

A Regression Model of Determinants of Effective Utilization of The E-Kescatin Application Among Premarital Couples

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ABSTRACT

Digital health applications have the potential to strengthen premarital health services by improving access to reproductive health information, risk screening, and preconception care. However, evidence regarding factors associated with their perceived effectiveness and benefits remains limited. This study aimed to examine factors associated with the perceived effectiveness and benefits of E-Kescatin utilization among premarital couples in Pringsewu District, Indonesia. A cross-sectional analytical study was conducted using 248 completed questionnaires. Data were collected using a structured questionnaire and analyzed using Pearson correlation and multiple linear regression with heteroskedasticity-consistent HC3 robust standard errors. All five explanatory constructs showed significant positive bivariate correlations with the outcome (all $p < 0.001$). The regression model was statistically significant, $F(5, 242) = 61.261$, $p < 0.001$, explaining 55.9% of the observed variance in the outcome ($R^2 = 0.559$; adjusted $R^2 = 0.550$). After simultaneous adjustment, Application Features was the only construct significantly associated with perceived effectiveness and benefits ($B = 0.478$; robust $SE = 0.173$; 95% $CI: 0.138-0.818$; $p = 0.006$). User Knowledge, Application Usability, Family and Environmental Support, and Technology and Infrastructure Access were not statistically significant in the adjusted model. These findings suggest that the relevance and usefulness of application features warrant particular attention in the continued development and evaluation of E-Kescatin. Given the cross-sectional design and self-reported measurements, the observed relationships should be interpreted as statistical associations rather than causal effects.

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I. INTRODUCTION

Digital transformation has become an important strategy for strengthening health systems by improving access to health information, service delivery, continuity of care, and the efficiency of preventive and promotive services. The World Health Organization (WHO) emphasizes that digital health interventions should complement existing health services and be implemented according to population needs, health system capacity, and local infrastructure [1,2]. In reproductive health, preconception care provides an important opportunity to identify and address health risks before pregnancy, thereby supporting maternal and child health [3]. Digital applications may facilitate health education, risk screening, self-monitoring, and access to preconception health information. Previous systematic reviews have examined mobile applications and digital interventions to promote preconception health behaviors, including improvements in nutrition, physical activity, and other modifiable risk factors [4,5]. In Indonesia, premarital health services provide an entry point for assessing reproductive health and identifying potential risks before

pregnancy. The E-Kescatin application was developed to support these services through digital health-information recording, reproductive health monitoring, risk identification, and health education for prospective brides and grooms. Nevertheless, the availability of digital technology does not necessarily ensure its effective utilization, as successful implementation also depends on users' needs, application functionality, accessibility, and the broader health service environment [1,6].

Previous studies have identified several factors associated with the acceptance and utilization of digital health technologies. The Technology Acceptance Model (TAM) highlights perceived usefulness and perceived ease of use as important determinants of technology acceptance, whereas the Unified Theory of Acceptance and Use of Technology (UTAUT) incorporates social influence and facilitating conditions [7–9]. More recent systematic reviews have further identified digital literacy, application characteristics, user experience, social support, and technological accessibility as relevant factors in mobile health acceptance and sustained engagement [10,11]. The Task-Technology Fit framework

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also emphasizes the importance of aligning technological functionality with users' tasks or needs[2]. Evidence from Indonesian primary health care settings also highlights the role of user readiness, digital competence, system usability, and implementation conditions in health information system utilization [6]. Previous E-Kescatin studies conducted by the research team have explored demographic, sociocultural, organizational, and technical factors associated with application implementation and utilization [12,13]. However, these studies have primarily provided descriptive or context-specific evidence, leaving the simultaneous associations of multiple user-, application-, social-, and technology-related factors with perceived utilization effectiveness insufficiently examined.

An important research gap therefore remains regarding the independent associations of multiple factors with the perceived effectiveness and benefits of E-Kescatin utilization in premarital health services. Although previous studies have identified barriers and facilitators to digital health utilization, descriptive or bivariate analyses do not necessarily show whether these associations persist after adjustment for other related factors. This distinction matters because user knowledge, application usability, application features, social support, and technological accessibility may be interrelated. Multiple linear regression provides an analytical approach for estimating the adjusted associations of these explanatory variables with a continuous outcome within a single empirical model [14]. By examining these dimensions simultaneously, the present study extends previous assessments of E-Kescatin utilization and provides a more comprehensive evaluation of factors associated with its perceived effectiveness and benefits. Given the cross-sectional design, do not interpret the estimated associations as evidence of causal relationships.

