

Threat appraisal and prevention of risky sexual behavior among high school students in Indonesian: the mediating roles of response efficacy and self-efficacy

Erni Gustina¹, Ira Nurmala², Nunik Puspitasari²

¹Doctoral Program in Public Health, Faculty of Public Health, Universitas Airlangga, Surabaya, Indonesia

²Faculty of Public Health, Universitas Airlangga, Surabaya, Indonesia

Article Info

Article history:

Received Jan 19, 2026

Revised Apr 10, 2026

Accepted May 14, 2026

Keywords:

High school students

Premarital sexual behavior

Response efficacy

Self-efficacy

Threat appraisal

ABSTRACT

Premarital sexual behavior among adolescents remains a public health concern. However, school programs often focus on risk perception without showing how perceived threat can lead to protection. This study examined the influence of threat appraisal (severity and vulnerability) on the prevention of premarital sexual behavior through response efficacy and self-efficacy as mediators. A cross-sectional survey was conducted among 333 high school students selected by multistage sampling. Likert-scale measures assessed severity, vulnerability, response efficacy, and self-efficacy. The model was analyzed using partial least squares structural equation modeling (PLS-SEM) with bootstrapping ($\alpha=0.05$). Most participants reported no premarital sexual behavior (66.1%). Severity and vulnerability positively predicted response efficacy and self-efficacy, with severity exerting a stronger effect. Response efficacy and self-efficacy were negatively linked to premarital sexual behavior ($p<0.05$), meaning that higher coping appraisal (the ability to handle risky situations) was associated to lower risk behavior. Indirect effects from severity and vulnerability to behavior through both mediators were significant. The model explained 34% of the variance in premarital sexual behavior. Threat appraisal reduced premarital sexual behavior mostly by improving coping appraisal. Thus, school-based interventions should combine risk communication with the development of refusal, negotiation, and self-confidence skills to support protection.

This is an open access article under the [CC BY-SA](https://creativecommons.org/licenses/by-sa/4.0/) license.



Corresponding Author:

Erni Gustina

Doctoral Program in Public Health, Faculty of Public Health, Universitas Airlangga

Surabaya 60115, Indonesia

Email: erni.gustina-2022@fkm.unair.ac.id

1. INTRODUCTION

Premarital sexual behavior among adolescents is a significant public health issue, contributing to unintended pregnancy, sexually transmitted infections (STIs), and psychological harm, all of which can disrupt academic and future life outcomes [1]–[4]. This issue is particularly relevant in secondary schools, where the developmental transition of adolescence increases vulnerability to risky behavior. Globally, approximately 21 million pregnancies occur annually among adolescents aged 15–19 in low- and middle-income countries, resulting in 12 million births [5]. A total 13% of young women worldwide gave birth before the age of 18 in 2023 [6], self-reported sexual activity increased between 2015 and 2023 among adolescent girls (from 3.8% to 4.8%) and adolescent boys (from 6.9% to 9.4%) [7], and Indonesia recorded an adolescent fertility rate of 26 births per 1,000 adolescent girls aged 15–19 in 2023 [8]. Overall, these data confirm that the prevention of adolescent sexual risks is not merely an information issue but a priority for school-based education and development requiring effective interventions [9]–[11].

Adolescent premarital sexual behavior reflects multilevel determinants. Gendered dynamics shape initiation and consequences; boys typically initiate earlier and report greater pleasure, while girls often face pressure and regret [12]–[14]. Peer influence [15]–[17] and exposure to sexually explicit media [14], [16], [18]–[21] further elevate risk, while substance use amplifies these effects [22], [23]. Conversely, strong parental support and monitoring can reduce risk, although these protections may attenuate during the autonomy expansion typical of secondary school [2], [3], [24]–[28]. Despite this evidence base, schools often struggle to translate knowledge-based sexual education into sustained protective behavior, particularly when programs do not adequately address motivation, perceived risk, self-regulation, and negotiation skills [29]–[31].

This study builds on protection motivation theory (PMT), which specifies how risk information converts into protective motivation through two appraisal processes: threat appraisal (perceived severity and vulnerability) and coping appraisal (response efficacy and self-efficacy). In adolescent sexual decision-making, heightened threat perception may be insufficient if adolescents doubt the effectiveness of preventive strategies or lack confidence to refuse pressure, set boundaries, negotiate, and delay sexual activity [32]–[34]. Moreover, knowledge gains alone do not guarantee protection without values, self-regulation, and negotiation skills to support protective decisions [35], [36]. Thus, PMT offers a framework particularly relevant to school-based prevention, as it links risk awareness to actionable coping beliefs and skills that can be trained in classrooms and counseling programs [37]–[39].

