibility when confronted with vulnerability and a high risk of diseases. Furthermore, resilience can also be applied to the understanding of groups, including families and communities, expanding the scope of this process (Stainton et al., 2019).

When exploring the connection between resilience and the presence of DM prior to the COVID-19 pandemic, there are indications of a positive association with better disease control and high levels of resilience (Saya et al., 2020). In this current study, we have chosen to delve into the correlation between resilience and self-care in DM due to the relevance of daily activities essential for the effectiveness of treatment, while also taking into consideration the impact of the COVID-19 pandemic on healthcare in the context of chronic diseases.

The World Health Organization (WHO) has defined self-care as the ability of individuals, families, and communities to promote health, prevent diseases, maintain health, and manage illness and disability, either with or without the assistance of a healthcare professional. It entails a deliberate action in which individuals, families, and communities must engage to preserve their quality of life (World Health Organization [WHO], 2019).

Figure 1

Flowchart for the study sample adapted from DIABETESvid, Brazil, 2022 (n =1475)



Note. Created by the authors.

A study involving 304 patients with Type 2 Diabetes Mellitus (T2DM) examined the relationship between self-care, self-efficacy, resilience, social support, autonomy in healthcare decision-making, and stress. It revealed that an increase in resilience or self-efficacy was linked to a decrease in illness-related distress (Wang et al., 2017).

It is important to note that DM and its associated complications have become more prevalent in recent times due to a sedentary lifestyle, especially during the COVID-19 pandemic, when much of the world's population had to implement social distancing measures. The COVID-19 pandemic disrupted the daily routines of millions of people and presented challenges in managing DM effectively. Notably, over half of the countries in the Americas reported interruptions in services for the treatment of DM and its related complications during the pandemic, leading to limited access to essential medications and critical medical technologies (WHO, 2019). Consequently, the pandemic imposed several barriers that directly affected the care of DM patients (Silva-Tinoco et al., 2021). In light of this situation and the need to generate evidence for the practice of self-care in DM, particularly within this new health context, this study aimed to examine the connection between self-care and resilience in individuals with DM during the COVID-19 pandemic.

Method

This was an observational, exploratory, and cross-sectional web survey study. To maintain data quality and ensure accurate interpretation, the researchers adhered to the Checklist for Reporting Results of Internet E-Surveys (CHERRIS) guidelines (Boni, 2020; Eysenbach, 2004).

Participants

The sample was chosen through a convenience sampling method and included 1918 volunteers from the DIABETESvid study. In this study, specific inclusion criteria were established: participants had to be adults, over 18 years of age, residing in Brazil, and self-reporting a diagnosis of DM. After applying the inclusion criteria, a total of 1,633 individuals (85.1%) were deemed eligible for the study (Figure 1). Subsequently, 158 potential participants were excluded due to incomplete responses to the questions on the CD-RISC 10 (Connor-Davidson Resilience Scale) and DSC (Diabetes Self-Care Activities Questionnaire) instruments. Thus, the final sample consisted of 1,475 individuals with DM, with an average age of 32.9 years (*SD* = 16.5) for T1DM, 55.1 years (*SD* = 16) for T2DM, and 42.1 years (*SD* = 15.9) for other types of DM.

Instruments

The battery of instruments was structured into three parts. The first encompasses sociodemographic variables such as country region, age, gender, education, and health insurance, along with clinical variables such as diagnosis, DM type and duration, medication usage, changes in disease control, engagement with telemedicine, and the level of isolation. The second features the Diabetes Self-Care Activities Questionnaire (Michels et al., 2010), and the third contains the presentation of the CD-RISC-10 (Lopes & Martins, 2011), totaling 45 questions.

The Connor-Davidson Resilience Scale (CD-RISC 10) by Connor and Davidson (2003) was employed to assess resilience. The original version of this scale comprised 25 items and was categorized into five factors associated with personal competence, confidence in one's instincts, tolerance towards adversity, positive acceptance of change, control, and spirituality. Its reliability reached a Cronbach's alpha coefficient of 0.89, and test-retest at a correlation coefficient of 0.87. CD-RISC 10 exhibits strong internal consistency, with a Cronbach's alpha value of 0.85, and relies upon good construct validity, as well as convergent and discriminant validity. Its adaptation and validation for the Brazilian sample were conducted by Lopes and Martins (2011), through an exploratory factor analysis, confirming a single-factor structure with the ten items of the scale and a Cronbach's alpha of 0.82. Contact was made with the authors of the CD-RISC scale to request authorization for its use, as well as access to the scale, which is protected by copyright and does not allow for reproduction. Jonathan Davidson granted permission to use the instrument by signing a deal that included a liability agreement and provided both the scale and its corresponding manual.

