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Full length article

Preconception health behaviours of women planning a Pregnancy: A scale development study

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ABSTRACT

Objectives: This study aims to develop a health behaviour scale for the preconception period and assess the preconception health behaviours of women who have applied to the municipality for marriage and are planning a pregnancy within a year.

Method: This is a methodological and descriptive study. While the exploratory and confirmatory factor analysis, the test-retest method and Cronbach's alpha internal consistency methods were used for data analysis in the methodological stage. The Mann-Whitney U test and Kruskal-Wallis test were used in the descriptive stage. Statistical significance was accepted as $p < 0.05$. In total, 260 women were enrolled in the study during the scale development stage. Upon completion of the scale development stage, for the evaluation of preconception health behaviours was conducted with 331 women who were planning pregnancy within one year.

Results: The Preconception Health Behaviours Scale consists of 18 items and 4 subscales. The Cronbach's alpha value was 0.867. The subscales "Preparation", "Coping Skills", "High-Risk Behaviours" and "Nutrition and Sleep" were found to be reliable. The mean score obtained from the scale was 29.50 ± 6.57. It was determined that level of education and level of knowledge on preconception care affected the preconception health behaviours of the women who have applied for marriage.

Conclusion: The Preconception Health Behaviours Scale is valid and highly reliable. Furthermore, a high level of education and high knowledge on preconception care affect preconception health behaviours positively.

Introduction

Every couple wishes to have a baby in good health after a healthy pregnancy. Furthermore, improving pregnancy outcomes and reducing maternal and infant mortality and morbidity have been a top priority in the world. The preconception period that is disregarded in general may affect pregnancy outcomes and contribute to the formation of healthier individuals in future generations. Preconception care provides biomedical, behavioural and social health interventions to women and couples before conception [1]. The preconception period provides the opportunity to intervene earlier to optimize the health of potential mothers and prevent risky behaviours. Most problems that occur during pregnancy can be addressed in the preconception period before women conceive [2]. Therefore, preconception care helps to prevent morbidity and mortality by reducing individual, environmental factors and behaviours that may deteriorate maternal and child health in the early period [3,4].

The preconception period is a protective healthcare service that will help identify and classify risk factors and raise consciousness in couples before pregnancy. The preconception period starts when a couple decides to become parents. The process of conception starts with unprotected sexual intercourse and after this decision is made, lifestyle should be in harmony with the desire to become pregnant [5]. Preconception care and counselling are important to reduce various high-risk behaviours and exposures that may affect foetal development and pregnancy outcomes. Addressing reproduction system issues, reducing the environmental hazards, toxins and drugs known to be teratogenic, encouraging nutrition and folic acid intake, providing advice on weight

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management, and determining genetic conditions and issues related to family history should be performed. Preconception care also involves substance abuse, chronic and infectious diseases, vaccination, family planning, individual's psychosocial mood, domestic violence and economic status [6–8].

Institutions and organisations related to paediatrics, childbirth and women's health, neonatal and public health, particularly in the developed world, consider preconception care crucial important and vital to women's health [9]. Based on the study by Shawe et al. (2015), in European countries such as Belgium, Denmark, Italy, the Netherlands, Sweden and the United Kingdom, only Italy has preconception clinics, and the Netherlands was the only country to have a national strategy for preconception care [10]. In Turkey, however, there are no standard practices or institutionalised services regarding preconception care services [11].

As the health of a woman planning a pregnancy and the health behaviours in her daily life are critical for the pregnancy, she is expected to make some changes in her health behaviours for a more positive pregnancy period. Studies conducted on the preconception period are limited to knowledge and attitude or counselling and care aspects, rather than women's behaviours. Preconception knowledge and attitudes have been assessed in different aspects in the literature [6,12–15]. Furthermore, authentic scale development studies to measure health behaviours of women in the preconception period are very limited [16,17], and existing scales measure the knowledge and attitudes of women regarding this period [18,19].

Scales that are intended to measure knowledge and general attitudes regarding the preconception period among women of childbearing age are very valuable in terms of raising awareness. Unlike other scales that have been developed, this study aimed to develop a tool that only contains behavioural items to measure health behaviours that may affect pregnancy of women in preconception period in which attitudes can become behaviours, rather than addressing a wide period such as childbearing age. The studies in the literature on the relationship between attitudes and behaviours reported that there are some differences between them and there may be variables that affect the time factor and behaviour-attitude relationship in particular [20]. Furthermore, studies conducted are insufficient in showing the change between women's current health behaviours and health behaviours after receiving care or counselling [21–23]. Therefore, studies to be conducted on this topic are required.

