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Application of theory of planned behavior to predictors of preconception care behavior in women of childbearing age

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Abstract:

BACKGROUND: Preconception care is essential for all women of childbearing age because it is the primary key to determining future health and significantly reducing maternal and infant mortality. However, millions of women do not carry out treatment because awareness to behave is still low due to lack of intention. This study aimed to analyze the influence of the theory of planned behavior on preconception care behavior in women of childbearing age.

MATERIALS AND METHODS: This study was a quantitative analytical cross-sectional study conducted in 2023 on 341 women of childbearing age in four public health centers in Kuningan Regency, West Java, Indonesia. The sampling technique and sampling method used were the Lemeshow formula and stratified random sampling. Data were collected using a researcher-made questionnaire and analyzed using Stata software. Bivariate analysis used simple linear regression tests, and multivariate analysis used structural equation modeling.

RESULTS: Preconception behavior was directly and positively influenced by high intention (b = 0.33; CI 95% =0.22 to 0.45; *P* = 0.001), high perceived behavioral control (b = 0.23; CI 95% =0.12 to 0.35; *P* = 0.001), and high attitude (b = 0.22; CI 95% =0.11 to 0.36; *P* = 0.001). Preconception care behavior was indirectly and positively influenced by subjective norms (b = 0.11; CI 95% =0.01 to 0.21; *P* = 0.037), perceived behavioral control (b = 0.31; CI 95% =0.22 to 0.40; *P* = 0.001), and attitude (b = 0.31; CI 95% =0.22 to 0.40; *P* = 0.001).

CONCLUSION: The theory of planned behavior has a very important role in improving preconception behavior through intentions that have an impact on health and reducing maternal and infant mortality rates by implementing strategies to develop more appropriate and effective preconception health promotion models.

Keywords:

Intention, preconception care, theory of planned behavior

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Introduction

The maternal mortality rate is one of the indicators of women's health and an indicator of the welfare of a region. To date, maternal deaths continue to claim the lives of women of childbearing age worldwide, and more than half a million women aged 15–49 years die from causes related to pregnancy and childbirth.[1,2] In West Java Province, Indonesia, the maternal mortality in the age group <20 years was 6.44%, that in the age group ≥35 years was 33.42%, and the most occurred in the age group 20–34, that is, 60.13%[3] The majority of maternal deaths are preventable, 40% due to obstetric abnormalities and 15% due to childbirth complications.[4] The World Health Organization (WHO) recommends that one of the efforts to reduce maternal

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and infant mortality significantly is preconception care. This is because health in the preconception period is the primary key to gaining quality of life for mothers, fetuses, and children through primary prevention and to improve health in the future.[5]

Preconception care refers to biomedical, behavioral, and preventive social interventions that can improve maternal health and having healthy babies.[6] The goals of preconception care are to improve health status, prevent, detect early, and reduce risky behaviors and environments that may affect poor health, including for groups of women who are cancer survivors or have comorbid diseases that are particularly risky to fertility, pregnancy, and health.[7–9] However, various barriers are experienced, including confidence, perceived needs, experience, characteristics of service providers, accessibility, and, most importantly, fertility awareness, which is still low.[10–12] The low awareness of women of childbearing age in preconception care is reflected in the achievement of tetanus toksoid (TT) immunization in Kuningan Regency, West Java, Indonesia, which is still relatively low at 86.9% compared to other districts in West Java Province that have reached the target.[3]

Other behaviors that risk reducing the health of mothers and babies include low consumption of fruits and vegetables, not taking folic acid, lack of physical activity, high stress levels, financial problems, and unfair treatment due to race/ethnicity/culture. Other research results show that risk factors in the preconception period include poor maternal mental health, unwanted pregnancy, perinatal depression, stress, low levels of folic acid intake, and drug consumption.[13,14]

The behavior of women of childbearing age who lack preconception care can be caused by lack of intention. This can be because preconception care is not a popular treatment for women of childbearing age in Indonesia, including Kuningan Regency. The results of previous studies have only slightly emphasized preconception interventions that emphasize intention and have not tested the relationship of a number of variables in an intervention model.[10,15–18] Therefore, as an effort to develop promotion programs and preconception interventions, it is necessary to assess appropriate behavioral determinants to improve preconception behavior. One comprehensive theory for predicting a person's behavior is the theory of planned behavior (TPB), and an important determinant according to this theory is intention.[19,20] Studies show that individual intentions are influenced by the interaction of attitudes, subjective norms, and perceived behavioral control.[21,22] Thus, the purpose of this study was to analyze the influence of theory of planned behavior on preconception care behavior in women of childbearing age. This study not only measures structural variables but also measures behavioral measurement variables with behavioral indicators of preconception care.