The Diabetes Self-Care (DSC) instrument was employed to assess self-care. This questionnaire was translated and adapted for use in Brazil from the Summary of Diabetes Self-Care Activities Questionnaire (SDSCA). The DSC comprises seven dimensions with 15 items aimed at evaluating self-care in individuals with diabetes. Those are split between general nutrition (two items), specific nutrition (three items), physical activity (two items), blood glucose monitoring (two items), foot care (three items), and medication use (three items). Additionally, three items assess smoking, for a total of 17 items (Michels et al., 2010). The answers are coded according to the experience of the seven days prior to the application of the questionnaire, ranging from 0 to 7, where zero is the least desirable situation and seven is the most favorable. The scores reflect the level of performance in self-care activities (Michels et al., 2010). Questions regarding smoking were omitted for the present study. In the specific nutrition dimension, the values are inverted when inquiring about the consumption of foods rich in fat and sugar. The adaptation and assessment of psychometric properties have confirmed that the DSC is a valid and reliable tool for measuring adherence to self-care activities in individuals with T2DM (Michels et al., 2010). For this research, self-care activities were categorized as adequate when the participant achieved an average of at least five days a week, and inadequate when activities were carried out up to two days a week.

Procedure

Data collection. Data collection took place between September 1st and October 19th, 2020, during epidemiological week 20 of the COVID-19 pandemic in Brazil. This period coincided with the relaxation of social restrictions in some regions of the country and occurred before the availability of vaccines for the entire Brazilian population.

The questionnaire was administered through the Research Electronic Data Capture (REDCap) platform, hosted on a server computer maintained by the institution to which the authors are affiliated. It is a secure web application designed for creating and managing online surveys and databases. The link <http://bit.ly/DIABETESvid> and a QR Code were shared on various platforms, including WhatsApp, Instagram, Facebook, Telegram, emails, websites, radio, and TV. Dissemination efforts targeted groups of people affected by DM, digital influencers, users of public and private healthcare facilities, scientific societies, and universities across all states in Brazil.

Upon clicking the research link, participants were presented with an invitation to join the study and provided with information on inclusion and exclusion criteria, study objectives, procedures, and an Informed Consent Form on the homepage. Participants gained access to the questionnaire after confirming their DM status, regardless of how long or type they had. They also were required to declare being over 18 years old and residing in Brazil, in addition to accepting the Informed Consent Form.

An online pilot study was conducted to assess the comprehensibility and ease of use of the electronic survey tool. This included testing the functionality of the electronic address and QR Code, the REDCap programming, compatibility with different device formats (smartphones, tablets, and computers), and the data submission process. Participants involved in this stage were not included in the final study sample. The research team consisted of eight professionals, each holding degrees in nursing, pharmacy, biomedical informatics, medicine, and psychology. All team members were affiliated with Brazilian higher education institutions located in the state of São Paulo and Sociedade Brasileira de Diabetes (Brazilian Diabetes Society).

The database was created using the REDCap platform, which offers automated procedures for exporting and downloading data. The raw data was securely stored on the servers of the Faculdade de Medicina de Ribeirão Preto at Universidade de São Paulo. To ensure data quality, responses were scrutinized for consistency during the export process, and invalid responses were subsequently removed from the dataset. To safeguard participant confidentiality, an algorithm was designed to identify and eliminate potential duplicate responses submitted by the same participant within a 30-minute time frame. On average, it took participants approximately 10 minutes to complete the questionnaire.

Data analysis. The collected data was imported from REDCap into Microsoft Excel software for organization. Subsequently, the data underwent descriptive statistical analysis, which included calculating frequency and percentage, using Statistica software (version 13). To examine potential differences between variables, the research team analyzed variance through the analysis of variance test. The p-value was used to assess statistical significance, with a predetermined threshold of 0.05 ($p = 0.05$).

Ethical Considerations

Following the recommendations of Resolution No. 466, of 12/12/2012 of the National Health Council, this study was approved by the Research Ethics Committee of Hospital das Clínicas da Faculdade de Medicina da Universidade de São Paulo de Ribeirão Preto, CAAE No. 36613320.4.0000.5440.

Results

Out of the 1,475 (100%) participants, the majority resided in the Southeast region of the country (67.25%), identified as female (67.66%), with a postgraduate degree (31.39%), and had health insurance coverage (70.44%). The participants averaged 43.02 years old (*SD* = 15.90), with ages ranging from 18 to 87 years. A significant portion, 42.92%, fell within the age group of 35 to 59, as detailed in Table 1.

The resilience average score was 25.40 (*SD* = 7.66). The North region displayed the highest resilience averages (26.95, *SD* = 7.98), while the South region had the lowest scores (24.14, *SD* = 7.65). A trend was observed, showing an increase in mean resilience with advancing age, transitioning from 23.91 (*SD* = 7.64) to 27.47 (*SD* = 7.37). Additionally, males reached a higher mean resilience score of 27.36 (*SD* = 7.36). Concerning educational levels, the highest mean resilience was observed among the postgraduate participants, at 26.55 (*SD* = 7.37), followed by individuals with incomplete primary education at 25.83 (*SD* = 8.18), and those who had completed their higher education at 25.36 (*SD* = 7.33). The resilience average score among individuals with private health insurance was higher compared to those without it, although this difference did not reach statistical significance.

Table 2 displays the clinical variables, alterations in disease management, access to telemedicine, and the extent of isolation during the pandemic. According to our findings, the majority had T1DM (50.92%), were diagnosed with COVID-19 (8.75%), aged between 1 and 10 years (41.83%), reported no changes in DM control (44.47%), abstained from consuming alcoholic beverages (53.83%), and adhered to contact restrictions, venturing out only for essential errands at supermarkets and pharmacies (45.02%). A mere 32.75% of individuals with DM had the means to consult healthcare professionals through telemedicine, and 98.71% acknowledged the use of medication to manage DM.