Accordingly, this study aimed to develop and evaluate a multivariable regression model examining factors associated with the perceived effectiveness and benefits of E-Kescatin utilization among premarital couples in Pringsewu District, Lampung Province, Indonesia. Specifically, the study simultaneously examined five explanatory constructs: user knowledge, application usability, application features, family and environmental support, and technology and infrastructure access. The findings are expected to provide empirical evidence to inform user-centered application development, identify dimensions requiring further evaluation, and support the optimization of digital premarital health services in primary health care settings.

II. MATERIALS AND METHODS

A. Respondents/Object

This quantitative analytical observational study employed a cross-sectional design to examine factors associated with the perceived effectiveness and benefits of E-Kescatin utilization among premarital respondents in Pringsewu District, Lampung Province, Indonesia. The study was conducted in 2025 among individuals who had accessed premarital health services and had experience using the E-Kescatin application. The accessible study

population comprised eligible premarital respondents identified during the defined data collection period. The observational study followed the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) recommendations [15].

A total sampling approach was applied to include all eligible premarital respondents within the accessible study population during the study period. Participants were eligible if they were registered E-Kescatin users, had received premarital health services, had experience using the application, and provided informed consent. The study included 248 premarital couples, comprising 496 individuals. One member of each couple completed the questionnaire, resulting in 248 respondents and 248 completed questionnaires.

Accordingly, the individual respondent was defined as the unit of analysis, with one respondent representing each participating couple. The final analytical dataset consisted of 248 individual-level observations with complete responses for all questionnaire items required to calculate the six study constructs. Demographic characteristics, including age, sex, educational attainment, occupation, religion, and ethnicity, were collected from the individual respondents. These characteristics were used to describe the questionnaire respondents rather than both members of each participating couple. Missing demographic information was reported according to the number of valid observations for each variable.

B. Data Acquisition

Primary quantitative data were obtained using a structured questionnaire completed by one member of each eligible premarital couple. The questionnaire was developed based on the study's conceptual framework, premarital health service guidelines, established concepts of digital health technology acceptance and utilization, and findings from previous studies. The selection of explanatory constructs was informed by the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT), which emphasize the roles of perceived usefulness, ease of use, social influence, and facilitating conditions in technology acceptance and utilization [7,9,14].

The questionnaire comprised 18 items organized into six constructs. Five constructs were specified as independent variables: User Knowledge, Application Usability, Application Features, Family and Environmental Support, and Technology and Infrastructure Access. The dependent construct was Effectiveness and Benefits of the E-Kescatin Application. Each construct consisted of three items measured using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). User Knowledge assessed awareness of E-Kescatin's existence and purpose, understanding of how to use the application, and knowledge of its main features. Application Usability assessed ease of access, interface clarity and comprehensibility, and perceived difficulty in using the application. Application Features assessed the perceived relevance of available features, the usefulness

of information related to nutrition and pregnancy preparation, and the usefulness of reproductive health monitoring features. Family and Environmental Support assessed encouragement from partners, support from family members, and encouragement from health workers or community health cadres. Technology and Infrastructure Access assessed smartphone access, internet connectivity, and technical barriers encountered during application use. The dependent construct assessed routine application use, satisfaction with the information provided, and perceived benefits for reproductive health.

Internal consistency was evaluated using Cronbach's alpha [9]. The coefficients were 0.884 for User Knowledge, 0.907 for Application Usability, 0.909 for Application Features, 0.890 for Family and Environmental Support, 0.826 for Technology and Infrastructure Access, and 0.867 for Effectiveness and Benefits of the E-Kescatin Application. Formal instrument validity testing was not conducted. Accordingly, the reported Cronbach's alpha coefficients were interpreted as measures of internal consistency rather than evidence of instrument validity.

C. Data Processing

Completed questionnaires were reviewed for completeness and consistency before statistical analysis. Responses to each questionnaire item were numerically coded according to the predefined five-point Likert-scale categories. Negatively worded items were coded from the outset so that higher scores consistently represented more favorable conditions. Therefore, no additional reverse-coding procedure was performed during composite score calculation. For each construct, a composite score was calculated as the arithmetic mean of its three corresponding questionnaire items:

Composite score = (Item 1 + Item 2 + Item 3) / 3.