Preconception care minimises the risks through behavioural and biomedical changes in women's health before conception to improve pregnancy outcomes. Preconception care must start immediately after a couple plans a pregnancy. It is believed that there is a direct relationship between women's health and pregnancy outcomes [24,25].

The aims of this study were (a) to develop a health behaviours scale for the preconception period and (b) to assess the preconception health behaviours of women who have applied to the municipality for marriage and are planning a pregnancy within a year.

Methods

Design

It was conducted as a methodological and descriptive study. The scale development study was methodological, and the assessment procedure for preconception health behaviours of women who applied for marriage was descriptive.

Setting

Data for the scale development stage of the study were collected from 01.02.2019 to 31.10.2019 and data for the following descriptive stage were collected at a registry office of a municipality in Sakarya, Turkey from 01.01.2020 to 31.12.2020.

Ethical procedures

Ethical approval of the study was obtained from XXX University School of Medicine Clinical Trials Ethics Committee (number: 71522473/050.01.04/321, date: 27.12.2018). Required permissions were taken from the district municipality of Sakarya. Furthermore, the women to be included in the study were informed about the study and their written consent was taken.

Population and sample of the study

The study population consists of women who have applied to the registry office of a municipality in Sakarya, Turkey for marriage. The sample size is suggested to be 5 to 10 times the number of scale items during the scale development stage [26]. In our study, the sample size was calculated as 260 individuals, corresponding to 10 times the number of items (26 items). In total, 260 individuals were enrolled in the study during the scale development stage in line with the literature. Upon completion of the scale development stage, the sample size was calculated as 197 women for the assessment stage of preconception health behaviours in women planning a pregnancy within one year ($p = 0.8$, alpha: 0.05). The women who applied to the registry office of the district municipality and plan to become pregnant within a year were included in the sample. The study was completed with 331 women in total.

Development of the preconception health behaviours scale (PHBS)

Scope validity of the scale

The Preconception Health Behaviours Scale was drafted by preparing a pool of 22 items on a 3-point Likert scale upon literature review. The draft scale was sent to academic members of several faculties of nursing and medicine as well as experts in these fields to assess whether the instructions and items are comprehensible in terms of language and wording and if they are relevant for the subject to be measured. The draft scale was read by a faculty member from the Turkish Language and Literature Department for compliance with Turkish grammar rules and accuracy check before its administration and it was named the "Preconception Health Behaviours Scale". The experts were asked to rate each item from 1 to 4 (1 = Not relevant, 2 = Needs major revision, 3 = Needs minor revision, and 4 = Very relevant) for its relevance. The Content Validity Index (CVI) was calculated for expert opinions. The Davis technique was used for the calculation of CVI. After expert assessments, a 26-item scale was developed and items were corrected in terms of language and wording based on expert opinions.

Pilot study (Pre-test)

A pilot study was conducted on 30 women with the characteristics of the sample group to assess the comprehensibility of the scale upon completion of language and content validity. After the pilot study, the Preconception Health Behaviours Scale was found to be comprehensible and it was finalised. The final version of the scale consists of 26 items. The women interviewed during the pilot study were not included in the study sample.

Validity and reliability analyses of the scale

While the Content Validity Index (CVI) analysis for expert opinions and then exploratory and confirmatory factor analysis were used for the validity stage, test–retest method and Cronbach's alpha internal consistency method were used in the reliability stage of the Preconception Health Behaviours Scale.

Factor analysis

The Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy test and Bartlett's Test of Sphericity showing the correlation of items were

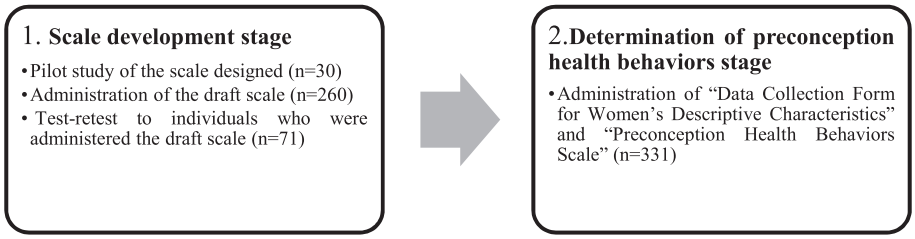

Fig. 1. Data collection by stages.

administered before the factor analysis to determine the suitability of data for the factor analysis.

