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Does Social Cognitive Theory Explain Antenatal Care for Pregnant Women in Boyolali, Central Java? A Multilevel Analysis

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ABSTRACT

Background: Healthy mothers play a central role in forming the foundation of future generations' health. The role of Antenatal Care (ANC) is quite crucial in the continuation of optimal pregnancy. The main purpose of pregnancy examination is to monitor fetal well-being and identify early risk factors during pregnancy. Although antenatal examination is considered important, some pregnant women have not made maximum use of pregnancy examination services due to various factors. This study aims to analyze the influence of the Social Cognitive Theory construct and the contextual influence of *Posyandu* on antenatal examination behavior.
Subjects and Method: A cross-sectional study was conducted at 25 integrated health posts (*Posyandu*) in Boyolali Regency, Central Java from August to September 2024. A total of 200 pregnant women were selected using a simple random sampling method. The dependent variable was complete antenatal examination (≥6 visits). The independent variables were self-efficacy, outcome expectation, modeling, and reinforcement. Data collection was carried out using interviews, questionnaires, and ANC visit data from village midwives. Data were analyzed using multilevel multiple linear regression.
Results: Multilevel analysis in this study showed that antenatal care visiting behavior in pregnant women increases along with high self-efficacy. (b=0.23; CI 95% = 0.09 to 0.36; p<0.001), positive outcome expectation (b=0.32; CI 95% = 0.21 to 0.43; p<0.001), reinforcement (b=0.38; CI 95% = 0.24 to 0.53; p<0.001), high education (b=0.28; CI 95% = -0.43 to 1.01; p=0.433), and high family income (b=0.27; CI 95%= -0.27 to 0.81; p=0.327). The effect of modeling, education and family income on antenatal visit behavior was not statistically significant. This multilevel analysis model showed the contextual effect of integrated health post on ANC visit behavior (ICC=24%).
Conclusion: The frequency of complete antenatal check-ups will increase with high self-efficacy, positive outcome expectations, and reinforcement. Thus, social cognitive theory can be used to explain and predict routine antenatal check-ups. Variations in the *posyandu* level have a significant contextual effect on the behavior of complete antenatal check-ups (≥ 6 check-up visits).

Keywords: Social cognitive theory, complete antenatal check-ups (≥ 6 times), pregnant women.

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BACKGROUND

Healthy mothers play a central role in forming the foundation of health. Optimal maternal health will create an environment that supports the growth and development of children and increases the potential of the next generation and human resource development. Healthy mothers have the capacity to make maximum contributions to their families and communities (BPS, 2023). The role of Antenatal Care (ANC) is quite crucial in ensuring the health of pregnant women and their fetuses. However, some pregnant women have not utilized this service due to various factors (LAKIP GIKIA Ministry of Health of RI, 2023).

Data from UNICEF (2022) showed that there is a significant gap in the coverage of ANC visits in various countries. A study by Gebrekirstos et al. (2021) stated that developed countries such as the United States and the United Kingdom have higher coverage, which is more than 90%, while developing countries such as Afghanistan and Bangladesh still experience ANC visit rates below 50%. This phenomenon shows the need for a more intensive educational strategy in areas that are still not optimal in utilizing maternal health services (Bain et al, 2022; Grum and Brhane, 2018).

The coverage of ANC visits in Indonesia shows significant fluctuations from year to year. Even though it reached its highest number in 2021 at 88.13%, it then decreased to 70.67% in 2022. The achievement of this ANC indicator is still far from the target set. The Indonesian Ministry of Health has set a minimum of 6 antenatal check-ups for 9 months as a form of commitment to providing essential services for pregnant women. Additional implementation and reporting efforts are needed to achieve the target in 2024 of 95% (LAKIP GIKIA Ministry of Health of RI, 2023).

Data from the 2023 Indonesian Health Survey (SKI) shows that there is a gap in the continuity of maternal health service utilization during pregnancy (continuum of care). There is a gap in the proportion of pure K1, K4, and K6 visits, the proportion of Pure K1 Antenatal Service visits is 86.7%, K4 is 68.1% and the total number of K6 is 17.6%, meaning around 6 out of 10 (57.8%). The coverage of services at the beginning of pregnancy is higher than in the following period, as well as the utilization of postpartum visit coverage which decreases at the end of the postpartum period (SKI Ministry of Health of RI, 2023).