The highest levels of resilience were observed among the patients who identified as having T2DM (26.33, *SD* = 7.62), utilized oral medications (26.05, *SD* = 7.65), perceived no alteration in Diabetes control during the pandemic (27.52, *SD* = 7.01), had virtual consultations with healthcare professionals through telemedicine

(26.19, *SD* = 7.68), and rigorously adhered to home isolation measures (26.83, *SD* = 7.77) during the period of recommended social distancing, especially at the onset of the pandemic.

Table 3 depicts the resilience averages based on self-care activities, categorized as either adequate or inadequate. For each of the 15 sub-items, the resilience averages are consistently higher among individuals practicing adequate self-care behaviors, as compared to those with inadequate self-care behaviors, when considering the number of days per week. The most substantial variance in averages is observed in the use of insulin: 25.07 (*SD* = 7.56) for individuals administering insulin 5 to 7 days a week, compared to 18.21 (*SD* = 7.03) for those using insulin less than five days a week. Notable disparities in resilience averages are also evident concerning the use of pills/tablets and overall healthy eating, with figures ranging from 26.24 (*SD* = 7.58) to 21.36 (*SD* = 7.78) and 26.98 (*SD* = 7.01) to 22.64 (*SD* = 7.98), respectively, when contrasting individuals with adequate and inadequate self-care behaviors.

Table 1

Numerical and percentage distribution of participants' sociodemographic variables according to their respective resilience averages (n = 1,475)

Parameter	Absolute frequency	Relative frequency (%)	Resilience averages	Standard deviation	*p*-value
Region of Brazil					**0.005**
North	75	5.08	26.95	7.98	
Northeast	169	11.46	26.93	7.59	
Midwest	84	5.69	25.32	9.07	
Southeast	992	67.25	25.22	7.48	
South	155	10.51	24.14	7.65	
Age group					**0.001**
18-34 years old	536	36.34	23.91	7.64	
35-59 years old	633	42.92	25.65	7.57	
≥ 60 years old	306	20.75	27.47	7.37	
Sex					**0.001**
Female	998	67.66	24.49	7.77	
Male	474	32.14	27.36	7.03	
Other	2	0.14	24.00	4.24	
I do not wish to share the information	1	0.07	8.00	0.00	
Education					**0.002**
Never attended school	4	0.27	18.50	13.87	
Incomplete elementary	53	3.59	25.83	8.18	
Elementary school	60	4.07	25.02	9.31	
Incomplete high school	32	2.17	24.38	8.32	
High school	196	13.29	25.03	7.57	
Technical/professional course	52	3.53	23.48	7.80	
Incomplete undergraduate education	216	14.64	24.06	7.79	
Complete undergraduate education	396	26.85	25.36	7.33	
Graduate education	463	31.39	26.55	7.37	
Did not answer	3	0.20	28.67	8.39	
Health plan					0.447
No	430	29.15	25.19	8.00	
Yes	1039	70.44	25.47	7.54	
Did not answer	6	0.41	28.83	3.43	

Note. Created by the authors.

Table 2

Numerical and percentage distribution of participants' clinical variables according to their respective resilience averages (n = 1475)

Variable	Absolute frequency	Relative frequency (%)	Resilience averages	Standard deviation	*p*-value
COVID-19 diagnosis					0.368
Negative	1337	90.64	25.30	7.61	
Positive	129	8.75	26.32	8.30	
Unsure	6	0.41	25.17	5.85	
Did not answer	3	0.20	30.00	5.57	
DM type					**0.003**
T1DM	751	50.92	24.79	7.62	
T2DM	567	38.44	26.33	7.62	
Other types	155	10.51	24.98	7.77	
Did not provide an answer	2	0.14	25.00	4.24	
DM time					0.294
< 1 year	103	6.98	25.58	7.82	
1-10 years	617	41.83	25.35	7.33	
11-20 years	431	29.22	25.08	7.78	
> 20 years	322	21.83	25.91	8.06	
Did not provide an answer	2	0.14	16.50	12.02	
Use of medication	1456	98.71	25.40	7.65	0.866
Use of pills/tablets	702	47.59	26.05	7.65	**0.001**
Use of insulin	918	62.24	24.85	7.64	**0.001**
Non-insulin injectable	43	2.92	27.30	6.94	0.098
Change in control					**0.001**
No change perceived	656	44.47	27.52	7.01	
Got a little worse	396	26.85	23.33	7.62	
Got a lot worse	161	10.92	21.86	8.72	
Got a little better	173	11.73	24.76	7.13	
Got much better	80	5.42	26.49	6.49	
Telemedicine					**0.015**
No	988	66.98	25.03	7.63	
Yes	483	32.75	26.19	7.68	
Did not provide an answer	4	0.27	22.00	7.07	
Level of isolation measures					**0.002**
No measures taken	47	3.19	26.06	8.19	
Tried to be careful	420	28.47	25.12	7.68	
Stayed at home, leaving only for errands	664	45.02	24.81	7.49	
Stayed strictly at home	336	22.78	26.83	7.77	
Did not provide an answer	8	0.54	25.13	7.64	

Note. Created by the authors.