Exploratory Factor Analysis (EFA)

Using the EFA, it was observed that 26 items were grouped under four factors and the statements with factor loadings above 0.300 were included in the scale. Items with factor loadings below 0.300 and items that loaded on multiple factors were removed from the scale; the number of items was reduced to 18.

Confirmatory Factor Analysis (CFA)

Four-factor structure of the 18-item Preconception Health Behaviours Scale was analysed with CFA.

Test-retest method

The literature shows that the number of test–retest participants should be at least 30 and the time interval between measurements should be two to three and four to six weeks to determine the reliability of the scale over time [27]. The draft scale was administered to 71 participants at an interval of two weeks.

Internal consistency analysis (Cronbach's alpha)

Cronbach's alpha is one of the most commonly used criteria to assess the reliability of a scale. Therefore, Cronbach's alpha reliability coefficient was calculated.

Data collection instruments

Data collection instruments used for this study included the "Data Collection Form for Women's Descriptive Characteristics" that was prepared in line with the literature and contained socio-demographic characteristics, general health statuses and women's level of knowledge on preparation for pregnancy, and the "Preconception Health Behaviours Scale" that was developed in the first stage.

Data collection

Data were collected by the researcher using a face-to-face interview method after the women, who were included in the sample for both stages of the study, were informed about the study, received answers to their questions about the study and completed the "Informed Consent Form". While only the draft "Preconception Health Behaviours Scale" was administered to 260 women in the first stage of the study, both the questionnaire that included their descriptive characteristics and the scale developed in the first stage were administered to the women in the second stage (Fig. 1). The procedure lasted approximately 15–20 min for each stage.

Data analysis

Data were analysed in IBM SPSS Statistics 23 and IBM SPSS AMOS 23 software. Standard deviation and mean of the measures of central tendency were given for numerical variables, and descriptive statistics (n, %) were given for categorical variables. Subscale scores generated after the validity and reliability of the Preconception Health Behaviours Scale were obtained by calculating the mean of relevant items. The Kolmogorov–Smirnov normality test ($n > 50$) was administered to all scores to determine the analyses to be performed. The Mann–Whitney *U* test was used to examine whether there is a difference between two independent groups by the scores. The Kruskal–Wallis test was used to examine whether there is a difference between more than two independent groups by the scores. and the Bonferroni test was conducted to determine which groups are different from one another. Statistical significance was accepted as $p < 0.05$.

Table 1
Correlation coefficients and their significance between the test–retest scores of the Preconception Health Behaviors Scale and its subscales (n = 260).

	r	p
Preconception Health Behavior Score	0.848	**0.000***
Subscales		
Factor 1	0.920	**0.000***
Factor 2	0.732	**0.000***
Factor 3	0.756	**0.000***
Factor 4	0.762	**0.000***

*$p < 0.001$ r = Pearson Correlation Coefficient p = Level of Significance.

Table 2
Internal consistency results of the Preconception Health Behaviors Scale and its subscales (n = 260 and n = 71).

	Number of items	Cronbach's Alpha (α)*	Reliability level
For n = 260			
Preconception Health Behaviors Scale	18	0.867	Highly Reliable
Subscales			
Factor 1	8	0.854	Highly Reliable
Factor 2	3	0.668	Very Reliable
Factor 3	3	0.605	Very Reliable
Factor 4	4	0.576	Reliable
For n = 71			
Preconception Health Behaviors Scale	18	0.877	Highly Reliable
Subscales			
Factor 1	8	0.821	Highly Reliable
Factor 2	3	0.696	Very Reliable
Factor 3	3	0.515	Reliable
Factor 4	4	0.652	Very Reliable

* $0.000 < \alpha < 0.400$ The Scale Is Not Reliable; $0.400 < \alpha < 0.600$ Low Reliability.
$0.600 < \alpha < 0.800$ Very Reliable; $0.800 < \alpha < 1.000$ Highly Reliable.