Previous studies have documented the relationship between peer influence, media exposure, substance use, and parenting patterns with adolescent premarital sexual behavior; however, most of the literature has only examined single determinants in isolation or is largely descriptive in nature [17], [21], [22], [24]. Specifically, it aims to: i) to analyze the influence of threat appraisal (severity and vulnerability) on response efficacy and self-efficacy; ii) to analyze the influence of response efficacy and self-efficacy on premarital sexual behavior; and iii) to examine the mediating role of response efficacy and self-efficacy between threat appraisal and premarital sexual behavior. The findings are expected to support the development of school-based interventions that raise awareness of risks and help adolescents build the skills and confidence needed to adopt protective behaviors.

2. METHOD

The methodological approach follows a systematic sequence: it begins with model conceptualization, followed by validation and reliability to optimize the items. Data were subsequently collected at specific intervals within the school setting, offline, from the target population, thereby enabling analysis of the relationship between variables contingent on variation in respondents' scores at the time of assessment. Data were analyzed using a component-based partial least squares structural equation modeling (PLS-SEM) framework, specifically designed for predictive modelling.

2.1. Sample and data collection

The intended study population comprises adolescents aged 15-18 years who are enrolled as high school students at the institution where the research is being conducted. The unit of analysis was the students' high school. The inclusion criteria for this study encompass students aged 15-18 years who are enrolled at the institution where the research is conducted, are present at the time of data collection, and have demonstrated willingness to participate via a suitable consent procedure for minors, specifically obtaining consent from parents or guardians and assent from the students. The exclusion criteria include individuals who fail to complete the questionnaire in full (e.g., leaving substantial sections/blank), exhibit inconsistent or unreliable response patterns, or elect to withdraw from data collection.

Data were collected using self-administered questionnaires in the classroom. Trained data collectors briefly explained the study's purpose, the voluntary nature of participation, anonymity, and the right to refuse or withdraw without penalty. To minimize social desirability bias, teachers were not involved in administering the surveys and were asked to remain outside the classroom whenever possible. Students completed the questionnaires individually and returned them in a sealed envelope directly to the research team to enhance confidentiality. The research team only checked the forms on-site for completeness (and recorded non-response and exclusion based on predetermined criteria).

2.2. Sampling techniques and sample size

Sampling may be conducted using class-based multistage sampling techniques. For example, a subset of schools is selected, the several classes within those schools are chosen, and finally, all pupils within the selected classes who meet the criteria are included. Determining the sample size utilized the Lwanga and Lemeshow formula. The sample size for this study was 333 high school students.

2.3. Statistical analysis

Data were analyzed using PLS-SEM with SmartPLS 4.1. The analysis consisted of two stages: evaluation of the measurement model and evaluation of the structural model. Reliability was assessed using Cronbach's alpha and composite reliability (CR), while convergent validity was evaluated using average variance extracted (AVE) [40]. Structural relationships were tested using bootstrapping with a significance level of 0.05 [41].

2.4. Measurement instruments

The measurement items were adapted from previous studies based on PMT. The questionnaire is divided into two sections: section A and section B. Section A collects demographic information from participants, including age, gender, number of siblings, and parents' educational attainment and occupational status. Section B focuses on the research construct and uses a 4-point Likert scale (from strongly disagree to strongly agree) to examine the determinants of premarital sexual behavior prevention. The constructs encompassed within this context include severity, vulnerability, response efficacy, and self-efficacy pertaining to the prevention of premarital sexual conduct. Each construct consisted of 6–7 items. An example item for self-efficacy was "I am confident that I can refuse sexual pressure from peers". Cronbach's alpha and CR for all construct >0.70. Furthermore, the AVE values for all constructs exceeded 0.50.

3. RESULTS AND DISCUSSION

3.1. Demographic of participants'

Table 1 shows that most respondents were aged 15–16 years (76.9%). Female students slightly outnumbered males (52.2%). Most participants reported having one or two siblings. The majority of parents had completed secondary education, and fathers were primarily employed in the informal sector.

Table 1. Demographic characteristic of adolescents' (n=333)

	Variable	Frequency (n)	Percentage (%)
Age	15 years	113	33.9
	16 years	143	43.0
	17 years	58	17.4
	18 years	19	5.7
Gender	Female	174	52.2
	Male	159	47.8
Number of siblings	0	39	11.8
	1	140	42.0
	2	107	32.1
	>2	47	14.1
Father's education	Not complete elementary school	2	0.6
	Elementary school	29	8.7
	Secondary school	43	12.9
	High school	194	58.3
	Higher education	65	19.5
Mother's education	Not complete elementary school	1	0.3
	Elementary school	28	8.4
	Secondary school	41	12.3
	High school	195	58.6
Father's employment	Higher education	68	20.4
	Informal sector	229	68.8
	Formal sector	104	31.2
Mother's employment	Housewife	188	56.5
	Informal sector	93	27.9
	Formal sector	52	15.6
Premarital sexual behavior	Yes	113	33.9
	No	220	66.1
	Total	333	100