Table 3

Numerical and percentage distribution of participants' self-care behaviors according to resilience averages

Variable	Absolute frequency	Relative frequency (%)	Resilience averages	Standard deviation	*p*-value
General diet					
Healthy diet					**0.001**
Inadequate	538	36.47	22.64	7.98	
Suitable	937	63.53	26.98	7.01	
Dietary orientation					**0.001**
Inadequate	631	42.78	23.33	7.89	
Suitable	844	57.22	26.95	7.11	
Specific diet					
Vegetable consumption					**0.001**
Inadequate	591	40.07	23.39	7.61	
Suitable	884	59.93	26.74	7.41	
Consumption of foods rich on Fat					0.199
Inadequate	1190	80.68	25.27	7.74	
Suitable	285	19.32	25.92	7.34	
Sweets consumption					**0.001**
Inadequate	639	43.32	24.34	7.83	
Suitable	836	56.68	26.21	7.44	
General physical activities					
Physical activity					**0.001**
Inadequate	965	65.42	24.27	7.68	
Suitable	510	34.58	27.54	7.16	
Workout					**0.001**
Inadequate	1103	74.78	24.77	7.72	
Adequate	372	25.22	27.25	7.19	
Blood glucose monitoring					
Blood glucose monitoring					**0.001**
Inadequate	544	36.88	26.28	7.85	
Adequate	931	63.12	24.88	7.51	
Blood glucose blood as recommended					0.946
Inadequate	648	43.93	25.38	8.02	
Adequate	827	56.07	25.41	7.38	
Medication use					
Use of medication					**0.001**
Inadequate	57	3.86	21.33	7.81	
Adequate	1399	94.85	25.57	7.60	
Tablets use (n = X)					**0.001**
Inadequate	28	1.90	21.36	7.78	
Adequate	674	45.69	26.24	7.58	
Insulin use (n = X)					**0.001**
Inadequate	29	1.97	18.21	7.03	
Adequate	889	60.27	25.07	7.56	
Foot care					
Feet examination					**0.001**
Inadequate	859	58.24	24.50	7.77	
Adequate	616	41.76	26.66	7.34	
Drying between the toes					**0.001**
Inadequate	467	31.66	23.63	7.65	
Adequate	1008	68.34	26.22	7.54	
Examination inside shoes					**0.001**
Inadequate	948	64.27	24.47	7.42	
Adequate	527	35.73	27.07	7.82	

Note. Created by the authors.

Discussion

This study revealed that the resilience average score in the sample was 25.40 (*SD* = 7.66). This average was notably lower when compared to studies conducted in Brazil prior to the pandemic, such as 29.1 (*SD* = 5.5) among adults (Lopes & Martins, 2011) and 25.8 (*SD* = 9.1) among psychiatric outpatients (Solano et al., 2016). Furthermore, when comparing the resilience averages in this study to a sample of individuals with T2DM published by Zhao et al. (2019): 30.7 (*SD* = 5.8) in China.

Resilience is a complex process closely linked to various individual characteristics, and it operates in cycles with distinct phases and responses contingent on specific stressors, individuals, and contexts (Stainton et al., 2019). Thus, its measurement may vary depending on the context of the data collection period, as participants' responses during the pandemic were subject to strong adverse factors, which may have potentially contributed to lower resilience scores. It is essential to recognize that personal characteristics and life context can significantly impact individuals' responses to adversity.

The region of residence was found to be a significant factor in this study, with the North region exhibiting the highest resilience averages, along with better scores for nutrition and physical activity in the DSC. Conversely, the South and Southeast regions displayed the lowest resilience averages. To interpret these findings, one must consider the differences in DM prevalence across regions. For instance, while the prevalence of diabetes in Brazil is 9.2%, it varies significantly between regions, reaching 3% in the North and 12.8% in the Southeast (Muzy et al., 2021).

In terms of the association between age and resilience, the results suggest that as age increases, so do the resilience averages. Resilience average scores may vary between populations and could be affected by age, according to positive correlations found in the literature (Seib et al., 2018). The study indicates a connection between resilience and other psychosocial constructs, particularly anxiety and depression. Higher scores in anxiety and depression were linked to lower scores in self-care behaviors.

In terms of sex, the research findings showed that males tended to have higher resilience averages when compared to females. The observation of higher levels of resilience in men compared to women is consistent with findings in the existing literature. Furthermore, Chinese men with T2DM scored higher than women in a sample of people with T2DM (Zhao et al., 2019), with scores of 31.3 (*SD* = 5.8) for men and 29.8 (*SD* = 5.7) for women.

The data from the VIGITEL study, which revealed a frequency of medical diagnoses of depression at 11.3%, demonstrates that depression is more prevalent than diabetes. It also highlighted that women were diagnosed with depression more than twice as often as men (Ministry of Health, 2021). In the present study, the diagnosis of diabetes was in the order of 9.1% of participants, with a higher prevalence among women.

The psychological and emotional consequences of the COVID-19 pandemic have had a disproportionate impact on women, considering that some have neglected their own needs to care for children, spouses, and the elderly.

Concerning educational levels, the study's results indicate that individuals with postgraduate degrees exhibited the highest resilience average scores. Regarding the resilience score provided by CD-RISC, previous studies have demonstrated a positive relationship between education levels and resilience scores, as in Zhao et al. (2019).