Table 3
Item total correlations of scale items and Cronbach's alpha values if an item is deleted (n = 260).

Factor and items	Scale mean if item deleted	Scale variance if item deleted	Corrected item-total correlation	Cronbach's alpha if item deleted
Factor 1: Preparation				
1- We decided on pregnancy together with my husband.	9.98	12.934	0.531	0.844
2- I researched pregnancy-related issues.	9.82	12.344	0.559	0.841
3- I had done to/ am planning to have my genetic screenings in preparation for pregnancy.	9.80	11.404	0.722	0.821
4- I have done/ am planning to have my blood tests (blood count, iron, infectious diseases, etc.) in preparation for pregnancy.	9.92	11.820	0.723	0.822
5- My husband had done/is planning his genetic screenings in preparation for pregnancy.	9.77	11.669	0.659	0.829
6- I had/am planning to do my annual gynaecological examination.	9.73	11.657	0.643	0.831
7- I had/am planning to do my oral and dental examinations.	9.87	12.855	0.500	0.847
8- I had/ am planning to get my vaccinations for infectious diseases (measles, rubella, mumps, chickenpox, hepatitis B etc.) that I had not had until today, at least three months before I became pregnant.	9.76	12.622	0.444	0.856
Factor 2: Coping Skills				
9- I am at average weight/ I'm trying to reach normal weight limits before I get pregnant.	2.87	1.350	0.461	0.597
10- I got information about diseases and conditions (thyroid, hypertension, diabetes, etc.) that may adversely affect pregnancy.	2.65	1.108	0.455	0.635
11- I take care not to enter environments (stress, radiation, etc.) that may adversely affect pregnancy.	2.94	1.409	0.559	0.502
Factor 3: High-Risk Behaviours				
12- I do not use non-prescription drugs.	2.42	0.732	0.382	0.560
13- I stay away from products containing chemicals and pesticides.	2.41	0.760	0.436	0.473
14- I do not consume herbal teas whose effects I do not know.	2.45	0.813	0.430	0.487
Factor 4: Nutrition and Sleep				
15- I sleep an average of 7–8 h a day.	4.23	2.124	0.391	0.554
16- I started/ am planning to use folic acid at least three months before conception.	3.96	1.512	0.382	0.499
17- I consume at least one portion of meat per week.	4.02	1.641	0.433	0.439
18- I consume seasonal fruits and vegetables.	4.32	2.189	0.379	0.511

Results

Results related to scale development

Factor analysis

The Kaiser-Meyer-Olkin (KMO) value was found to be 0.865 in our study. Thus, it was observed that the results of factor analysis to be administered on data would be useful and utilisable. Based on Bartlett's Test of Sphericity, it was concluded that there were significantly higher relationships between the variables and data were suitable for the administration of factor analysis (X^2: 1519.727, SD: 171, $p < 0.001$). The variance level of items creating the four-dimension structure generated from EFA was 52.93 %.

Internal consistency

These values are higher than 0.700, a generally acceptable value. Cronbach's alpha internal consistency coefficients of the Preconception Health Behaviours Scale and its subscales, Cronbach's alpha values if an item was deleted, and item-total correlations were examined. The results are given in Tables 2 and 3.

Based on the results of the reliability analysis given in Table 2, it was observed that the 18-item Preconception Health Behaviours Scale was highly reliable (α = 0.867). It was found that the F1 subscale was highly reliable (α = 0.909), F2 (α = 0.829) and F3 subscales (α = 0.835) were very reliable and the F4 subscale (α = 0.576) was reliable.

Based on the reliability analysis results of the administration to 71 individuals for test–retest purposes, the 18-item Preconception Health Behaviours Scale was found to be highly reliable (α = 0.877). It was found that the F1 subscale was highly reliable (α = 0.821), the F2 (α = 0.696) and F4 subscales (α = 0.652) were very reliable and the F3 subscale (α = 0.515) was reliable.