Although the implementation of ANC in Boyolali Regency has been in accordance with standards, the number of visits has fluctuated. Data shows that the coverage of K1, K4, and K6 visits varies from year to year, for example in 2023 the coverage of K1 visits was 100%, while the coverage of K4 was 97.1% there was a difference of 2.9%, and for K6 visits it was 93.7% of pregnant women (Health department of Boyolali, 2020; 2021; 2022; 2023).

Social Cognitive Theory (SCT) by Albert Bandura explains that human behavior is influenced by dynamic interactions between personal, environmental and behavioral factors. These interactions influence each other and shape individual learning patterns in a social context. Proper education can increase self-efficacy, namely the individual's self-confidence to take action (Fajri et al, 2024). The number of visits that are unstable during antenatal check-ups is influenced by various factors. Based on the phenomena found, this study aims to analyze the influence of the social cognitive theory construct and the contextual effect of the integrated health post on antenatal check-up behavior.

SUBJECTS AND METHOD

1. Study Design

This study is an observational study with a cross-sectional approach. The study was conducted from August-September 2024. The location of the study was in Boyolali Regency, Central Java.

2. Population and Sample

The population in this study were pregnant women with a gestational age of 1-38 weeks who underwent antenatal check-ups at the *Posyandu*. The number of *Posyandu* involved in the study was 25 *Posyandu*. Each *Posyandu* consisted of 8 pregnant women as the subjects. The sampling technique was simple random sampling with a total sample of 200 pregnant women.

3. Research Variable

The dependent variable in this study was antenatal examination, while the independent variables in this study were self-efficacy, outcome expectation, modeling and reinforcement.

4. Definition of Operational Research

Antenatal Care (ANC)

Antenatal examination or pregnancy examination is a pregnancy health service received by the mother during the last pregnancy and is provided by health workers, including doctors (general practitioners and/or obstetricians), midwives and nurses by ≥ 6 visits. This variable is measured using a questionnaire and data from village midwives, with a continuous scale.

Self-efficacy

It is a person's belief about his/her ability to perform a behavior and maintain that behavior in the long term successfully. This variable is measured using a questionnaire, with a continuous scale.

Outcome Expectation

It is a personal belief about the effect of an action to achieve certain results in pregnancy examination. This variable is measured using a questionnaire, with a continuous scale.

Modeling

It is behavioral learning by watching and observing the behavior of others (models), storing information (retention), then imitating (imitation) and reproducing/ replicating that behavior, which occurs in the context of social interaction. This variable is measured using a questionnaire, with a continuous scale.

Reinforcement

It is an internal or external response to a person's behavior that influences (increases or decreases) the likelihood of repeating or stopping the behavior. Reinforcement can be internal/ self-initiated (e.g., satisfaction, pride, sense of accomplishment of a task/ important behavior), or from the external environment (rewards, praise, recognition). This variable is measured using a questionnaire, with a continuous scale.

5. Instrument of the Study

This study used a questionnaire consisting of favorable and unfavorable statements for each variable (self-efficacy, outcome expectation, modeling and reinforcement) to measure the value of each construct as well as data collection on the number of visits by pregnant women based on village midwife records.

6. Data Analysis

Univariate analysis was used to see the frequency distribution and characteristics of the research subjects. The next analysis was bivariate which was carried out on each exogenous variable, namely social cognitive theory on endogenous variables, namely antenatal examination behavior and multivariate analysis using a linear regression analysis model with a multilevel approach. The contextual influence of *Posyandu* on the frequency of antenatal examinations is shown by the intra-class correlation (ICC) value.

7. Research Ethic

Research ethics including informed consent, anonymity, and confidentiality, are handled carefully throughout the research process. Research ethics were obtained from the Research Ethics Committee at Dr. Moewardi Hospital, with a decree number: 2.229/VIII/HR-EC/2024.

RESULTS

This study was conducted in Boyolali Regency for two months on 200 pregnant women at the integrated health post, Boyolali health center, Central Java. Researchers took samples from 25 integrated health posts consisting of *madya*, *purnama*, to *mandiri* strata.