The VIGITEL study reveals that, among women, the prevalence of obesity decreases with higher educational attainment. It is also notably lower among those who have completed at least 12 years of education. Furthermore, the habit of smoking decreases as education levels rise, with a particularly high prevalence among men with up to eight years of education. DM cases increased significantly with age but decreased among those with higher levels of education (Ministry of Health, 2021).

A study investigating the association between sociodemographic characteristics and hospital mortality due to COVID-19 in Brazil found that there was a correlation between education and the number of deaths during the pandemic. Hospital mortality rates were higher among individuals with lower education levels, with higher education at 5.6%, secondary education at 11%, elementary education at 15%, and illiterate individuals at 2.1%. Notably, illiterate patients had the highest hospital mortality rate, exceeding 50%, especially among black or mixed-race patients with limited education levels (Peres et al., 2021).

In this context, telemedicine emerges as a critical strategy for diabetes management, enabling the detection of clinical and psychological needs, providing support to patients, and aiming to significantly enhance glycemic metrics. Our study indicates that individuals with access to telemedicine exhibited higher resilience averages compared to those without access to this form of care.

In June 2022, the Ministry of Health published two new regulations that complement the framework for telemedicine (or telehealth). While Ordinance No. 1,348/2022 (Ministry of Health, 2022a) governs the utilization of telemedicine within the Unified Health System (Sistema Único de Saúde [SUS]), Ordinance No. 1,355/2022 (Ministry of Health, 2022b) establishes the pilot project for the Digital Basic Health Unit (UBS Digital) for primary healthcare.

Another crucial variable to consider in the context of resilience and self-care during the pandemic is the degree of isolation to which the patients were subjected. Within our study, individuals who reported strictly adhering to stay-at-home measures exhibited the highest resilience averages when compared to varying levels of isolation intensity. The second-highest resilience averages were observed among those who responded, "I didn't do anything, I led a normal life." This prompts the question of whether 'doing nothing' signifies neglectful or essential behavior.

Concerning the DM type, our data indicates that individuals with T1DM displayed the lowest resilience

averages. A meta-analysis study aimed to assess the impact of the COVID-19 pandemic lockdown on glycemic control in patients with T1DM (n = 2881) and T2DM (n = 1823), encompassing a total of 33 studies. They revealed significant improvements in glycemic values among individuals with T1DM during this period, potentially linked to positive changes in self-care and the adoption of digital diabetes management practices (Eberle & Stichling, 2021).

In contrast, the lockdown had a short-term adverse effect on glycemic parameters among patients with T2DM. Factors that may have contributed to the improvements observed in patients with T1DM include the increased availability of time for self-care activities, such as diet and exercise, as well as the utilization of telemedicine, which positively impacted glycemic control (Verma, 2020). Conversely, for individuals with T2DM, there was a noticeable trend of increasing glycemic values and body mass index (BMI). These changes were attributed to alterations in dietary habits, reduced physical activity, and extended screen time (Ojo et al., 2022).

Within our study, it becomes apparent that the group of individuals who 'adequately' engaged in 14 of the 15 self-care activities mentioned in the DSC framework, excluding blood sugar monitoring, exhibited higher resilience averages when compared to those who performed activities 'inadequately.' According to the conceptual analysis by Martínez et al. (2021), three attributes are closely associated with the concept of self-care: awareness, self-control, and self-confidence.

Awareness plays a pivotal role in an individual's ability to address their needs, especially when overall development and health are in line with expectations, leading individuals to disregard any possible health concerns. Combined with knowledge and skill, this awareness empowers individuals to motivate their behaviors and enhance their quality of life. Therefore, recognizing and assessing symptoms serves as a catalyst for self-care.

Self-care is a product of an individual's self-regulation, where they are actively involved in controlling their emotions and behaviors, particularly in the context of prevention and regulation.

The concept of self-confidence is directly tied to the management of chronic diseases and is reflected, for example, in the administration of medications and adherence to treatment proposals, directly influencing the inclusion of the patient and their family in self-care and reflecting resilience and individual perseverance.

As a result, resilience can serve as a predictor of self-care, influencing the process of self-awareness, the transition from denial to decision-making in terms of self-care, the ability to exercise self-control when dealing with challenging factors (Zhou et al., 2023), and adapting to difficulties to foster self-confidence (Zhang et al., 2022).

In terms of dietary habits, while the majority adhered to a healthy diet (63.5%) and consumed adequate foods (59.9%), there was a notable inadequacy in fat consumption (80.7%) and sweet intake (43.3%). Similarly, there were challenges in physical activity, with 65.4% engaging in physical activity and 74.8% reporting insufficient physical exercise. A review study that investigated changes in the dietary habits of patients with T2DM during the pandemic also observed an increase in the consumption of sugary foods and unhealthy snacks. This shift in eating habits might be associated with emotions such as boredom and stress induced by confinement, potentially contributing to weight gain and difficulties in managing blood glucose, especially in high-risk T2DM patients (Suzin et al., 2022). Adherence to self-care was highest for medications and diet, but lowest for glycemic monitoring, physical activity, and foot care. This pattern is consistent with pre-pandemic findings (Eid et al., 2018).