Subjects and Methods

Study design and setting

This type of research was analytical using a cross-sectional design. The study was conducted in 2023 in Kuningan Regency, West Java Province, Indonesia.

Study and sample population

The population in this study was 3061 women of childbearing aged 15 to 49 years. The sampling technique using the Lemeshow formula as follows to obtain 341 participants was used:

$$N.\ Z2\ (1 - a/2).\ p.q$$

$$n = d2\ (N - 1) + Z2\ (1 - a/2).\ p.q$$

Furthermore, stratified random sampling was carried out based on the number of women of childbearing age in four public health centers in Kuningan Regency, West Java, Indonesia. This study selected four public health centers with the highest maternal and infant mortality rates, representing urban and rural areas. Then, the determination of samples in each public health center was based on inclusion and exclusion criteria.

Data collection tools and techniques tools

Data collection used a questionnaire made by researchers according to the construct of the theory of planned behavior. The questionnaire consisted of two parts. The first part of the question about the identity and characteristics of respondents included age, education, occupation, number of children born, and health insurance owned. The second part included questions about the theory of planned behavior and preconception care behavior. The TPB questions consisted of five subjective norm statements, five attitude statements, five behavioral control perception statements, and five intention statements, while the preconception care behavior questionnaire had ten statements. The choice of statements used a Likert scale and gave a score of 4 for the answer strongly agree, a score of 3 for agree, 2 for disagree, and 1 for strongly disagree or a negative statement. The validity of this questionnaire has been tested by considering the calculated r-value < the table r-value, for number of respondents (n) =30, with a two-way test significance distribution of 5%, namely, 0.3610. The test results obtained from all statements of attitude, perception, control, behavior, and intention were valid. Meanwhile, subjective norm statement 1 had an invalid status. All statements of preconception care behavior have a valid status.

Furthermore, the reliability testing was carried out using the Cronbach alpha formula. Instruments that had an alpha value greater than 0.60 were said to be reliable. Questionnaire testing in this study used Stata software. The reliability test results obtained were attitude variables (0.6745), subjective norms (0.6311), perceived behavioral control (0.6011), intention (0.9497), and preconception care behavior (0.9497).

Statistical analysis

Data analysis was done using Stata software. Bivariate analysis using simple linear regression tests and multivariate analysis using structural equation modeling (SEM) were performed. SEM can measure construction relationships (measurable) and measurement relationships (not measurable).[23] In addition, SEM can determine the goodness of the fit and also the significance of the influence of variables by using indices such as Chi-square mean/degree of freedom (CMIN/DF), root mean square error of approximation (RMSEA), comparative fit index (CFI), Tucker-Lewis index (TLI), standardized root mean squared residual (SRMR), coefficient of determination (CD), and log likelihood.

Ethical considerations

This research has received approval from the Research Ethics Committee. Before the study was conducted, respondents received an explanation about the research, then filled out an informed consent sheet, and filled out a questionnaire.

Results

Of the 341 women of childbearing age, the age mainly was in early adulthood (51.9%), most had junior high-school education (37.2%), most were not working or housewives (95.9%), and most had 2–4 children (61.9%) [Table 1].

Almost all participants had weak intentions (99.7%), most of the respondents' perceived behavioral control was strong (55.7%), most of the respondents had negative subjective norms (66.9%), most of the respondents' attitudes were positive (56%), and the behavior of most respondents was poor (60.1%) [Table 2].