Higher composite scores indicated higher levels of the respective construct. The composite scores ranged from 1 to 5 and were treated as continuous variables in correlation and regression analyses. No categorical cut-off points were applied. The use of parametric statistical methods for composite Likert-scale measures was informed by methodological literature examining their statistical properties and robustness [16]. The analytical dataset consisted of 248 individual-level observations, each corresponding to one completed questionnaire from one member of a participating premarital couple. All 248 questionnaires contained complete responses for the 18 items required to calculate the six study constructs. Consequently, no questionnaire-item data required imputation, and no observations were excluded from the primary correlation or regression analyses because of missing construct scores.

Missing values in demographic characteristics were reported according to the number of available observations for each variable and were not imputed.

Statistical data processing and analysis were performed in Python using the pandas, SciPy, and statsmodels libraries.

Data Collection

Data collection was conducted during 2025 among eligible premarital respondents who had received premarital health services and used the E-Kescatin application in Pringsewu District, Lampung Province, Indonesia.

Before questionnaire administration, participants received information regarding the study objectives, procedures, voluntary participation, and confidentiality of their information. One member of each participating premarital couple completed the structured questionnaire independently. Each questionnaire reflected the individual participant's responses rather than a joint assessment by both partners. Clarification of questionnaire instructions was provided when necessary without directing participants' responses.

Participation was voluntary, and each respondent provided written informed consent before data collection. The Health Research Ethics Committee of Poltekkes Kemenkes Tanjungkarang granted ethical approval (No. 359/KEPK-TJK/V/2025). The research team kept participant information confidential and used it exclusively for research purposes.

D. Data Analysis

Descriptive statistics summarized the demographic characteristics and study variables. Continuous variables were presented as means and standard deviations, whereas categorical variables were summarized using frequencies and percentages. Demographic characteristics and questionnaire-based study constructs were analyzed at the individual respondent level. Pearson correlation analysis examined bivariate linear associations between each of the five independent constructs and the Effectiveness and Benefits of the E-Kescatin Application score.

Multiple linear regression was subsequently performed using ordinary least squares (OLS) to estimate the adjusted associations of User Knowledge, Application Usability, Application Features, Family and Environmental Support, and Technology and Infrastructure Access with the dependent variable. All five independent variables were prespecified based on the study's conceptual framework and entered simultaneously into the regression model rather than selected solely according to their bivariate p-values.

The regression model was specified as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \varepsilon \quad (1)$$

where Y represents the Effectiveness and Benefits of the E-Kescatin Application score; X_1 represents User Knowledge; X_2 represents Application Usability; X_3 represents Application Features; X_4 represents Family and Environmental Support; and X_5 represents Technology and Infrastructure Access. β_0 denotes the intercept, β_1 – β_5 denote the regression coefficients, and ε represents the error term.

The regression model was summarized using unstandardized regression coefficients (B), standardized regression coefficients (β), standard errors, 95%

confidence intervals (CI), p-values, the coefficient of determination (R^2), adjusted R^2 , and the overall conventional F-test. We conducted regression diagnostics to evaluate model assumptions and identify potentially influential observations. We assessed linearity using the Rainbow test, residual normality using the Shapiro–Wilk test, and heteroskedasticity using the Breusch–Pagan test. Residual independence was examined using the Durbin–Watson statistic, multicollinearity was assessed using variance inflation factors (VIF), and potentially influential observations were evaluated using Cook's distance. Because heteroskedasticity was detected, heteroskedasticity-consistent HC3 robust standard errors and corresponding 95% confidence intervals were used for coefficient-level statistical inference [17]. Statistical significance was defined as a two-sided p-value below 0.05. All primary correlation and regression analyses were conducted using 248 individual-level observations, with one respondent representing each participating premarital couple. Given the cross-sectional study design, the estimated regression coefficients were interpreted as adjusted statistical associations rather than causal effects.

III. RESULTS

A. Participant Characteristics and Descriptive Statistics

The final quantitative analysis included 248 individual respondents, with one respondent representing each participating premarital couple. The mean age of respondents with available age data was 25.31 ± 4.39 years ($n = 245$), ranging from 17 to 48 years. Sex data were available for 246 respondents, comprising 231 females (93.9%) and 15 males (6.1%). Regarding educational attainment, 126 respondents had completed senior high school, 46 had a bachelor's degree, 41 had junior high school education, 14 had a diploma, 7 had elementary school education, 2 had vocational high school education, 2 reported other educational backgrounds, and 1 had a master's degree. Missing demographic information was not imputed. Table 1 presents the descriptive statistics for the six study constructs.