Among the limitations of this study is the unequal access to the internet in Brazil. According to TIC Domicílios 2022 (Regional Center for Studies on the Development of the Information Society, 2023), 80% of Brazilian households have internet access, with the southeast region reaching an 82% rate. Furthermore, it is known that the most connected audience on social media is young people and adults (Hage & Kublikowski, 2019), which may mean that our sample does not reflect the reality of the entire population with diabetes. Another limitation is the reliance on self-reported diabetes diagnoses. Diabetes control data were also self-reported and not based on actual glycemic values or HbA1c measurements. Additionally, the study did not evaluate the resilience construct in conjunction with symptoms of depression, anxiety, or stress, which could provide a more comprehensive understanding of resilience in this population. This study was conducted during a specific period of the pandemic, from March to October 2020, and its findings should be continuously monitored in subsequent waves and should also consider the effects of mass vaccination among the Brazilian population, which commenced in January 2021.

The results of this study allow us to conclude that there was an increase in the resilience averages with increasing age and higher resilience averages among men. The highest resilience averages were observed among individuals who had been diagnosed with T2DM, were using oral medications, experienced no change in DM control during the pandemic, had contact with healthcare professionals via telemedicine, and strictly adhered to stay-at-home measures during the period of social isolation. A notable increase in resilience averages was evident among individuals exhibiting adequate self-care behaviors, in comparison to those with inadequate self-care practices, as assessed based on the number of days per week.

This study makes a valuable contribution to the field of psychology by enhancing our understanding of the psychological repercussions of the pandemic, stemming from the necessity to adapt to the constraints imposed during this period. It also supports the development of psychological strategies that encourage healthy coping mechanisms, such as social support, optimism, and acceptance, which can be applicable in various contexts, including adapting these interventions to restrictive pandemic conditions.

However, the study does not merely highlight that people may adhere to self-care to varying degrees based on their level of resilience, as this would merely imply identifying individuals more or less inclined to self-care

based on personal characteristics. Instead, it underscores the importance of developing methods to foster resilience within this population. The correlation between resilience and self-care presents an intriguing prospect for healthcare professionals in clinical practice, as it introduces an additional dimension to disease management.

In the ongoing and evolving pandemic scenario, these findings offer insights into how diabetes care can be enhanced, with the goal of improving the quality of life for this population. Furthermore, these findings can be compared to forthcoming international studies and longitudinal investigations that track the same sample throughout the pandemic's evolution, considering the impact of vaccination. The dissemination of this study sheds light on an important health context that stimulates reflection on resilience as a protective factor in the face of chronic illness.

References

Boni, R. B. D. (2020). Websurveys nos tempos de COVID-19. *Cadernos de Saúde Pública, 36*(7), e00155820. https://doi.org/10.1590/0102-311X00155820

Centro Regional de Estudos para o Desenvolvimento da Sociedade da Informação. (2023). *Pesquisa sobre o uso das tecnologias de informação e comunicação nos domicílios brasileiros: TIC Domicílios 2022* [Survey on the use of information and communication technologies in Brazilian households: ICT Households 2022]. São Paulo: Comitê Gestor da Internet no Brasil. https://cetic.br/media/docs/publicacoes/2/20230825143720/tic_domicilios_2022_livro_eletronico.pdf

Connor, K. M., & Davidson, J. R. T. (2003). Development of a new resilience scale: The Connor-Davidson Resilience Scale (CD-RISC). *Depression and Anxiety, 18*(2), 76-82. http://doi.org/10.1002/da.10113

Crump, C., Sundquist, J., Winkleby, M. A., & Sundquist, K. (2016). Stress resilience and subsequent risk of type 2 diabetes in 1.5 million young men. *Diabetology, 59*(4), 728-733. http://doi.org/10.1007/s00125-015-3846-7

Eid, L. P., Leopoldino, S. A. D., Oller, G. A. S. A. O., Pompeo, D. A., Martins, M. A., & Gueroni, L. P. B. (2018). Factors related to self-care activities of patients with type 2 diabetes mellitus. *Escola Anna Nery, 22*(4), e20180046. https://doi.org/10.1590/2177-9465-EAN-2018-0046

Eysenbach, G. (2004). Improving the Quality of Web Surveys: The Checklist for Reporting Results of Internet E-Surveys (CHERRIES). *Journal of Medical Internet Research, 6*(3), e34. https://doi.org/10.2196/jmir.6.3.e34

Eberle, C., & Stichling, S. (2021). Impact of COVID-19 lockdown on glycemic control in patients with type 1 and type 2 diabetes mellitus: A systematic review. *Diabetology & Metabolic Syndrome, 13*(1), 95. http://doi.org/10.1186/s13098-021-00705-9

Hage, Z. C. M., & Kublikowski, I. (2019). Estilos de uso e significados dos autorretratos no Instagram: Identidades narrativas de adultos jovens brasileiros. *Estudos e Pesquisas em Psicologia, 19*(2), 522-539. https://doi.org/10.12957/epp.2019.44285

Lopes, V. R., & Martins, M. C. F. (2011). Validação factorial da escala de resiliência de Connor-Davidson (CD-RISC-10) para brasilieiros [Factorial validation of the Connor-Davidson resilience scale (CD-RISC-10) for Brazilians]. *Revista Psicologia Organizações e Trabalho, 11*(2), 36-50. http://pepsic.bvsalud.org/scielo.php?script=sci_arttext&pid=S1984-66572011000200004