The results of bivariate analysis between the constructs of planned behavior theory and preconception care behavior showed a significant influence between intention ($P = 0.001$), perceived behavioral control ($P = 0.025$), attitude ($P = 0.010$), and preconception care behavior, as well as between subjective norms ($P = 0.001$), perceived behavioral ($P = 0.001$), and intention. However, there was no significant influence between attitude and intention ($P = 0.196$) [Table 3].

Table 1: Characteristics of the research subject (*n*=341)

Characteristics of Respondents	Frequency (*n*)	Percentage (%)
Age		
Late Adolescence (17-25 years old)	86	25.2
Early Adult (26-35 years)	177	51.9
Late Adult (36-45 years old)	78	22.9
Education		
Elementary school	75	22
Junior high school	127	37.2
Senior high school	115	33.7
Higher Education	24	7.1
Occupation		
Not Working	327	95.9
Self-employed	2	0.6
Village Apparatus	3	0.9
Government employees	9	2.6
Number of Children		
No children	8	2.3
Primi (1 child)	115	33.7
Multi (2–4 children)	211	61.9
Grande (≥5 children)	7	2.1

Table 2: Univariate analysis results

Variable	Frequency (*n*)	Percentage (%)
Intention		
Strong (≥ median15)	1	0.3
Weak (< median (15)	340	99.7
Total	341	100
Perceived Behavioral Control		
Strong (≥ median 12)	190	55.7
Weak (< median 12)	151	44.3
Total	341	100
Subjective Norms		
Positive (≥ median 16)	171	50.1
Negative (< median (16)	170	49.9
Total	341	100
Attitude		
Positive (≥ median 15)	191	56
Negative (< median 15)	150	44
Total	341	100
Preconception Care Behavior		
Good	1	0.3
Enough	135	39.6
Less	205	60.1
Total	341	100

Results of a multivariate analysis of factors influencing preconception care behavior using the theory of planned behavior model were obtained. The SEM model consists of structural relationships and measurement relationships. Structural relationships link attitude constructs, subjective norms, perceived behavioral control, and behavioral intentions, with preconception preventive behavior. The measurement relationship correlates the latent variables of preconception care behavior with

preconception care behavior indicators 1, 2, 3, and 4. The measurement relationship showed that the latent variables of preconception behavior were significantly shaped by indicators of preconception behavior 1, 2, and 3, each with $P < 0.001$. The factor loadings of these indicators on the latent attitude variables were quite large, each >0.50, and the factor loadings of preconception behavior indicator 4 = 0.40 <0.50 [Table 4].

Meanwhile, the structural relationship shows that there is a direct positive and statistically significant relationship between behavioral intentions and preconception preventive behavior. Each increase of one intention score would be followed by an increase in preconception behavior of 0.33 units (b = 0.33; CI 95% =0.22 to 0.45; $P = 0.001$). A direct positive and statistically significant relationship existed between perceived behavioral control and preconception preventive behavior. Each increase in one score of perceived behavioral control would be followed by an increase in preconception behavior by 0.23 units (b = 0.23; CI 95% =0.12 to 0.35; $P = 0.001$). A direct positive and statistically significant relationship existed between preconception preventive attitudes and behaviors. Each increase in one score of attitudes would be followed by an increase in preconception behavior by 0.22 units (b = 0.22; CI 95% =0.11 to 0.36; $P = 0.001$). There was a positive and statistically significant relationship between subjective norms and intentions. Each increase in one score of subjective norms would be followed by an increase in behavioral intent of 0.11 units (b = 0.11; CI 95% =0.01 to 0.21; $P = 0.037$). A positive and statistically significant relationship existed between perceived behavioral control and behavioral intent. Each increase in one score of perceived behavioral control would be followed by an increase in behavioral intent by 0.31 units (b = 0.31; CI 95% =0.22 to 0.40; $P = 0.001$). There was a positive and statistically significant relationship between attitude and behavioral intention. Each increase in one score of attitudes would be followed by an increase in intent of 0.14 units (b = 0.14; CI 95% =0.04 to 0.24; $P = 0.008$) [Table 4].