The majority of the study sample consisted of middle-aged adolescents, particularly those aged 15 and 16. This developmental phase is critical. It marks the period of greatest propensity for hazardous behaviors, identity formation, and heightened susceptibility to peer influence. These factors significantly impact decisions about sexual conduct [42]. The sample also showed disparities in parental education and employment stability. Most parents were high school graduates, indicating that most adolescents came from households with secondary education. This intermediate level of educational attainment is often associated

with enhanced healthy literacy. Parents with this background can foster more open and effective communication about sexual health and its risks with their children [43]. Such communication is crucial for adolescents to form accurate risk perceptions. Research over the past decade has consistently shown that low socioeconomic status is a significant digital risk factor for hazardous sexual behavior among adolescents. This is due to economic hardship, environmental resource shortages, and increased exposure to perilous environments [44], [45].

3.2. Path coefficient and mediation effects testing

The structural model’s evaluation commenced with a verification of the absence of multicollinearity and proceeded to an assessment of the path coefficients. Assessment of the structural model, as shown in Figure 1, shows the bootstrapped structural model. The pattern of coefficients is consistent with the theorized mechanism: threat appraisal (severity and vulnerability) is positively related to coping appraisal (response efficacy and self-efficacy), and both coping appraisal constructs are negatively related to premarital sexual behavior. Specifically, both severity and vulnerability exhibit a statistically significant positive impact on each aspect of appraisal coping.

The measurement model showed that all indicators loaded significantly on their respective constructs ($p < 0.001$), with most outer loadings exceeding 0.70, indicating acceptable to strong convergent validity. The strongest performance indicator was observed for self-efficacy and response efficacy, while one severity indicator showed a relatively lower but still acceptable loading (0.611). In the structural model, severity positively predicted response efficacy ($\beta = 0.460, p < 0.001$) and self-efficacy ($\beta = 0.478, p < 0.001$), while vulnerability also showed significant positive effects on response efficacy ($\beta = 0.325, p < 0.001$) and self-efficacy ($\beta = 0.278, p = 0.001$). In turn, response efficacy ($\beta = -0.188, p < 0.001$) and self-efficacy ($\beta = -0.103, p = 0.002$) were negatively associated with premarital sexual behavior. The model explained 54.4% of the variance in response efficacy, 50.7% in self-efficacy, and 33.7% in premarital sexual behavior, indicating moderate explanatory power.