1. Sample Characteristic

The characteristics of the research subjects can be seen from several variables including maternal age, gestational age, parity, distance from home to health facilities, level of education and income (Table 1).

Table 1. Description of sample characteristics

Variable	Category	Frequency (n)	Percentage (%)
Maternal Age	< 30 years old	99	49.5
	≥ 30 years old	101	50.5
Gestational Age	1st Trimester	30	15
	2nd Trimester	79	39
	3rd Trimester	91	45
Parity	Nulliparous	34	17
	Primiparous	104	52
	Multiparous	62	31
Distance	Near	98	49
	Far	102	51
Education Level	Finished Elementary School	6	3
	Finished middle school	23	11.5
	Finished high school	125	62.5
	College	46	23
Income	< Rp 2,650,000	100	49
	≥ Rp 2,650,000	100	51

1. Univariate Analysis

Univariate analysis provides a descriptive picture of each research variable, including self-efficacy, outcome expectation, modeling, reinforcement, and antenatal check-up behavior. The results of this analysis include the mean, standard deviation, minimum, and maximum values of each variable. This information is presented in a table that summarizes the statistical characteristics of all variables studied, providing an initial understanding of the data distribution and range of values observed in the study.

Table 1 shows the characteristics of the subjects obtained from 200 participants based on the age of pregnant women <30 years old by 99 subjects (49.5%) and ≥ 30 years old by 101 subjects (50.5%). Based on the number of parities there were 34 nulliparous pregnant women (17%), 104 primiparous subjects (52%) and 62 multiparous subjects (31%). Based on the distance from home to health facilities, 98 subjects (49%) had a close distance from health facilities and 102 pregnant women (51%) had a far distance from health facilities. Pregnant women had various levels of education, namely 6 subjects (3%) who completed their

education at elementary school level. There were 23 (11.5%) pregnant women completed their education at junior high school level. While pregnant women who completed their education at high school level were 125 (62.5%) and there were 46 subjects (23%) who completed their education at college level. There were 100 pregnant women (49%) who have a family income in the last 6 months of less than Rp. 2,650,000 while 100 pregnant women (51%) have a family income of more than Rp. 2,650,000.

2. Bivariate Analysis

Bivariate analysis was conducted to see the relationship between two variables at once, in this case to explore how variables such as self-efficacy, outcome expectations, modeling, and reinforcement relate to antenatal visit behavior.

Table 2. Univariate Analysis (continuous data)

Variable	n	Mean	SD	Min	Max
Self-efficacy	200	12.65	2.10	4	14
Outcome expectation	200	9.83	2.22	3	12
Modeling	200	1.57	2.09	0	9
Reinforcement	200	12.77	1.99	6	14
Antenatal Care	200	5.83	2.44	0	10

Table 3 Univariate Analysis (categorical data)

Characteristic	Category	Frequency (n)	Percentage (%)
Self-efficacy	Low	96	48.00
	High	104	52.00
Outcome expectation	Negative	66	33.00
	Positive	134	67.00
Modeling	Yes	99	49.50
	None	101	50.50
Reinforcement	Yes	71	35.50
	None	129	64.50
Antenatal Checkup	Not complete < 6 times	88	44.00
	Complete ≥ 6 times	112	56.00

Table 4. The results of bivariate analysis with linear regression test between social cognitive theory and antenatal visits

Independent Variable	Regression coefficient (b)	CI 95 %		p
		Lower Limit	Upper Limit	
Self-efficacy	0.47	0.32	0.62	<0.001
Outcome expectation	0.51	0.37	0.64	<0.001
Modeling	-0.02	-0.19	0.135	0.735
Reinforcement	0.60	0.45	0.75	<0.001

The Effect of Self-Efficacy on Antenatal Checkup

There was a statistically significant positive relationship between self-efficacy and complete antenatal check-ups. Every 1 unit increase in self-efficacy score will be followed by an increase in the number of complete antenatal check-ups by 0.47 units (b=0.47; CI 95% = 0.32 to 0.62; p= <0.001).

The Effect of Outcome expectation on Antenatal Checkup

Outcome expectation has a positive and statistically significant relationship with outcome expectation and complete antenatal

checkup. Every 1 unit increase in outcome expectation score will be followed by an increase in the number of complete antenatal examination visits by 0.51 units (b=0.51; CI 95% = 0.37 to 0.64; p= <0.001).