Martínez, N., Connelly, C. D., Pérez, A., & Calero, P. (2021). Self-care: A concept analysis. *International Journal of Nursing Sciences, 8*(4), 418-425. http://doi.org/10.1016/j.ijnss.2021.08.007

McCoy, M. A., & Theeke, L. A. (2019). A systematic review of the relationships among psychosocial factors and coping in adults with type 2 diabetes mellitus. *International Journal of Nursing Sciences, 6*(4), 468-477. http://doi.org/10.1016/j.ijnss.2019.09.003

Michels, M. J., Coral, M. H. C., Sakae, T. M., Damas, T. B., & Furlanetto, L. M. (2010). Questionário de Atividades de Autocuidado com o Diabetes: Tradução, adaptação e avaliação das propriedades psicométricas [Questionnaire of Self-Care Activities with Diabetes: Translation, adaptation and evaluation of psychometric properties]. *Arquivos Brasileiros de Endocrinologia & Metabologia, 54*(7), 644-651. http://doi.org/10.1590/S0004-27302010000700009

Ministério da Saúde. Secretaria de Vigilância em Saúde. Departamento de Vigilância de Doenças e Agravos Não Transmissíveis e Promoção da Saúde. (2021). *Vigitel 2020: Vigilância de fatores de risco e proteção para doenças crônicas por inquérito telefônico* [Vigitel 2020: Surveillance of risk and protection factors for chronic diseases by telephone survey]. Ministério da Saúde. https://www.gov.br/saude/pt-br/centrais-de-conteudo/publicacoes/svsa/vigitel/relatorio-vigitel-2020-original.pdf/

Ministério da Saúde. (2022a, 2 de junho). Portaria No. 1.348, de 2 de junho de 2022. Dispõe sobre as ações e serviços de Telessaúde no âmbito do Sistema Único de Saúde (SUS) [Provides for Telehealth actions and services within the scope of the Sistema Único de Saúde (SUS)]. Ministério da Saúde. https://bvsms.saude.gov.br/bvs/saudelegis/gm/2022/prt1348_03_06_2022.html

Ministério da Saúde. (2022b, 6 de junho). Portaria No. 1.355, de 3 de junho de 2022. Institui o projeto Unidade Básica de Saúde Digital - UBS Digital no âmbito da Atenção Primária à Saúde [Establishes the Digital Basic Health Unit - Digital UBS project within the scope of Primary Health Care]. *Diário Oficial da União*. https://www.cosemssp.org.br/wp-content/uploads/2022/06/PORTARIA-No-1.355-DE-3-DE-JUNHO-DE-2022-Institui-o-projeto-Unidade-Basica-de-Saude-Digital-UBS-Digital-no-ambito-da-Atencao-Primaria-a-Saude.pdf

Muzy, J., Campos, M. R., Emmerick, I., Silva, R. S., & Schramm, J. M. A. (2021). Prevalence of diabetes mellitus, its complications and characterization of the lagoons in health care based on the triangulation of investigations. *Cadernos de Saúde Pública, 37*(5), e00076120. http://doi.org/10.1590/0102-311X00076120

Ojo, O., Wang, X. H., Ojo, O. O., Orjih, E., Pavithran, N., Adegboye, A. R. A., Feng, Q. Q., & McCrone, P. (2022). The effects of COVID-19 lockdown on glycaemic control and lipid profile in patients with type 2 diabetes: A systematic review and meta-analysis. *International Journal of Environmental Research and Public Health, 19*(3), 1095. http://doi.org/10.3390/ijerph19031095

Peres, I. T., Bastos, L. S. L., Gelli, J. G. M., Marchesi, J. F., Dantas, L. F., Antunes, B. B. P., Maçaira, P. M., Baião, F. A., Hamacher, S., & Bozza, F. A. (2021). Sociodemographic factors associated with COVID-19 in-hospital mortality in Brazil. *Public Health, 192*, 15-20. http://doi.org/10.1016/j.puhe.2021.01.005

Saya, A., Proietti, L., Lisi, G., Ribolsi, M., Uccioli, L., Niolu, C., & Siracusano, A. (2020). Traumatic experiences and type 2 diabetes mellitus. *Rivista di Psichiatria, 55*(6), 349-354. http://doi.org/10.1708/3503.34893

Seib, C., Porter-Steele, J., Ng, S. K., Turner, J., McGuire, A., McDonald, N., Balaam, S., Yates, P., McCarthy, A., & Anderson, D. (2018). Life stress and symptoms of anxiety and depression in women after cancer: The mediating effect of stress appraisal and coping. *Psychooncology, 27*(7), 1787-1794. http://doi.org/10.1002/pon.4728

Silva-Tinoco, R., González-Cantú, A., Torre-Sandaña, V., Guzmán-Olvera, E., Cuatecontzi-Xochitiotzi, T., Castillo-Martínez, L., Romero-Ibarguengoitia, E., Nahuacatl-López, A., Castillo-Galindo, C., Orea-Tejeda, A., Serna-Alvarado, J., León-García, E., & Ochoa-Moreno, J. (2021). Effect in self-care behavior and difficulties in coping with diabetes during the COVID-19 pandemic. *Revista Mexicana de Endocrinología, Metabolismo y Nutrición, 8*, 13-9. http://doi.org/10.24875/RME.20000063