The results of the model conformity test (goodness of fit) confirmed that the model presented was appropriate, with indicators $P = 0.204$ ($P > 0.05$), RMSEA = 0.029 (<0.008), CFI = 0.98 (>0.90), TLI = 0.98 (>0.90), SRMR = 0.027 (<0.008), and log likelihood -3764.46 [Figure 1].

Discussion

The theory of planned behavior is a theory that focuses on behavior, and the most crucial factor that influences

Table 3: Simple linear regression analysis (crude analysis) between constructs in the theory of planned behavior

Variable Dependencies	Independent Variables	Regression Coefficient (b)	CI 95%		*P*
			Lower limit	Upper limit	
Preconception Care Behavior	Intention	0.36	0.16	0.55	<0.001
	Perceived Behavior, Iracabctpb Control	0.22	0.27	0.41	0.025
	Attitude	0.22	0.05	0.39	0.010
Intention	Subjective Norms	0.23	0.13	0.34	<0.001
	Perceived behavioral control	0.29	0.19	0.39	<0.001
	Attitude	0.06	-0.31	0.15	0.196

P<0.001 was considered statistically significant

Table 4: Results of pathway analysis based on the theory of planned behavior

Dependent Variables	Relationship symbol	Independent Variables	Regression Coefficient (b)	95% CI		*P*
				Lower limit	Upper limit	
Structural Relationships						
Direct Effect						
Preconception Behavior	←	Intention	0.33	0.22	0.45	<0.001
	←	Perceived Behavioral Control	0.23	0.12	0.35	<0.001
	←	Attitude	0.22	0.11	0.34	<0.001
Indirect Effects						
Intention	←	Subjective Norms	0.11	0.01	0.21	0.037
	←	Perceived Behavioral Control	0.31	0.22	0.40	<0.001
	←	Attitude	0.14	0.36	0.24	0.008
Measurement Relationship						
Preconception Care Behavior	→	Preconception Care Behavior 1	0.69	0.61	0.78	<0.001
	→	Preconception Care Behavior 2	0.72	0.63	0.81	<0.001
	→	Preconception Care Behavior 3	0.52	0.43	0.62	<0.001
	→	Preconception Care Behavior 4	0.40	0.29	0.52	<0.001

Goodness of Fit: *P*=0.204. RMSEA=0.029. CFI=0.98. TLI=0.98. SRMR=0.027. CD: 0.247. Log Likelihood; -3764.46. P<0.001 was considered statistically significant. Symbol ← indicates direct relationship of measurement variables, while → indicates direct relationship of indicator variables

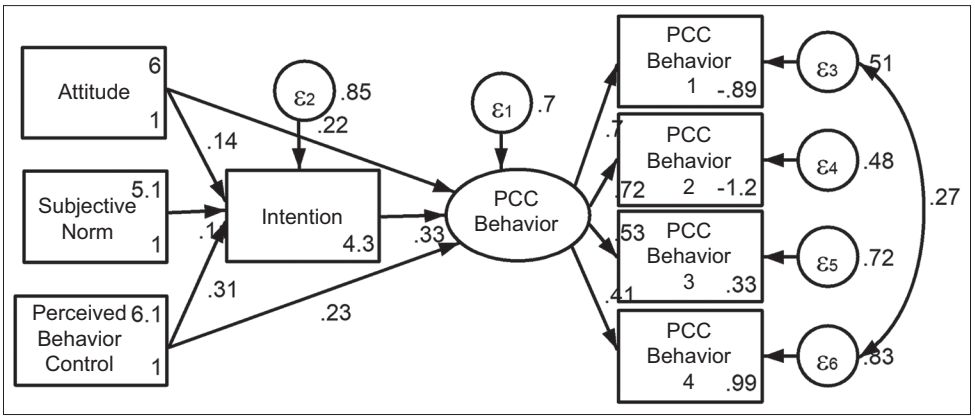

Figure 1: Structural equation model by theory of planned behavior

behavior is intention. Intentions are influenced by the interaction between perception, control, behavior, attitude, and subjective norms. The results of the research show that most women of childbearing age firmly intend to carry out preconception cares. There is a high direct and positive influence between intention and preconception care behavior. The intention of women of childbearing age in preconception care depends on several factors, including pregnancy planning, previous pregnancy history, insurance owned, and medical history. In addition, there was history of diseases such as diabetes, weight, age, and race/ethnicity.[24,25] Likewise, maternal knowledge of preconception care, adverse birth outcome experiences, chronic health problems, and spousal support increases the intention and utilization of preconception care.[26]