Item total correlations of scale items and Cronbach's alpha values if an item is deleted are given in Table 3. Item total correlations ranged from 0.379 to 0.723. According to this method, the general correlation value between the scale items and total item scores was expected to be

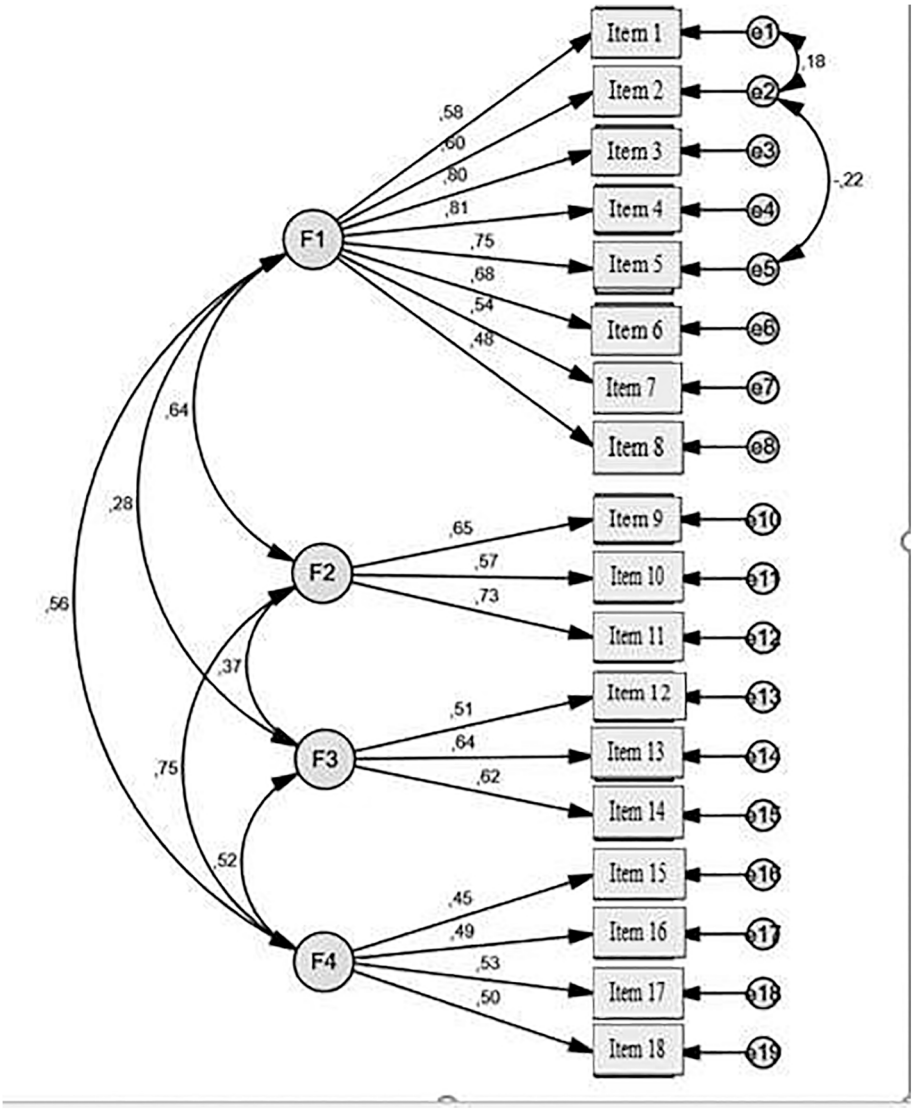

Fig. 2. First Order CFA Model with Four Subscales.

0.300 and above [28]. As item-total correlation of all scale items was 0.300 and above, no item was removed from the scale.

Based on the analysis of the four-factor structure of the 18-item Preconception Health Behaviours Scale through CFA, the following data were obtained for the fit index: RMSEA = 0.06, CFI = 0.91, GFI = 0.91, and SRMR = 0.06. Furthermore, the path diagram showing the distribution of standard load values obtained regarding one-factor structure through CFA is given in Fig. 2.

Assessment of the scale

The Preconception Health Behaviours Scale (PHBS) developed after all analyses have 18 items grouped into four subscales. The subscales are "Preparation" (Items 1, 2, 3, 4, 5, 6, 7 and 8), "Coping Skills" (Items 9, 10 and 11), "High-Risk Behaviours" (Items 12, 13 and 14), and "Nutrition and Sleep" (Items 15, 16, 17 and 18).