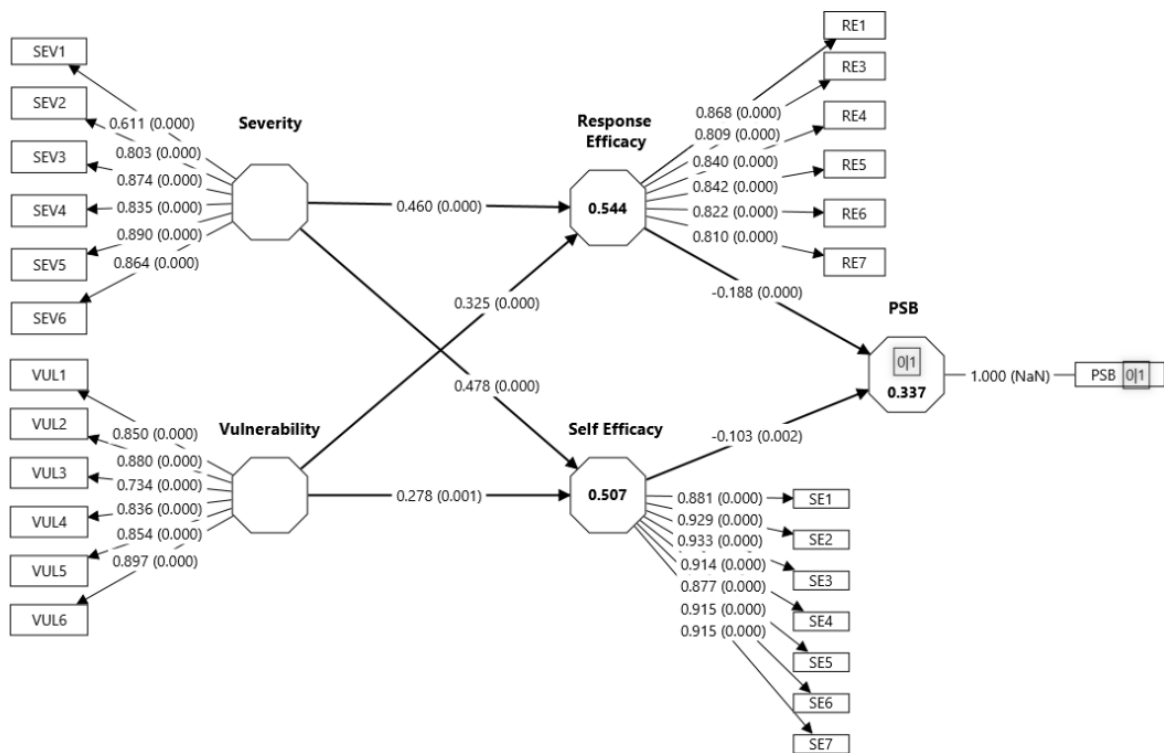


Figure 1. Results of structural modelling generated from SEM-PLS

The findings of the path analysis conducted in this study indicate that perceptions of threat severity and vulnerability consistently contribute to increased adolescents’ confidence in the effectiveness of preventive measures and in their ability to implement them. These results further suggest that perceptions of threat severity exert a stronger influence than perceptions of vulnerability in predicting response

effectiveness and self-efficacy, which in turn enhance coping assessments. Conceptually, severity may provide a clearer cognitive anchor that enhances motivation to evaluate and adopt coping responses, whereas vulnerability may be more ambiguous, processed defensively, or ignored—particularly among adolescents who often exhibit an optimism bias. This inconsistent role of vulnerability has also been reported in PMT-based research, where vulnerability sometimes shows weaker or mixed associations compared to efficacy constructs [46]. A comprehensive understanding of the potential negative consequences associated with premarital sexual activity—including the risk of STIs, unintended pregnancy, and social and psychological impacts—is more effective in fostering confidence in prevention strategies than a mere perception of personal vulnerability [47], [48]. Previous research has identified the perception of severity as a key determinant of protective behavior, particularly when the perceived threat poses a significant and tangible risk to an individual’s well-being [46] and as a stronger determinant of protective motivation, particularly when the danger is believed to pose a substantial and tangible risk to an individual’s well-being [49], [50].

The main barrier to reducing premarital sexual behavior among adolescents is their belief in the effectiveness of preventive measures. This finding underscores that trust in prevention, or response efficacy, is essential if adolescents are to avoid risky behavior. Adolescents may understand risks yet still engage in risky behavior if they doubt that prevention strategies are effective or relevant in real-life situations. PMT research repeatedly emphasizes that efficacy beliefs are decisive in converting risk awareness into adaptive action and that efficacy-enhancing components are essential for sustained behavior change [51]. According to PMT, response efficacy helps determine whether an individual responds to fear with positive action rather than avoidance [52], [53]. However, research also cautions that emphasizing threats alone, without showing how to cope, can cause adolescents to reject these messages, especially if the threats seem excessive [54].

Self-efficacy remained statistically significant but was smaller than response efficacy—this is consistent with the adolescent behavior literature, which suggests that confidence in implementing protective actions (refusal, negotiation, boundary setting, and emotion regulation) is protective but can be limited by situational stress. Related PMT research in adolescents also found stronger support for coping appraisals (particularly self-efficacy) than threat appraisals in predicting behavior over time [55]. Self-efficacy greatly affects adolescents’ ability to overcome both internal and external challenges, such as peer pressure and temptations, and supports their commitment to abstain from sexual activity [53], [56], [57]. Within this framework, adolescents with elevated self-efficacy demonstrate an enhanced capacity to withstand peer pressure and maintain their resolve to defer sexual activity [58]. Specifically, elevated self-efficacy among adolescents mitigates the adverse effects of engaging in hazardous behaviors, particularly for those within social environments that reinforce adaptive sexual norms and possess proficient risk-aversion skills [59], [60]. Conversely, diminished adolescent emotional self-efficacy, characterized by challenges in regulating emotions such as anxiety, loneliness, or fear of rejection, may promote impulsive decision-making and elevate risk, thereby significantly influencing adolescent behavior and decision-making processes [61], [62].

The findings of this study confirm a strong empirical foundation for early prevention interventions. School-based reproductive health education must go beyond “risk communication” and prioritize strengthening efficacy. Within a PMT framework, programs need to simultaneously enhance threat perceptions and coping capacity so that risk messages do not trigger avoidance or disengagement. Strengthening cognitive factors—especially self-efficacy—is an effective and adaptive strategy for building behavioral resilience in adolescents [63], [64]. Therefore, comprehensive reproductive health education should sharpen core values, resilience, and refusal and negotiation skills while strengthening risk assessment and coping through response efficacy and self-efficacy [12], [16], [46], [65]–[67]. This approach aims to elevate positive expectations and diminish negative expectations related to engaging in risky sexual behaviors [36], [53], [68]–[72].