This study also shows a direct and positive influence between perceptions of behavioral control and preconception preventive behavior. Perceived behavioral control refers to an individual's perception of the ability to perform a particular behavior. Other findings of individual factors that influence preconception care behavior include cultural beliefs, pregnancy planning, knowledge, preconception, gender roles and responsibilities, information retrieval, previous health behaviors, and social and economic factors.[27] An individual's encouragement to make positive lifestyle changes such as quitting smoking, reducing alcohol consumption, avoiding illegal drugs, engaging in regular physical activity, and maintaining a healthy weight reduces adverse pregnancy outcomes and overall health.[28]

In addition, the results show that there is a direct and positive influence between attitudes and preconception preventive behavior. Attitudes are assessed by the extent to which behavior is viewed positively or negatively. Previous research results reported that women with positive attitudes toward preconception care behavior were proven to be a predictor of preconception care behavior.[23] Most women attach great importance to preconception care and consider it a top priority for good health, so changing attitudes to a good lifestyle includes regular physical activity and maintaining a healthy diet.[29,30] Another study found that as many as 47.8% of women with good attitudes underwent mammography screening. It is thus in line with the other research which states that a person's behavior is predicted by attitude.[31,32]

The results show an indirect and positive influence between subjective norms and preconception care behavior through intention. Subjective norms are perceived social pressures to perform a behavior. The influence of family, friends, and health care providers involved may influence the intention to implement preconception care behaviors.[20,33] In another study, the intention to take action was due to recommendations from family, friends, and partners.[31] Women who consider that their closest people approve of preconception care will have a 34.4% higher intention to do preconception care than women who do not get approval from the closest person.[22] Research results report that women often keep it a secret when deciding to try to conceive for fear of not getting pregnant and will be painful or irritated if others ask.[34]

Perceived behavioral control (PBC) is a crucial component of the theory of planned behavior (TPB) and influences behavioral intent. The results of this study are known to have an indirect and positive influence on the perceived behavioral control over preconception care behavior through intention. Perceived behavioral control refers to the individual's perception of the ability to perform a specific behavior, considering the presence of factors that can facilitate or inhibit that behavior. Research has shown that perceived behavioral control can influence intention, with high levels of perceived control reinforcing a person's intention to perform the behavior.[31] Another study found that perceived behavioral control could potentially inform efforts to prevent unwanted

pregnancy.[35] Perceived behavioral control is influenced by knowledge and skills, availability of resources (time, money, social support), environmental factors, past experiences, and self-efficacy.[36]

There is an indirect and positive influence between attitudes toward preconception care behavior and intention. The relationship between attitude and intention is essential in shaping an individual's behavior toward preconception care. In line with other research, intentions to use preconception services indirectly affects attitude.[22] Women's attitudes toward preconception health can potentially influence intentions to know more about preconception health and the preconception self-efficacy as well as intentions to change lifestyle.[29] A Dutch study found that women with low levels of health literacy generally had positive attitudes toward participation in preconception counseling.[37]

Conclusion

Planned behavior theory has the potential to improve preconception care behavior. Thus, to facilitate the improvement of preconception care behavior based on these findings, it can be applied through preconception health promotion programs with a family approach, increasing community participation, improving the quality of preconception services, and building partnerships between institutions, professions, and individuals so that ultimately, it will improve the degree of preconception health and reduce maternal and infant mortality.

Limitations and advice

The limitation of this study is that the population only included women of childbearing age as recipients of preconception services. This research suggests paying attention to health workers and loved ones such as husbands and families who are an important part of improving preconception care behavior.

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Key messages

This study not only measures structural variables but also measures behavioral measurement variables with behavioral indicators of preconception care. The theory of planned behavior will influence appropriate and effective actions in managing preconception health.

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Conflicts of interest

There are no conflicts of interest.

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