The PHBS was calculated by summing the scores of responses given to the scale's 18 items. Item responses were "Yes", "Partly" and "No". Responses were scored as follows: "Yes" = 2, "Partly" = 1, and "No" = 0. Accordingly, the highest score that could be obtained from the scale was 36, and the lowest score was 0. Minimum and maximum scores for the subscales were 0–16, 0–6, 0–6 and 0–8, respectively. Higher scores obtained from the scale and subscales show that preconception health behaviours of women were positive.

Results for preconception health behaviours of women who applied for marriage and plan a pregnancy within the first year

Demographic characteristics of participating women and their spouses (n = 331), and whether women were informed on pregnancy are given in Table 4 with their frequency and percentage. It was determined that the majority of women who applied to the registry office had a university degree (58.3 %), lived in the city centre (61 %), had a job (55.9 %), had no income (39.3 %) and their spouses had a university degree (49.8 %). Almost all women (97.9 %) were not related to their spouses, and a great majority had no disease (95.8 %). While almost half of the women had been informed on preparation for pregnancy, the majority had been informed by hospital staff/healthcare professionals (Table 4). Although it was not shown in the Table, the mean age of the women and their spouses were calculated as 26.31 ± 5.36 and 29.48 ± 6.02, respectively.

For the second administration, Cronbach's alpha value of the PHBS was calculated as 0.868. Table 5 shows whether there was any difference in terms of preconception health behaviour score and subscale score levels according to the demographic characteristics of the women. Based on the analyses, it was determined that the women's level of education and level of knowledge on preconception care affected their preconception health behaviours. Women who had a university degree had

Table 4
Distribution of socio-demographic characteristics and information related to pregnancy (n = 331).

Socio-demographic characteristics		Number	%
Age	23 and below	107	32.3
	24–27	118	35.7
	28 and above	106	32.0
Level of Education	Secondary school	49	14.8
	High school	89	26.9
	University	193	58.3
Place of Residence	City centre	202	61.0
	District centre	91	27.5
	Village	26	07.9
	Abroad	12	3.6
Working Status	Working	185	55.9
	Not working	146	44.1
Income Status	No income	130	39.3
	Low income	72	21.7
	Middle income	102	30.8
	High income	27	8.2
Having a Disease	Yes*	14	04.2
	No	317	95.8
Spouse's Level of Education	Primary school	18	5.4
	Secondary school	35	10.6
	High school	113	34.2
	University	165	49.8
Consanguine Marriage	Yes	7	2.1
	No	324	97.9
Having Been Informed on Preconception Care	No	163	49.2
	Yes	168	50.8
Source of Knowledge**	Books/Magazines	38	22.6
	Internet	35	20.8
	TV	10	6.1
	Hospital Staff/Healthcare Professional	69	41.1
	School	49	29.1

*Diseases include asthma, epilepsy, FMF, Behçet's disease, hypothyroidism, Hashimoto's thyroiditis, valvular heart disease, Type I diabetes, and panic attack.
**These are the answers of 168 individuals who stated that they had been informed. Some individuals chose multiple options.

higher PHBS scores than women with other levels of education (Table 5). Although it was not shown in the Table, there was no difference between the groups in terms of PHBS scores by consanguineous marriage, having a disease, working status, and income levels ($p > 0.05$).

The total PHBS score of the women who were included in the sample was 29.50 ± 6.57 (not shown in a tabular form). It was calculated as 12.87 ± 3.99 for the "Preparation" subscale, 4.82 ± 1.49 for the "Coping Skills" subscale, 5.30 ± 1.25 for the "High-Risk Behaviours" subscale and 6.50 ± 1.63 for the "Nutrition and Sleep" subscale.

Discussion

There are limited reliable and valid tools in the world that enable the measurement of the preconception health behaviours of women. This study aimed to develop a valid and reliable measurement tool specific to assess the preconception health behaviours of women planning a pregnancy. The results regarding the structure validity of the scale were obtained with EFA and CFA. Based on EFA, eight items of the PHBS were removed due to factor loading being lower than the required value and loading on multiple factors. Then, the CFA was administered to items whose structure validity was proven. The goodness of fit statistics of CFA must be at the desired level. Having RMSEA ≤ 0.08, SRMR ≤ 0.10, GFI ≥ 0.90 and CFI ≥ 0.95 shows an acceptable fit [29]. In this study, it was observed that four subscales obtained from CFA had sufficient fit index values (Fig. 1).