4. CONCLUSION

This study demonstrates that threat appraisal influences adolescents’ protective behavior through response efficacy and self-efficacy. The findings highlight the importance of strengthening adolescents’ confidence and belief in preventive strategies to reduce risky sexual behavior. School-based interventions should therefore integrate risk awareness with skills-building programs that enhance refusal skills, self-control, and decision-making among adolescents.

This study has several limitations. First, the cross-sectional design limits causal interpretation. Second, data were based on self-reported questionnaires, which may be subject to social desirability bias. Third, the study was conducted in one region, which may limit generalizability. Future studies should consider longitudinal designs and broader geographic samples.

ACKNOWLEDGMENTS

Thanks are given to the headmaster of the senior high school in Bantul Regency, Special Region of Yogyakarta, as well as to all respondents who were willing to be samples in this study.

FUNDING INFORMATION

This research was supported by the Indonesian Education Scholarship (BPI) of the Ministry of Higher Education, Science, and Technology through funding from the Higher Education Financing and Assessment Center (PPAPT) with the number of the Indonesian Education Scholarship (BPI) 202209090528.

AUTHOR CONTRIBUTIONS STATEMENT

This journal uses the Contributor Roles Taxonomy (CRediT) to recognize individual author contributions, reduce authorship disputes, and facilitate collaboration.

Name of Author	C	M	So	Va	Fo	I	R	D	O	E	Vi	Su	P	Fu
Erni Gustina	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	
Ira Nurmala		✓				✓		✓	✓	✓	✓	✓		
Nunik Puspitasari	✓	✓								✓	✓		✓	✓

C : Conceptualization

M : Methodology

So : Software

Va : Validation

Fo : Formal analysis

I : Investigation

R : Resources

D : Data Curation

O : Writing - Original Draft

E : Writing - Review & Editing

Vi : Visualization

Su : Supervision

P : Project administration

Fu : Funding acquisition

CONFLICT OF INTEREST STATEMENT

Authors state no conflict of interest.

INFORMED CONSENT

We have obtained informed consent from all individuals included in this study. Participant data confidentiality was strictly maintained.

ETHICAL APPROVAL

All research activity by the authors included in the review have been undertaken with the approval of Health Research Ethics Committee Faculty of Public Health Universitas Airlangga (Approval Number: 153/EA/KEPK/2025).

DATA AVAILABILITY

The data that support the findings of this study are available on request from the corresponding author, [EG]. The data, which contain information that could compromise the privacy of research participants, are not publicly available due to certain restrictions.

REFERENCES

- [1] Centers for Disease Control and Prevention, "Youth risk behavior survey data summary & trends report: 2011-2021." 2023. Accessed: Jan. 12, 2026. [Online]. Available: <https://stacks.cdc.gov/view/cdc/124928>
- [2] A. Nurhayati, I. Nurmala, S. R. Devy, and Arwan, "The phenomenon of premarital sex among adolescents (study in the working area of the Mamboro Health Center)," *Jurnal Promkes*, vol. 13, no. 1, pp. 93–104, Mar. 2025, doi: 10.20473/jpk.V13.I1.2025.93-104.
- [3] P. S. Okah, C. E. Onalu, G. U. Aghedo, C. C. Iyiani, and S. E. Abonyi, "Factors associated with the premarital sex among adolescents and the need for introduction of functional sex-education in secondary schools in Ebonyi state, Nigeria," *Cogent Social Sciences*, vol. 9, no. 1, p. 2220234, Dec. 2023, doi: 10.1080/23311886.2023.2220234.
- [4] R. B. Shrestha, "Premarital sexual behaviour and its impact on health among adolescents," *Journal of Health Promotion*, vol. 7, pp. 43–52, Sep. 2019, doi: 10.3126/jhp.v7i0.25496.
- [5] UNFPA, "Adolescent pregnancy." Accessed Feb. 19, 2026. [Online]. Available: <https://www.unfpa.org/adolescent-pregnancy>
- [6] UNICEF, "Early childbearing." Accessed Jan. 3, 2026. [Online]. Available: <https://data.unicef.org/topic/child-health/early-childbearing/>