The Effect of Modeling on Antenatal Checkup

There is no statistically significant relationship between modeling and complete antenatal examination (b= -0.02; CI 95% = -0.19 to 0.135; p= 0.735).

The Effect of Reinforcement on Antenatal Checkup

There is a statistically significant positive relationship between reinforcement and complete antenatal check-ups. Every 1 unit increase in reinforcement score will be followed by an increase in the number of complete antenatal check-ups by 0.60 units (b=0.60; CI 95% = 0.45 to 0.75; p= <0.001).

3. Multivariate Analysis

Table 5 shows the results of multivariate analysis, and this study used multiple linear regression with a multilevel approach on the variables of self-efficacy, outcome expectations, modeling, reinforcement and antenatal check-up behavior with a multilevel approach. Level I is the individual level and level II is the *posyandu* level.

The effect of self-efficacy on complete antenatal checkup (≥6 times)

There is a positive and statistically significant relationship between self-efficacy and complete antenatal check-ups. Every 1 unit increase in self-efficacy score will be followed by an increase in the number of antenatal check-ups by 0.23 units (b=0.23; CI 95% = 0.09 to 0.36; p= <0.001).

The effect of outcome expectation on complete antenatal checkup (≥6 times)

There is a positive and statistically significant relationship between outcome expectation and complete antenatal check-ups. Every 1 unit increase in outcome expectation score will be followed by an increase in the number of antenatal check-ups by 0.32 units (b=0.32; CI 95% = 0.21 to 0.43; p= <0.001).

Peng The effect of modeling on complete antenatal checkup (≥6 times)

There is no statistically significant relationship between modeling and complete antenatal examination with a p value = 0.916. (b= -0.01; CI 95% = -0.12 to 0.10; p= 0.916).

The effect of reinforcement on complete antenatal checkup (≥6 times)

There is a positive and statistically significant relationship between reinforcement and complete antenatal check-ups. Every 1 unit increase in reinforcement score will be followed by an increase in the number of antenatal check-up visits by 0.38 units (b=0.38; CI 95% = 0.24 to 0.53; p= <0.001).

The effect of education on complete antenatal checkup (≥6 times)

There is a positive and statistically insignificant relationship between education and complete antenatal check-ups. Every 1 unit increase in education score will be followed by an increase in the number of antenatal check-ups by 0.28 units (b=0.28; CI 95% = -0.43 to 1.01; p= 0.433).

The effect of income on complete antenatal checkup (≥6 times)

There is a positive and statistically insignificant relationship between income and complete antenatal check-ups. Every 1 unit increase in income score will be followed by an increase in the number of antenatal check-ups by 0.27 units (b=0.27; CI 95% = -0.27 to 0.81; p= 0.327).

Contextual effect of integrated health posts on complete antenatal check-ups (≥6 times)

Based on the results of the multilevel multiple linear regression analysis on the contextual variables of the integrated health post, it showed the score of ICC = 24%. This

means that 24% of the variation in complete antenatal checks (≥ 6 times) is determined by contextual factors at the integrated health post level. This also means that 24% of the variation in the frequency of complete antenatal checks (i.e., visits of 6 times or more) can be explained by contextual factors at the integrated health post level. These factors include aspects such as service quality, resource availability, and support provided by health workers and the community at the integrated health post, which significantly influence maternal behavior in carrying out optimal antenatal checks.

Table 5. Results of multilevel multiple linear regression analysis on social cognitive theory with antenatal visits (level 2: *Posyandu*)

Independent Variable	Regression coefficient (b)	CI 95 %		p
		Lower Limit	Upper Limit	
Fixed effect				
Self-efficacy (≥ 14)	0.23	0.09	0.36	0.001
Outcome expectation (≥ 10)	0.32	0.21	0.43	<0.001
Modeling (≥ 1)	-0.01	-0.12	0.10	0.916
Reinforcement (≥ 14)	0.38	0.24	0.53	<0.001
Education (≥ SMA)	0.28	-0.43	1.01	0.433
Income (≥ 2,650,000)	0.27	-0.27	0.81	0.327
Random effect				
Posyandu Var (Constants)	0.825	0.37	1.81	
N observation 200				
Group Average= 8				
min = 8, max = 8				
Log likelihood = -395.83				
LR test vs linear model: chibar2(01) = 2.02 p= <0.001				
Intra class Correlation (ICC) = 24%				