The most preferred technique in the reliability analysis of Likert-type scales is to calculate Cronbach's alpha value. Higher Cronbach's alpha values show that the scale consists of consistent items measuring the aspects of the same feature [29]. In this study, the Cronbach's alpha value of the PHBS was found to be highly reliable both in the first and the second stage. During the scale development stage, it was determined that the Cronbach's alpha values of the subscales varied between reliable and highly reliable in both the first administration and the test–retest (Table 2). It was concluded that the variation in Cronbach's alpha values of the subscale was because of the different number of items in the subscales and different sample sizes.

Time invariance is an important parameter showing the stability of a tool in measuring, and it ensures reliability. Time invariance of the PHBS was assessed with the test–retest method as the PHBS had no similar form. In the test–retest method, the correlation value between two measurements should ideally be 0.70 and above [30]. The consistency of the results of the first test and retest involving correlation coefficients obtained in this study showed that the scale was highly time invariant (Table 1). As a result of all analyses conducted, it was determined that the PHBS is a valid and reliable measurement tool for Turkish society.

Helping women improve health behaviours during preconception is essential to promote maternal and child health. Women planning their pregnancy are more likely to have preconception health behaviours [16]. In this study, it was determined that women planning a pregnancy had positive preconception health behaviours. In a study to assess preconception health behaviours, Borges et al. reported that women with planned pregnancies had more preconception health behaviours than women with unplanned pregnancies [16]. Om et al.'s study showed that there was a positive correlation between preconception health behaviours and intention to conceive [31]. The results of our study are consistent with the literature. As women planning a pregnancy feel ready for motherhood, it is believed that they make good use of social and psychological sources and, therefore, had more positive preconception health behaviours.

Factors such as preconception care knowledge and level of education may affect preconception health behaviours [31]. Half of the women in this study reported that they have been informed on preconception care. While healthcare professionals were the most commonly used source of knowledge, broadcasting was the least commonly used source of knowledge (Table 4). Furthermore, it was determined that women who were informed on preconception care had more positive preconception health behaviours than those who were not informed. Women who had been informed on preconception care had more positive preconception health behaviours on preparation and coping skills than those without preconception care knowledge (Table 5). In the study by Ayalew et al., three out of every ten women stated that they had previously heard of preconception care. The women in the same study reported that the most commonly used source of knowledge was health institutions and the least commonly used one was friends [6]. In the study by Tesema et al., more than half of the women stated that they had preconception care knowledge. The majority of the women in the same study obtained information on preconception care from health institutions [32]. Om et al. reported that higher preconception care knowledge is associated with increased preconception health behaviours [31]. These findings indicate that the results of our study are consistent with the literature. The use of health institutions as a source of knowledge is important for the reliability of the knowledge obtained. Accordingly, healthcare providers are essential in providing reliable information to women. It is believed that knowledge obtained from reliable sources ensures that women are more prepared for the preconception period, their coping skills improve and their preconception health behaviours become more positive.

In this study, it was determined that women with a university degree had more positive preconception health behaviours (preparation, coping skills, high-risk behaviours, nutrition and sleep) than secondary school and high school graduates (Table 5). In their study conducted on women with a planned pregnancy, Nascimento et al. found that preconception health behaviours of women who were graduates of high school or university were more positive than primary or secondary

Table 5
Review of socio-demographic characteristics in terms of preconception health behaviour score and subscale scores (n = 331).