- [7] World Health Organization, "Global school-based student health survey Indonesia (rest of the country) 2023 fact sheet." Accessed: Jan. 12, 2026. [Online]. Available: https://cdn.who.int/media/docs/default-source/ncds/ncd-surveillance/data-reporting/indonesia/2023_indonesia_gshs_fact_sheet.pdf?sfvrsn=48453029_1&download=true
- [8] World Bank, "Adolescent fertility rate (births per 1,000 women ages 15-19) – Indonesia." 2025. [Online]. Available: <https://genderdata.worldbank.org/en/economies/indonesia>
- [9] M. Schneider and J. S. Hirsch, "Comprehensive sexuality education as a primary prevention strategy for sexual violence perpetration," *Trauma, Violence, & Abuse*, vol. 21, no. 3, pp. 439–455, Jul. 2020, doi: 10.1177/1524838018772855.
- [10] R. Niland, C. Flinn, and F. Nearchou, "Assessing the role of school-based sex education in sexual health behaviours: a systematic review," *Cogent Psychology*, vol. 11, no. 1, p. 2309752, Dec. 2024, doi: 10.1080/23311908.2024.2309752.
- [11] A. Rodríguez-García, A. Botello-Hermosa, Á. Borrallo-Riego, and M. D. Guerra-Martín, "Effectiveness of comprehensive sexuality education to reduce risk sexual behaviours among adolescents: a systematic review," *Sexes*, vol. 6, no. 1, p. 6, Jan. 2025, doi: 10.3390/sexes6010006.
- [12] A. Luthfiah and E. N. Hayati, "Understanding premarital sexual behavior: a qualitative case study among male and female college students," *Journal of Educational, Health & Community Psychology (JEHCP)*, vol. 14, no. 2, pp. 791–807, 2025, doi: 10.12928/jehcp.vi.30677.
- [13] S. J. Lopes, D. L. Anakaka, and D. Aipipidely, "Adolescent premarital sexual behavior," *Journal of Health and Behavioral Science*, vol. 2, no. 4, pp. 335–346, Dec. 2020, doi: 10.35508/jhbs.v2i4.3067.
- [14] H. Asyari, L. A. Fitriana, Marsono, and Kayubi, "The influence of adolescent resilience on premarital sexual behavior," *Jurnal Penelitian Pendidikan IPA*, vol. 11, no. 2, pp. 1063–1069, Feb. 2025, doi: 10.29303/jppipa.v11i2.10186.
- [15] E. Yuandari, R. T. A. Rahman, I. A. Haryono, N. Hidayah, N. D. Iswandari, and S. Hateriah, "The qualitative study of the phenomenon of premarital sex: between expectations and reality among adolescents in Banjarmasin," *Media Publikasi Promosi Kesehatan Indonesia (MPPKI)*, vol. 8, no. 8, pp. 621–634, Aug. 2025, doi: 10.56338/mpki.v8i8.7488.
- [16] F. Rezal, Fithria, and N. Hasdamayanti, "Factors associated with premarital sexual behavior in adolescents at SMA X Kendari City in 2023," *World Journal of Advanced Research and Reviews*, vol. 18, no. 3, pp. 190–197, Jun. 2023, doi: 10.30574/wjarr.2023.18.3.1023.
- [17] C. W. Kabiru *et al.*, "Risk and protective factors for the sexual and reproductive health of young adolescents: lessons learnt in the past decade and research priorities moving forward," *Journal of Adolescent Health*, vol. 75, no. 4, pp. S20–S36, Oct. 2024, doi: 10.1016/j.jadohealth.2024.03.007.
- [18] Z. Hosseinkhani, H. Hassanabadi, M. Parsaeian, and S. Nedjat, "Epidemiologic assessment of self-concept and academic self-efficacy in Iranian high school students: multilevel analysis," *Journal of Education and Health Promotion*, vol. 9, no. 1, p. 315, Nov. 2020, doi: 10.4103/jehp.jehp_445_20.
- [19] R. Sadeghi and V. Agadjanian, "Challenging the stigma of premarital sex in urban Afghanistan," *Culture, Health & Sexuality*, vol. 24, no. 9, pp. 1181–1198, Sep. 2022, doi: 10.1080/13691058.2021.1936185.
- [20] W. C. Millanzi, K. M. Osaki, and S. M. Kibusi, "Attitude and prevalence of early sexual debut and associated risk sexual behavior among adolescents in Tanzania; evidence from baseline data in a randomized controlled trial," *BMC Public Health*, vol. 23, no. 1, p. 1758, Sep. 2023, doi: 10.1186/s12889-023-16623-6.
