# SELF-EFFICACY SCALE IN GESTATIONAL DIABETES: A SCALE DEVELOPMENT STUDY

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**ABSTRACT**

*Objective: The aim of this study is to develop a valid and reliable tool to determine the self-efficacy level of individuals with gestational diabetes.*

*Method: This study follows a psychometric methodological design. Content validity was evaluated using the Davis technique with eight experts. 252 individuals with gestational diabetes were included in the study. "Explanatory Factor Analysis, Confirmatory Factor Analysis, Barlett Test, Chi-Square Fit Test, Cronbach Alpha Test, Shapiro-Wilk Test, Hotelling's T Test, Spearman Brown Coefficient, Guttman Split-Half Coefficient Test were used in the development of the item.*

*Findings: The Self-Efficacy Scale in Gestational Diabetes (SESGD) is a five-point Likert-type scale consisting of four sub-dimensions. The total Cronbach alpha value of the scale was determined to be 0.654.*

*Result: In line with this data, "Self-Efficacy Scale in Gestational Diabetes" was determined to be a valid and reliable scale.*

*Keywords: Gestational diabetes, self-efficacy, scale, scale development.*

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## Introduction

Gestational diabetes is the intolerance of carbohydrate metabolism during the pregnancy period in an individual whose blood glucose concentration is within normal range before pregnancy[1]. GDM prevalence varies between 1-14%[2]. The presence of maternal obesity and hyperglycemia in pregnancy causes an increased risk of diabetes and obesity and transmission of cardio-metabolic diseases to future generations in the newborn[3]. Healthy lifestyle practices protect the mother and newborn against the negative consequences of GDM newborn[4].

The American Diabetes Association (2019) has expressed the importance of lifestyle practices in the treatment of diabetes and emphasized the importance of medical nutrition therapy and physical activity in this regard[5]. GDM, which affects both pregnant and family and causes maternal and fetal complications to occur, makes it compulsory for the patient to make changes in his life[6]. Both medical and non-medical treatment methods are used in GDM, and teaching these to the patients is among the duties of nurses[7].

Therefore, it is thought that the qualified care given by nurses in the prenatal period will play an important role in the prevention of maternal and fetal complications caused by GDM[6]. As a result of the training to be provided by Diabetes Nurses, it is impotant to gain healthy lifestyle behaviors to pregnant women, such as self-monitoring and control of blood sugar, nutrition, physical activity, coping with stress, regular sleep and self-care practices[8]. This scale was developed as a result of the absence of a scale to plan a new training in the appropriate area in compliance with this competence, which will cover all these trainings of the individual after the training and determine self-sufficiency. The syntax is not brilliant; please rewrite for better clarity.

**Aim of the study**

The aim of this study is to develop a valid and reliable tool to determine the self-efficacy level of individuals with gestational diabetes.

**Type of the research**

***This study is a methodological research.***

*Place and time of the research*

This research is connected to the Provincial Health Directorate of Izmir Province between February 2019 - June 2019; It was applied at İzmir Katip Çelebi University Atatürk Training and Research Hospital, İzmir Faculty of Health Sciences Tepecik Training and Research Hospital.

**The population and sample of the research**

*The population of the study*

All individuals with gestational diabetes who applied to the units where the research was conducted. The sample of the research; The number of people to be sampled was determined by the fact that the number of scale items was 10 times higher. The final version of the scale is 23 items and was applied to 252 individuals.

*Sampling Criteria*

They are individuals with gestational diabetes who volunteer to participate in the study and use insulin. Exclusion criteria; Pregnant women who were not diagnosed with gestational diabetes, individuals with gestational diabetes who did not use insulin, pregnant women with diabetes before, individuals who did not agree to participate in the study were not included in the study.

*Research questions*

The study was conducted to answer the following research questions:
• Is the "Self-Efficacy Scale in Gestational Diabetes" a valid scale?
• Is the "Self-Efficacy Scale in Gestational Diabetes" a reliable scale?
• Does the "Self-Efficacy Scale in Gestational Diabetes" contain sub-components?

*Data Collection Tools*

The questionnaire created by the researchers and the developed SESGD were used as data collection tools. In the questionnaire, defining features of individuals are included. Data were collected between 15-20 minutes by face to face interview method.

*Preparation of Self-Efficacy Scale in Gestational Diabetes*

Preparation of the scale item pool: feedbacks were received from 8 experts who are experts in their field. The scope of the scale items were submitted for experts evaluation in terms of their suitability to our language of society, their social openness and understandability. In order to evaluate the expert opinions, Davis Technique was used in the calculation of the content validity index (CVI). As a result of the research, the value of CVI was calculated as 0.98 perfect.

*Research Ethics*

Ethics committee permissions and hospital permissions were obtained to conduct the research. Written consent was obtained from volunteers who accepted verbal consent and written consent.