Table 1. Descriptive Statistics of the Study Variables ($n = 248$)

Study variable	n	Mean	SD	Minimum	Maximum
User Knowledge	248	3.91	0.74	1.00	5.00
Application Usability	248	3.96	0.76	1.00	5.00
Application Features	248	4.00	0.74	1.00	5.00
Family and Environmental Support	248	4.03	0.66	1.00	5.00
Technology and Infrastructure Access	248	4.04	0.63	1.00	5.00

Effectiveness and Benefits of E-Kescatin	248	3.81	0.76	1.00	5.00
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Note: Each observation represents one individual respondent from a participating premarital couple. SD = standard deviation.

All composite scores were measured on a five-point scale. The mean scores were 3.91 ± 0.74 for User Knowledge, 3.96 ± 0.76 for Application Usability, 4.00 ± 0.74 for Application Features, 4.03 ± 0.66 for Family and Environmental Support, and 4.04 ± 0.63 for Technology and Infrastructure Access. The mean score for Effectiveness and Benefits of the E-Kescatin Application was 3.81 ± 0.76 . All six constructs had mean scores above the response scale midpoint.

B. Bivariate Correlations

Pearson correlation analysis showed statistically significant positive bivariate associations between all five explanatory constructs and the Effectiveness and Benefits of the E-Kescatin Application score (all $p < 0.001$). Correlation coefficients ranged from 0.541 to 0.707. Application Features showed the highest correlation with the outcome ($r = 0.707$; $p < 0.001$), followed by Family and Environmental Support ($r = 0.634$; $p < 0.001$), User Knowledge ($r = 0.578$; $p < 0.001$), Application Usability ($r = 0.573$; $p < 0.001$), and Technology and Infrastructure Access ($r = 0.541$; $p < 0.001$). These findings indicate that higher scores on each explanatory construct were associated with higher perceived effectiveness and benefits of E-Kescatin utilization at the bivariate level. Multiple linear regression was used to examine the adjusted associations between the five prespecified explanatory constructs and the Effectiveness and Benefits of the E-Kescatin Application score. All five explanatory variables were entered simultaneously into the model. Because model diagnostics detected heteroskedasticity, we used HC3 robust standard errors and corresponding 95% confidence intervals for coefficient-level inference. Table 2 presents the regression results.

The overall regression model was statistically significant based on the conventional F-test, $F(5, 242) = 61.261$, $p < 0.001$, with $R^2 = 0.559$ and adjusted $R^2 = 0.550$. Collectively, the five explanatory constructs accounted for 55.9% of the observed variation in the perceived effectiveness and benefits of E-Kescatin utilization.

C. Multiple Linear Regression Analysis

Application Features had the largest standardized regression coefficient among the five explanatory constructs ($\beta = 0.462$). This finding indicates the largest adjusted standardized association with the outcome within the fitted model and should not be interpreted as evidence of causality.

Table 2. Multiple Linear Regression Analysis of Factors Associated with the Perceived Effectiveness and Benefits of E-Kescatin ($n = 248$)

Independent variable	B	Standardized β	Robust SE (HC3)	95% Robust CI for B	p-value	VIF
User Knowledge	0.181	0.177	0.096	-0.007 to 0.370	0.059	2.20
Application Usability	-0.037	-0.038	0.159	-0.350 to 0.275	0.814	2.85
Application Features	0.478	0.462	0.173	0.138 to 0.818	0.006	2.58
Family and Environmental Support	0.130	0.113	0.187	-0.238 to 0.498	0.487	3.77
Technology and Infrastructure Access	0.178	0.148	0.145	-0.107 to 0.463	0.219	2.54

Note: B = unstandardized regression coefficient; β = standardized regression coefficient; SE = standard error; CI = confidence interval; VIF = variance inflation factor. HC3 robust standard errors and confidence intervals were used for coefficient-level statistical inference. Statistical significance was set at $p < 0.05$.

D. Regression Model Diagnostics

Regression diagnostics were conducted to evaluate model assumptions and identify potentially influential observations. The Rainbow test showed no statistical evidence of departure from linearity ($p = 0.987$). Variance inflation factors ranged from 2.20 to 3.77, indicating that the reported diagnostic values did not suggest severe multicollinearity. The Shapiro–Wilk test indicated a departure from residual normality ($W = 0.912$; $p < 0.001$), while the Breusch–Pagan test indicated heteroskedasticity ($p < 0.001$). The Durbin–Watson statistic was 1.446, indicating potential residual dependence. The maximum Cook's distance was 1.603, identifying at least one potentially influential observation.