- [21] D. I. Lestari, E. W. Ningrum, and M. Safitri, "The influence of social media exposure on adolescent reproductive health practices: evidence from Indonesian vocational students," *CoMPHI Journal: Community Medicine and Public Health of Indonesia Journal*, vol. 6, no. 1, pp. 7–18, 2025.
- [22] N. Mundhiro, R. Fauzi, M. A. Maruf, and N. Nurfadhilah, "Determinant of premarital sexual behavior amongst adolescent in Indonesia," *Jurnal Biometrika dan Kependudukan*, vol. 10, no. 1, pp. 86–93, Jun. 2021, doi: 10.20473/jbk.v10i1.2021.86-93.
- [23] L. A. S. Al-amri, B. Sawitri, H. T. S. Mohammed, and H. H. Moqbel, "Adolescent premarital sexual behavior: a narrative review of challenges, and the vital role of comprehensive sex education in promoting health and well-being in Islamic countries," *Jurnal Psikiatri Surabaya*, vol. 13, no. 1, pp. 100–107, Apr. 2024, doi: 10.20473/jps.v13i1.53690.
- [24] M. R. Lumolo and L. A. Shintya, "The association of parenting styles with premarital sexual behavior in adolescents," *Nutrix Journal*, vol. 9, no. 2, pp. 410–421, 2025, doi: 10.37771/nj.v9i2.1412.
- [25] G. F. Lestari, I. Sukmawati, N. A. Safitri, M. Simanjuntak, and Y. E. Riany, "Exploratory study on the moral development of adolescent premarital sex actors," *Journal of Family Sciences*, pp. 17–36, Mar. 2022, doi: 10.29244/jfs.vi.36551.
- [26] N. L. Qomariah, E. P. Pamungkasari, and U. R. Budihastuti, "Determinants of premarital sex behavior: application of theory of planned behavior and social cognitive theory," *Journal of Health Promotion and Behavior*, vol. 5, no. 4, pp. 272–283, 2020, doi: 10.26911/thejhp.2020.05.04.05.
- [27] P. Nabunya *et al.*, "Family factors and gender norms as protective factors against sexual risk-taking behaviors among adolescent girls in Southern Uganda," *Global Social Welfare*, vol. 11, no. 2, pp. 111–121, Aug. 2022, doi: 10.1007/s40609-022-00237-8.
- [28] E. Delgado, C. Serna, I. Martínez, and E. Cruise, "Parental attachment and peer relationships in adolescence: a systematic review," *International Journal of Environmental Research and Public Health*, vol. 19, no. 3, p. 1064, Jan. 2022, doi: 10.3390/ijerph19031064.
- [29] P. Leekuan, R. Kane, P. Sukwong, and W. Kulnitichai, "Understanding sexual and reproductive health from the perspective of late adolescents in Northern Thailand: a phenomenological study," *Reproductive Health*, vol. 19, no. 1, p. 230, Dec. 2022, doi: 10.1186/s12978-022-01528-1.
- [30] R. S. van der Gaag, M. G. G. Walpot, and L. Boendermaker, "Professional competencies for sexuality and relationships education in child and youth social care: A scoping review," *Children and Youth Services Review*, vol. 158, p. 107258, Mar. 2024, doi: 10.1016/j.chilyouth.2023.107258.
- [31] R. Seiler-Ramadas, I. Grabovac, R. Winkler, and T. E. Dorner, "Applying emotional literacy in comprehensive sex education for young people," *American Journal of Sexuality Education*, vol. 16, no. 4, pp. 480–500, Oct. 2021, doi: 10.1080/15546128.2021.1932657.
- [32] T.-T. Xin, X.-J. Li, Lei-Shen, W.-Y. Ding, Wei-Liu, and Ning-Chen, "The relationship between adolescent risk perception and emotions during the COVID-19: a short-term longitudinal study," *Current Psychology*, vol. 42, no. 23, pp. 20091–20100, Aug. 2023, doi: 10.1007/s12144-022-02860-2.
- [33] A. L. Wiese, T. B. Sease, E. D. Joseph, J. E. Becan, K. Knight, and D. K. Knight, "Avoidance self-efficacy: personal indicators of risky sex and substance use among at-risk youth," *Children and Youth Services Review*, vol. 147, p. 106846, Apr. 2023, doi: 10.1016/j.chilyouth.2023.106846.
- [34] F. A. Etmiman, K. HajiAlizadeh, and A. Samavi, "Psychometric properties of emotional self-efficacy questionnaire: relationships between emotional self-efficacy and risky sexual behaviors," *Iranian Evolutionary and Educational Psychology*, vol. 2, no. 4, pp. 309–315, Nov. 2020, doi: 10.52547/ieepj.2.4.309.