*Statistical Analysis*
*Data collection and evaluation*

SPSS 25 version for data analysis and AMOS structural equation modeling for confirmatory factor analysis was performed using software package software. Content validity index was calculated. Explanatory and confirmatory factor analysis (Cronbach alpha, Test-Retest Reliability Analysis, Pearson collation, item analysis, determination of time invariance) were performed for construct validity.

*Findings*
*Descriptive characteristics of individuals with gestational diabetes*

It was determined that the individuals were at least 20 years old, 45 years old maximum and 29.38 ± 4.59 years old on average. It was determined that 51.6% of the individuals are high school graduates, 57.5% are working, 44.4% are the second pregnancy, 60.3% are at the 28-32 week.

*Validity and Reliability Analysis*

Self-Efficacy Scale in Gestational Diabetes 'Diet and Weight Management' factor coverage validity ratio (CVR) is 0.97, Complication Precautions 0.98, Nutrition Education Compliance and Medical Treatment Practices 1.0 are shown in the table. The Scope Validity Index was found to be 0.98 (Table 1).

| SCALE SUB DIMENSIONS | CVR |
|---|---|
| **Diet-Weight Management** | 0.97 |
| **Complication Precautions** | 0.98 |
| **Nutrition Education Compliance** | 1.00 |
| **Medical Treatment Applications** | 1.00 |
| **\* Scope Validity Index (SVI)** | 0.98 |

**Table 1**: Scope validity ratios of self-efficacy scale in gestational diabetes.

Before the explanatory factor analysis, Kaiser-Meyer-Olkin (KMO) test was applied to see if the sample size was sufficient to perform factor analysis. According to the analysis results, KMO value was calculated to be 0.715 (Table 2).

| | KMO | 0.715 |
|---|---|---|
| | Chi. square ($\chi2$) | 1768.624 |
| **Bartlett Sphericity Test** | p | 0.000 |

**Table 2**: Factor analysis results regarding the sub-dimensions of the self-efficacy scale in gestational diabetes

The scale developed consists of four factors. According to these factors; Cronbach's Alpha reliability coefficient was calculated to determine the internal consistency of the scale (Table 3).

As seen in Figure 1, the model is improved. While improving, variables that reduce compliance were determined and new covariances were created for those with high covariance among the values (e10-e11; e10-e13; e11-e12; e11-e13; e12-e13). According to the results of the Confirmatory Factor analysis, the scale's structural equation model result was found to be p: 0.000 and significant, and the self-efficacy scale in gestational diabetes was related to the scale structure consisting of 23 items and four sub-dimensions.

It is shown in the table that the adaptation index renewed after the improvement phase is at an acceptable level. According to the first level multi-factor confirmatory factor analysis, the goodness-of-fit indices of the self-efficacy scale in gestational diabetes; RMSEA 0.075; GFI 0.836; AGFI 0.794; CFI 0.802; $\chi^2$ is at an acceptable level with 2.425 (p: 0.000) values (Table 4).

Factor loads for each factor are given in Table 5 and the model for the first level confirmatory factor analysis of the Self-Efficacy Scale in Gestational Diabetes is given in Figure 1. As can be seen, factor loads vary between 0.158 and 0.916.

| Scales and sub-dimensions | Number of Expressions | Cronbach's Alpha ($\alpha$) |
|---|---|---|
| Diet-weight management | 5 | 0.735 |
| Complication measures | 8 | 0.718 |
| Compliance with nutrition education | 4 | 0.807 |
| Medical treatment applications | 6 | 0.560 |
| **Scale overall** | 23 | 0.654 |

**Table 3**: Reliability coefficients of the self-efficacy scale and scale sub-dimensions in gestational diabetes.

| AFTER MODIFICA-TION | | | | | | | |
|---|---|---|---|---|---|---|---|
| RMESA | NFI | CFI | IFI | GFI | TLI | AGFI | CMIN/df |
| 0.075 | 0.710 | 0.802 | 0.806 | 0.836 | 0.771 | 0.794 | 2.425 |

**Table 4**: First level multifactor DFA fit indexes of self-efficacy scale in gestational diabetes
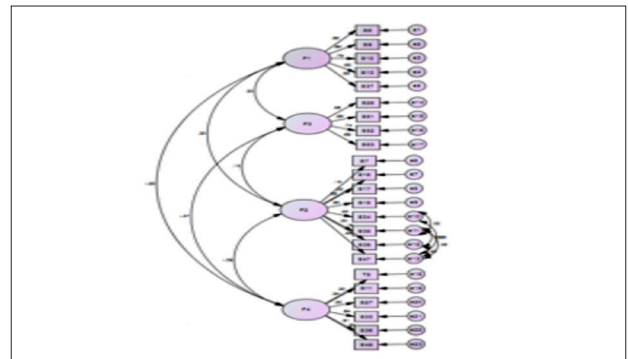


**Fig. 1**: First level multifactor DFA model of self-efficacy scale in gestational diabetes.

When we examine the correlation coefficients of the sub-dimensions of the scale, the correlation coefficient for the 'Diet-Weight Management' sub-dimension is 0.95, the correlation coefficient for the 'Prevention of Complications' sub-dimension is 0.97, the correlation coefficient for the 'Medical Treatment Practices' sub-dimension is 0.95, the correlation coefficient is 0.93. According to this result, scale sub-dimensions do not change with time and are internally consistent.