DISCUSSION

The effect of self-efficacy on complete antenatal check-ups (≥6 times)

Antenatal check-ups in pregnant women are influenced by self-efficacy in the individual. The results of this study indicate that there is a positive and statistically significant relationship between self-efficacy and complete antenatal check-ups. It can be concluded that pregnant women with high self-efficacy tend to have the ability to carry out antenatal check-ups regularly and routinely every month with a frequency of visits (≥ 6 times) during their pregnancy.

This study is line with research conducted by Pamungkasari and Murti (2020) which stated that strong self-efficacy can have a significant impact on the use of antenatal services, with an odds ratio (OR) of 7.85. This shows that individuals with high levels of self-efficacy are more likely to utilize antenatal services, with a 95% confidence interval between 1.50 and 40.99, and a p-value of 0.015. This finding confirms the importance of increasing self-efficacy in encouraging pregnant women to actively use antenatal services.

The effect of outcome expectations on complete antenatal check-ups (≥6 times)

Outcome expectation directly affects complete antenatal check-ups, it refers to an individual's perception of the expected results of a particular behavior. Pregnant women with positive outcome expectations will have the expectation that by conducting routine check-ups, they can ensure their own and their fetus' health, and reduce the risk of

complications. This expectation can motivate them to use health care facilities.

This study is in line with the study conducted by Heri et al. (2023) which showed that women's satisfaction with antenatal care is closely related to the use of health services. Research shows that outcome expectations also play an important role in this context; when women have positive expectations about the benefits and outcomes of antenatal care, they tend to be more motivated to utilize these health services. In other words, satisfaction with antenatal care can increase outcome expectations, which in turn encourages greater use of health services.

The effect of modeling on complete antenatal check-ups (≥6 times)

The results of this study indicate that there is no statistically significant relationship between modeling and complete antenatal check-ups. Although modeling is a strong theoretical construct, in this context, its influence may not be realized in influencing a behavior. Other factors in this study include the possibility of limitations in the model used to measure the influence of modeling. For example, when the subjects do not have enough positive examples to imitate, or if they do not feel the impact of the modeling.

This study is in contrary with research that suggests that interactive mobile health technology has been shown to improve utilization of antenatal care services in Dodoma region, Tanzania. The findings highlight that the implementation of effective modeling can further improve antenatal care visits, by providing better access and necessary support for pregnant women. Thus, this technology not only facilitates services, but also strengthens women's motivation and confidence to utilize the care they need (Masoi et al, 2023).

Another study by Desairy et al. (2024) concluded that modeling can influence a person's behavior, for example, the negative influence of adolescents who have parents who consume alcohol is 1.53 times more likely to consume alcohol compared to adolescents whose parents do not drink (aOR = 1.53; 95% CI = 1.23 to 1.89; p = 0.001), and adolescents whose friends drink are 2.63 times more likely to consume alcohol compared to adolescents whose friends do not drink (aOR = 2.63; 95% CI = 1.59 to 4.35; p = 0.002). The influence of modeling can have both positive and negative effects on a behavior.

The effect of reinforcement on complete antenatal check-ups (≥6 times)

Reinforcement directly affects antenatal visits of pregnant women at the Boyolali health center. The results of this study concluded that there is a statistically significant positive relationship between reinforcement and complete antenatal examinations. Every 1 unit increase in the reinforcement score was associated with an increase in the number of antenatal examination visits by 0.38 units (b = 0.38; 95% CI = 0.24 to 0.53; p <0.001). This study is in line with previous studies which stated that group antenatal services increased the number of women who attended at least three antenatal examination visits. This increase can be attributed to reinforcement, where support and repetition of information received during group meetings reinforce positive behavior to attend more antenatal visits (Sayinzoga et al, 2021).