Socio-demographic characteristics	Preconception health behaviours scale				
	Subscales				Total scale score med (min–max)
	Preparation Med (min–max)	Coping Skills Med (min–max)	High-Risk Behaviours Med (min–max)	Nutrition and Sleep Med (min–max)	
Age Group					
23 and below	14 (0–16)	5 (0–6)	6 (0–6)	7 (0–8)	31 (0–36)
24–27	14.5 (0–16)	5 (0–6)	6 (0–6)	7 (3–8)	32 (8–36)
28 and above	14.5 (0–16)	6 (0–6)	6 (0–6)	7 (0–8)	32 (0–36)
Test and p-value	KW = 0.918	KW = 2.667	KW = 1.931	KW = 2.420	KW = 3.536
	p = 0.632	p = 0.264	p = 0.381	p = 0.298	p = 0.171
Place of Residence					
City	15 (0–16)	5 (0–6)	6 (0–6)	7 (0–8)	32 (0–36)
District	14 (0–16)	5 (0–6)	6 (0–6)	7 (2–8)	31 (8–36)
Village	14 (0–16)	5 (0–6)	6 (4–6)	7 (0–8)	32 (15–36)
Abroad	15 (0–16)	5 (1–6)	6 (0–6)	7 (2–8)	32 (7–36)
Test and p-value	KW = 7.348	KW = 3.126	KW = 3.344	KW = 3.472	KW = 7.195
	p = 0.062	p = 0.373	p = 0.342	p = 0.3240	p = 0.066
Level of Education					
Secondary school	13 (0–16)[a]	5 (0–6)[a]	6 (0–6)	7 (0–8)	30 (0–36)[a]
High school	14 (0–16)[a]	5 (0–6)	6 (0–6)[a]	6 (0–8)[a]	30 (0–36)[a]
University	15 (0–16)[b]	6 (0–6)[b]	6 (0–6)[b]	7 (0–8)[b]	32 (0–36)[b]
Test and p-value	KW = 11.172	KW = 8.569	KW = 9.556	KW = 14.206	KW = 21.511
	p = 0.004	p = 0.014	p = 0.008	p = 0.001	p < 0.001
Having a Disease					
Yes	15 (7–16)	5 (3–6)	5 (4–6)	5 (3–8)	32 (18–36)
No	14 (0–16)	5 (0–6)	6 (0–6)	7 (0–8)	32 (0–36)
Test and p-value	Z=-,114	Z=-,115	Z = -1,058	Z=-,590	Z=-,013
	p = 0.909	p = 0.908	p = 0.290	p = 0.555	p = 0.990
Having Been Informed on Preconception Care					
Not informed	14 (0–16)	5 (0–6)	6 (0–6)	7 (0–8)	31 (0–36)
Informed	15 (0–16)	6 (0–6)	6 (0–6)	7 (0–8)	32 (0–36)
Test and p-value	Z = -2.786	Z = -3.044	Z = -0.446	Z = -0.856	Z = -2.352
	p = 0.005	p = 0.002	p = 0.656	p = 0.392	p = 0.019

KW = Kruskal-Wallis Test Z = Mann-Whitney U Test; a, b: The difference in the group analysis was due to the difference of b from a, as shown in further analysis.

school graduates [33]. A systematic review conducted by Delissaint and McKyer concluded that women with postgraduate education were more likely to practice preconception care [34]. It is believed that women with a high level of education can perform more searches on preconception health behaviours, access information from reliable sources more easily and, therefore, have more positive preconception health behaviours.

This study determined that factors such as age, disease, working status, income level, place of residence and consanguineous marriage had no impact on women's preconception health behaviours. Borges et al. reported that women who are older and engaged in paid jobs had more preconception health behaviours than women who are younger and have no paid job [16]. Nascimento et al. determined that women of older age, with a paid job, belonging to economic groups A and B and with no disease had more preconception health behaviours than those in younger age, without a paid job, belonging to economic groups C and D and with a disease [33]. It was also reported that a history of genetic disease in women and consanguinity between partners did not affect preconception health behaviour [33]. In the literature, there has been no study examining the effect of place of residence on preconception health behaviours. It was concluded that the variation in findings was because of the sample characteristics, regional and cultural differences and the use of different measurement tools in the studies.

Conclusion and implication for practice

The PHBS developed in this study was determined to be a highly reliable scale that can be used for Turkish society. An 18-item reliable scale with four subscales was developed after preparing a pool of items, seeking expert opinions, drafting the PHBS scale with 26 items, conducting a pilot study, administering the scale to individuals up to 10 times the number of items, and performing EFA and CFA. Higher scores obtained from the scale and subscales show that preconception health behaviours of women were positive.

Furthermore, a high level of education and high knowledge of preconception care in women who applied for marriage and plan a pregnancy within one year affect preconception health behaviours positively. Providing women who plan a pregnancy with information on preconception care is important to achieve positive pregnancy outcomes and healthy pregnancies. Studies examining the effects of preconception counselling on preconception health behaviours and pregnancy are recommended.

Limitations of the study

The PHBS is a reliable scale that can be used in Turkish society. It can be used by conducting language validity and reliability studies in various countries. Various studies can be conducted with a sample including different regions or countries.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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