## Discussion

The number of experts presented to the opinion should consist of at least 3 experts and at most 20 experts, after the suggestions of the views should be rearranged[9,10].

| Articles | Factor Loads |
|---|---|
| I take care not to skip my snacks. | 0.501 |
| When I am outside (such as day meeting, restaurant, neighbor visit) I take care to stick to my diet. | 0.644 |
| I exercise regularly. | 0.747 |
| I also exercise when I don't want to exercise. | 0.826 |
| Vitamin D intake is important for my pregnancy diabetes. | 0.320 |
| I apply my insulin regularly. | 0.158 |
| When my blood sugar drops, I get something sugary (like sugar cubes, sugar water). | 0.335 |
| When my blood sugar is too high, I consult my doctor. | 0.881 |
| When my blood sugar drops too much, I consult my doctor. | 0.908 |
| I brush my teeth twice a day. | 0.330 |
| I pay attention to my salt use. | 0.341 |
| I measure my blood pressure at least once a week. | 0.176 |
| Before I go to my appointments, I save the food that I ate that week. | 0.377 |
| I choose the right foods for gestational diabetes. | 0.579 |
| I take care to eat foods with pulp (such as apples, grapefruit, oat bran, dried legumes). | 0.848 |
| I read the labels of the products I bought. (Such as calorie value, glucose syrup) | 0.745 |
| I restrict carbohydrate-rich foods (such as cereal, bread, rice). | 0.695 |
| I apply my insulin needle to my abdomen. | 0.200 |
| I apply my insulin needles as shown. | 0.237 |
| I take care to eat my meals at the same time. | 0.231 |
| When I travel, I take my insulin with me. | 0.637 |
| I keep my insulin needles in the refrigerator. | 0.916 |
| I measure my fasting blood glucose. | 0.295 |

**Table 5**: Factor loads obtained as a result of confirmatory factor analysis regarding the self-efficacy scale in gestational diabetes.

Eight expert opinions were received and the Davis technique was used for the scope validity of the evaluations.

The minimum CVR was found to be 0.88. The scope validity index should be 0.80 and above[10]. In line with these data, it has been determined that the items express the desired area to be measured quite well. After deciding 23 items, the last form of the scale, a scale was applied to 252 gestational diabetic individuals and validity-reliability analyzes were performed. Erkuş, for the number of samples, "50-very poor", "" 100-poor "," "200-suitable", "" 300-good "," "500-very good", "1000. - it was excellent "[11].

According to these data, our sample is between "suitable" and "good". KMO test 0.50 or more, should be statistically significant in Bartlett test. That is, the significance value should be less than 0.05[12].

In our study, the KMO value of 0.715, Bartlett's sphericity test (p: 0.000) was found to be significant. According to these data, there is a high correlation between the variables and it is suitable for factor analysis. The limit for the load values in the factor where the items are located in AFA is determined as 0.20. As a result, 4 sub-dimensions were reached. It explains the total variance by 46.585%. In multi-factor models, it is sufficient that the total variance explained is between 40% and 60%[13].

The overall Cronbach alpha value of the scale was determined to be 0.654. In the scale develop-

ment study, Karadaş found that the internal consistency of the sub-dimensions was 0.77-0.93 and was a reliable scale[10]. For the consistency of the scale and its consistency over time, 30 gestational diabetic individuals underwent test-retest after 4 weeks. For test-retest analysis, it is recommended to apply to at least 30 people between 2 and 6 weeks[14]. The test-retest correlation coefficient is 0.70 if the scale is newly developed[15]. According to our study result, the test-retest reliability correlation coefficient is 0.98. According to this result, the scale does not change over time, and internal consistency is good.

## Result

Gestational Diabetes Scale Items represent the area to be measured (scope validity), measures the structure under study (surface validity), consists of 4 sub-dimensions according to factor analysis (structure validity), internal consistency between items is high (internal consistency reliability), consistent with time is a scale (test-retest reliability). As a result of all measurements, it has been determined that it is a valid and reliable scale. It can be considered that the self-efficacy of the individual will increase with the increase in the score to be obtained from the scale as a result of coding the positive and negative expressions on the scale and that it can perform its own care effectively as a result of the trainings it receives.

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