Given the detected heteroskedasticity, HC3 robust standard errors and corresponding 95% confidence intervals were used for coefficient-level statistical inference. The potentially influential observation identified by Cook's distance was further examined through sensitivity analysis. The positive association between Application Features and the outcome remained statistically significant after excluding this observation, although the estimated coefficient changed. This sensitivity analysis evaluated the stability of the findings rather than justifying exclusion from the primary model.

4. DISCUSSION

The present study examined user-, application-, social-, and technology-related factors associated with the perceived effectiveness and benefits of E-Kescatin utilization among 248 premarital couples in Pringsewu District, Indonesia. All five explanatory constructs showed statistically significant positive bivariate correlations with the outcome. However, after simultaneous adjustment using HC3 robust inference, Application Features was the only construct that remained statistically significantly associated with the perceived effectiveness and benefits of E-Kescatin utilization ($B = 0.478$; 95% CI: 0.138–0.818; $p = 0.006$). The model explained 55.9% of the observed variance in the outcome ($R^2 = 0.559$; adjusted $R^2 = 0.550$).

The stronger bivariate associations and the attenuation of several coefficients after adjustment suggest that the explanatory constructs may share statistical information. These findings highlight the relevance of application features within the adjusted model but do not establish that improvements in these features would directly increase utilization effectiveness. The cross-sectional design does not establish temporal ordering or causal relationships.

The association between Application Features and the perceived effectiveness and benefits of E-Kescatin aligns with theoretical perspectives that emphasize the relevance of technological functionality to users' needs. The Technology Acceptance Model identifies perceived usefulness and ease of use as important dimensions of technology acceptance, while the Task-Technology Fit framework emphasizes the alignment between technological capabilities and users' tasks [2,8]. Adnan et al. in a systematic review of mobile health application acceptance, examined the contribution of core and extended technology acceptance constructs to the acceptability of mobile health applications [10]. Thanthrige et al. further demonstrated the relevance of technology acceptance and task-technology fit in health care technology adoption [18]. Similarly, Galavi et al. identified important usability criteria for evaluating mobile health applications [19]. In the context of premarital health, Musgrave et al. reviewed mobile applications designed to promote preconception health behavior change, providing evidence of the potential role of digital interventions during the preconception period [4]. The present findings extend this literature by examining adjusted associations between multiple explanatory constructs and E-Kescatin utilization in a specific premarital health service setting. Nevertheless, the non-significant adjusted associations of User Knowledge, Application Usability, Family and Environmental Support, and Technology and Infrastructure Access should not be interpreted as evidence that these dimensions are unimportant. Their statistically significant bivariate associations indicate relationships with the outcome, although the present sample did not show independent associations after simultaneous adjustment.

Several limitations should be considered when interpreting these findings. First, the cross-sectional design prevents establishing temporal or causal relationships. Second, each participating couple completed the questionnaire jointly, and the outcome was based on self-reported assessments of application use, satisfaction, and perceived reproductive health benefits. The findings may therefore be affected by recall bias, social-desirability bias, and differences in responses between partners that were not separately measured. Third, although the questionnaire showed acceptable internal consistency, the authors did not conduct formal instrument validity testing. Consequently, the extent to which the questionnaire adequately measured the intended constructs remains uncertain. Fourth, the study included couples who had already used E-Kescatin in one district, limiting the generalizability of the findings to non-

users and other geographical or health service settings. Finally, the regression diagnostics identified heteroskedasticity, non-normal residuals, and potentially influential observations. Although HC3 robust standard errors were used for coefficient-level inference, they do not eliminate the potential influence of unusual observations or resolve all model assumption concerns. The absence of longitudinal assessment, external validation, and formal mediation analysis further limits the interpretation of the observed relationships.