Solano, J. P. C., Bracher, E. S. B., Faisal-Cury, A., Ashmawi, H. A., Carmona, M. J. C., Lotufo Neto, F., & Vieira, J. E. (2016). Factor structure and psychometric properties of the Connor-Davidson resilience scale among Brazilian adult patients. *São Paulo Medical Journal, 134*(5), 400-406. http://doi.org/10.1590/1516-3180.2015.02290512

Stainton, A., Chisholm, K., Kaiser, N., Rosen, M., Upthegrove, R., Ruhrmann, S., & Wood, S. J. (2019). Resilience as a multimodal dynamic process. *Early Intervention in Psychiatry, 13*(4), 725-732. http://doi.org/10.1111/eip.12726

Suzin, J., Biondo, C., & Nicoletto, B. B. (2022). Impacto da pandemia sobre mudanças alimentares de pacientes com diabetes mellitus tipo 2: Uma revisão sistemática [The impact of the pandemic on food consumption in patients with type 2 diabetes mellitus: A systematic review]. *Clinical and Biomedical Research, 42*(2), 135-143. https://doi.org/10.22491/2357-9730.120144

Verma, A., Rajput, R., Verma, S., Balania, V. K. B., & Jangra, B. (2020). Impact of lockdown in COVID 19 on glycemic control in patients with type 1 Diabetes Mellitus. *Diabetes & Metabolic Syndrome: Clinical Research & Reviews, 14*(5), 1213-1216. http://doi.org/10.1016/j.dsx.2020.07.016

Wang, R. H., Hsu, H. C., Kao, C. C., Yang, Y. M., Lee, Y. J., & Shin, S. J. (2017). Associations of changes in psychosocial factors and their interactions with diabetes distress in patients with type 2 diabetes: A longitudinal study. *Journal of Advanced Nursing, 73*(5), 1137-1146. http://doi.org/10.1111/jan.13201

World Health Organization. (2019). *WHO consolidated guideline on self-careinterventions for health: Sexual and reproductive health and rights*. WHO. https://www.ncbi.nlm.nih.gov/books/NBK544164/

Zhang, Y., Yang, Z., Zhang, H., Xu, C., & Liu, T. (2022). The role of resilience in diabetes stigma among young and middle-aged patients with type 2 diabetes. *Nursing Open, 10*, 1776-1784. https://doi.org/10.1002/nop2.1436

Zhao F. F., Suhonen, R., Katajisto, J., Stolt, M., Leino-Kilpi, H. (2019). Association between diabetes-related self-care activities and positive health: a cross-sectional study. *BMJ Open, 9*, e023878. http://dx.doi.org/10.1136/bmjopen-2018-023878

Zhou, M., Wang, H., Yu, J., Luo, D., Zhu, M., Zhang, M., Xu, J., & Yang, T. (2023). Diabetes distress and disordered eating behaviors in youth with type 1 diabetes: The mediating role of self-regulatory fatigue and the moderating role of resilience. *Journal of Eating Disorders, 11*(1), 123. https://doi.org/10.1186/s40337-023-00838-4

Bárbara Aparecida Binhardi is a Master's of the Postgraduate Program in Fundamental Nursing at Escola de Enfermagem de Ribeirão Preto of the Universidade de São Paulo, Ribeirão Preto-SP, Brazil.

Maria Teresa Da Costa Gonçalves Torquato is a PhD at Faculdade de Medicina de Ribeirão Preto, of the Universidade de São Paulo, Ribeirão Preto-SP, Brazil.

Fabio Scorsolini-Comin is a Professor at Escola de Enfermagem de Ribeirão Preto of the Universidade de São Paulo, Ribeirão Preto-SP, Brazil.

Maria Lúcia Zanetti is a Professor at Escola de Enfermagem of the Universidade de São Paulo, Ribeirão Preto-SP, Brazil.

Laércio Joel Franco is a Professor at Faculdade de Medicina de Ribeirão Preto of the Universidade de São Paulo, Ribeirão Preto-SP, Brazil.

Carla Regina de Souza Teixeira is a Professor at Escola de Enfermagem de Ribeirão Preto of the Universidade de São Paulo, Ribeirão Preto, Ribeirão Preto-SP, Brazil.

Authors' Contribution:
All authors made substantial contributions to the conception and design of this study, to data analysis and interpretation, and the manuscript revision and approval of the final version. All the authors assume public responsibility for the content of the manuscript.

Associate editor:
Wanderlei Abadio de Oliveira

Received: Mar. 17, 2023
1st Revision: Aug. 19, 2023
Approved: Aug. 24, 2023

How to cite this article:
Binhardi, B. A., Torquato, M. T. C. G., Scorsolini-Comin, F., Zanetti, M. L., Franco, L. J., & Teixeira, C. R. S. (2023). Self-care and resilience in people with Diabetes Mellitus in the COVID-19 pandemic. *Paidéia (Ribeirão Preto), 33,* e3335. doi:https://doi.org/10.1590/1982-4327e3335