In another context, the influence of the social environment provides reinforcement for the occurrence of domestic violence (DV), such as in the study of Jati et al. (2019) where the occurrence of DV is influenced by many factors including the social environment, perception of gender equality, socio-economic factors, and patriarchal culture. This violence may have an impact on the

number of antenatal care visits.

The effect of education on complete antenatal check-ups (≥6 times)

There is a positive association between education level and complete antenatal check-up, but this association is not statistically significant. This study is in line with other studies which stated that higher education level is associated with more optimal utilization of antenatal care in East African countries. Women with better education tend to have good understanding about the importance of prenatal care and utilize antenatal care more often, which can then contribute to improving maternal and infant health in the region (Raru et al, 2022).

A study by Purbaningrum et al. (2019) showed that higher education tends to affect the frequency of antenatal care visits. This study is in line with the study by Sitepu et al. (2023) which stated that pregnant women with higher education are 2.93 times more likely to utilize antenatal services than pregnant women with lower education. This shows that individuals with higher education are more likely to utilize antenatal services, with a 95% confidence interval between 1.93 and 4.45, and a p-value of 0.001.

The effect of income on complete antenatal check-ups (≥6 times)

There is a positive relationship between family income and complete antenatal check-ups, but it is not statistically significant. Research by Sui et al. (2021) stated that the positive relationship found in this study is in line with other findings stating that women in the highest wealth quintile were 2.6 times more likely to meet the recommended number of antenatal visits, which was 8 times. This suggests that better economic status plays an important role in increasing access and participation in antenatal care services, which are important for maternal and infant health compared to resource-poor populations, such as disadvantaged rural populations (Bain et al, 2022).

Another study by Feng et al. (2021) also stated that economic status or family income has a negative relationship with non-compliance with antenatal visits of 8 or more times in sub-Saharan Africa. This suggests that individuals with lower incomes are less likely to adhere to the recommended number of antenatal visits, which may have implications for maternal and infant health. Socio-economic inequality and increased awareness of women affect the coverage of antenatal visits of eight or more times in Benin. This suggests that socioeconomic factors and women's education levels play an important role in increasing access and participation in antenatal services, which has an impact on maternal and infant health.

Contextual effect of integrated health posts on complete antenatal check-ups (≥6 times)

Based on the multilevel multiple linear regression analysis on the contextual variables of the integrated health post, the ICC was 24%. This shows that 24% of the variations in complete antenatal check-ups, which are visits of 6 times or more and influenced by contextual factors at the integrated health post level. In other words, 24% of the variation in the frequency of complete antenatal examinations (≥ 6 times) can be explained by contextual factors at the integrated health post level. These factors include the quality of services, availability of resources, and support provided by health workers and the community at the integrated health post, which have a significant influence on maternal behavior in undergoing optimal antenatal check-ups.

The contextual influence of *posyandu* on pregnancy check-up behavior has been proven to be significant (Murdikawati et al. 2019). Interventions that focus on increasing

self-efficacy and social support in the *posyandu* environment can increase the frequency of pregnancy check-ups, which in turn can improve maternal and infant health. This study supports the importance of a holistic approach in maternal health services, which considered social and psychological factors that influence their behavior.

This study is in line with previous research by Lestari (2024) which stated that there is a significant relationship between the strata of health centers and prenatal healthy behavior. Health centers have an important role in empowering communities and facilitating access to basic health services, especially in implementing healthy behavior during pregnancy, which aims to accelerate the reduction in maternal and infant mortality rates. This activity can be carried out in village halls, sub-district halls, or other locations that are easily accessible to the community. If activities at health centers are managed well, this can make a significant contribution to reducing maternal, infant, and toddler mortality rates. In addition to the contextual influence of *posyandu*, labor preparation is increased by the strong role of midwives, strong motivation, and the use of pregnancy classes (Yuliana et al,2019).

Chen and He (2019) concluded that Antenatal Care (ANC) visits help detect risks and complications during pregnancy and promote health education, nutritional intake, and delivery in health facilities. The risk of a woman who does not attend ANC visits to die from pregnancy-related causes is 61 times higher than a woman who attends at least 8 ANC visits.

AUTHORS CONTRIBUTION

All authors have made significant contributions to the data analysis and preparation of the final manuscript.

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CONFLICT OF INTEREST

There was no conflict of interest in this study.

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