The findings have practical implications for further developing and evaluating digital premarital health services. The observed association between Application Features and perceived effectiveness and benefits suggests that the relevance, clarity, usefulness, and functionality of E-Kescatin features warrant particular attention. User-centered design, usability testing, and feedback from premarital couples could evaluate features related to nutritional assessment, pregnancy preparation, reproductive health information, and health monitoring. However, application development should also consider user knowledge, accessibility, social support, and technological readiness, as these dimensions remain relevant to comprehensive digital health implementation [6,11]. Health care providers may help couples understand application-based information and connect digital health services with appropriate premarital and preconception care. Future longitudinal, multicenter, and intervention studies are needed to evaluate whether changes in application functionality precede improvements in sustained utilization and measurable reproductive health outcomes. Such studies should also incorporate objective application-use indicators, formally validated measurement instruments, and evaluations involving both members of participating couples.

5. CONCLUSION

This study examined factors associated with the perceived effectiveness and benefits of E-Kescatin utilization among 248 premarital couples in Pringsewu District, Indonesia. All five explanatory constructs were positively and significantly correlated with the outcome at the bivariate level. However, after simultaneous adjustment using HC3 robust inference, Application Features was the only construct that remained statistically significantly associated with the perceived effectiveness and benefits of E-Kescatin utilization ($B = 0.478$; 95% CI: 0.138–0.818; $p = 0.006$). The multivariable model explained 55.9% of the observed variance in the outcome ($R^2 = 0.559$; adjusted $R^2 = 0.550$). These findings suggest that the relevance and usefulness of application features warrant particular attention in the continued development and evaluation of E-Kescatin. Nevertheless, the non-significant adjusted associations of the other explanatory constructs do not establish their practical irrelevance. Given the cross-sectional design, self-reported measurements, lack of formal instrument validity testing, and single-district setting, interpret the findings as statistical associations rather than causal effects. Further research using longitudinal or intervention designs and

validated measurement instruments is needed to evaluate sustained application utilization and its potential contribution to premarital and reproductive health outcomes.

6. RECOMMENDATIONS

A. For Program Managers and Policymakers

Program managers and policymakers should consider incorporating systematic, user-centered evaluation of E-Kescatin into program monitoring and development. Evaluation should address the relevance, usefulness, accessibility, and functionality of application features in meeting the reproductive and premarital health needs of prospective couples. Program implementation should also consider digital literacy, infrastructure readiness, health care provider support, and integration with existing primary health care services. These considerations align with international guidance on implementing digital health interventions based on population needs and health system capacity [1,6].

B. For Application Developers

Application developers should evaluate and improve features related to nutrition, pregnancy preparation, reproductive health education, and health monitoring. User-centered design, usability testing, and feedback from premarital couples may help identify functions that are difficult to understand, insufficiently relevant, or inadequately aligned with users' needs. Application accessibility and usability should remain important development considerations, even though usability did not demonstrate a statistically significant independent association in the adjusted regression model [18,19] [17,19].

C. For Health Care Providers

Health care providers, particularly midwives involved in premarital and preconception care, should consider integrating E-Kescatin into appropriate health education, risk screening, and counseling activities. Midwives may help couples interpret reproductive health information from the application and connect digital information with appropriate clinical assessment and preventive services. These activities should complement, not replace, direct professional assessment and individualized care [1,4].

D. For Future Research

Future research should employ longitudinal, multicenter, or intervention-based designs to evaluate changes in E-Kescatin utilization over time and assess whether improvements in application features are associated with sustained engagement and measurable reproductive health outcomes. Subsequent studies should also conduct formal instrument validity testing, incorporate objective application-use indicators, and consider collecting separate responses from both members of each couple. Further analyses may examine potential mediation and interaction mechanisms among user knowledge, application usability, application features, social support, and technological accessibility. Sensitivity

analyses and external validation are also recommended to assess the stability and generalizability of the regression findings.

AUTHOR CONTRIBUTIONS

NI: Conceptualization, study design, project administration, funding acquisition, supervision of data collection, writing of the original draft, and manuscript finalization; **RN:** Data collection, formal analysis, data interpretation, and writing support; **EB:** Methodological review, literature review, data interpretation, and writing review and editing; **MM:** Data management, visualization, statistical interpretation, and critical review of the manuscript; **IT:** Investigation, literature search, and writing—review and editing; **NN:** Supervision, methodological review, critical revision of the manuscript, and final approval of the version to be published. All authors read and approved the final manuscript and agreed to be accountable for the work's integrity and accuracy.

CONFLICTS OF INTEREST

The authors declare no conflicts of interest that could have influenced the conduct, interpretation, or reporting of this study. The authors report no financial or personal relationships that could have inappropriately influenced the work presented in this manuscript.

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