- [35] S. C. Ozdemir and E. Cevik, "The relationship between risky sexual behaviors and sexual health literacy and self-esteem in young women," *Revista da Associação Médica Brasileira*, vol. 71, no. 2, pp. 1–7, 2025, doi: 10.1590/1806-9282.20241040.
- [36] L. Savadori and M. Lauriola, "Risk perception and protective behaviors during the rise of the COVID-19 outbreak in Italy," *Frontiers in Psychology*, vol. 11, p. 577331, Jan. 2021, doi: 10.3389/fpsyg.2020.577331.
- [37] Y. Yan *et al.*, "Application of the protection motivation theory in predicting cigarette smoking among adolescents in China," *Addictive Behaviors*, vol. 39, no. 1, pp. 181–188, Jan. 2014, doi: 10.1016/j.addbeh.2013.09.027.
- [38] Y. Wang, C. Li, J. Zhang, Y. Mao, and W. Li, "Protection motivation theory in predicting intentional behaviors regards schistosomiasis: a WeChat-based qualitative study," *Frontiers in Public Health*, vol. 12, p. 1295081, May 2024, doi: 10.3389/fpubh.2024.1295081.
- [39] H. Xiao *et al.*, "Protection motivation theory in predicting intention to engage in protective behaviors against schistosomiasis among middle school students in rural China," *PLoS Neglected Tropical Diseases*, vol. 8, no. 10, p. e3246, Oct. 2014, doi: 10.1371/journal.pntd.0003246.
- [40] J. F. Hair, G. T. M. Hult, C. M. Ringle, and M. Sarstedt, *A primer on partial least squares structural equation modeling (PLS-SEM)*, 3rd ed. Thousand Oaks, CA: SAGE Publications, Inc., 2022.
- [41] J. F. Hair, J. J. Risher, M. Sarstedt, and C. M. Ringle, "When to use and how to report the results of PLS-SEM," *European Business Review*, vol. 31, no. 1, pp. 2–24, Jan. 2019, doi: 10.1108/EBR-11-2018-0203.
- [42] L. D. Steinberg, *Adolescence*, 13th ed. New York: McGraw Hill, 2023.
- [43] Z. Rong *et al.*, "Sex differences in the association of childhood sexual abuse severity with premarital sex among Chinese college students in Luzhou, China," *BMC Public Health*, vol. 24, no. 1, p. 290, Jan. 2024, doi: 10.1186/s12889-024-17767-9.
- [44] J. E. Strickhouser and A. R. Sutin, "Family and neighborhood socioeconomic status and temperament development from childhood to adolescence," *Journal of Personality*, vol. 88, no. 3, pp. 515–529, Jun. 2020, doi: 10.1111/jopy.12507.
- [45] S. Yau, P. Wongsawat, and A. Songthap, "Knowledge, attitude and perception of risk and preventive behaviors toward premarital sexual practice among in-school adolescents," *European Journal of Investigation in Health, Psychology and Education*, vol. 10, no. 1, pp. 497–510, Mar. 2020, doi: 10.3390/ejihpe10010036.
- [46] S. Hedayati, H. Damghanian, M. Farhadinejad, and A. A. Rastgar, "Meta-analysis on application of protection motivation theory in preventive behaviors against COVID-19," *International Journal of Disaster Risk Reduction*, vol. 94, p. 103758, Aug. 2023, doi: 10.1016/j.ijdr.2023.103758.
- [47] D. C. Richner and S. M. Lynch, "Sexual health knowledge and sexual self-efficacy as predictors of sexual risk behaviors in women," *Psychology of Women Quarterly*, vol. 48, no. 1, pp. 133–146, Mar. 2024, doi: 10.1177/03616843231172183.
- [48] S. Rosenstock, R. Chambers, A. Lee, N. Goklish, F. Larzelere, and L. Tingey, "Self-efficacy and response-efficacy: critical components of sexual and reproductive health interventions targeting condom use intention among American Indian adolescents," *AIDS Care*, vol. 32, no. 3, pp. 379–385, Mar. 2020, doi: 10.1080/09540121.2019.1695726.
- [49] S.-Y. Tzeng and T.-Y. Ho, "Exploring the effects of product knowledge, trust, and distrust in the health belief model to predict attitude toward dietary supplements," *SAGE Open*, vol. 12, no. 1, pp. 1–13, 2022, doi: 10.1177/21582440211068855.
- [50] Y. Jadir and M. Ouzir, "Exploring the predictors of health-protective behavior during the COVID-19 pandemic: a multi-country comparison," *Environmental Research*, vol. 199, p. 111376, Aug. 2021, doi: 10.1016/j.envres.2021.111376.
- [51] R. E. Rad *et al.*, "Application of the protection motivation theory for predicting COVID-19 preventive behaviors in Hormozgan, Iran: a cross-sectional study," *BMC Public Health*, vol. 21, no. 1, p. 466, Dec. 2021, doi: 10.1186/s12889-021-10500-w.
- [52] A. K. Jeihooni, S. Bashti, B. Erfanian, J. Ostovarfar, and P. A. Hasirini, "Application of protection motivation theory (PMT) on skin cancer preventive behaviors amongst primary school students in rural areas of Fasa city-Iran," *BMC Cancer*, vol. 22, no. 1, p. 21, Jan. 2022, doi: 10.1186/s12885-021-09142-3.
- [53] P. Kisaakye *et al.*, "How self-efficacy and agency influence risky sexual behavior among adolescents in Northern Uganda," *Adolescents*, vol. 3, no. 3, pp. 404–415, Jul. 2023, doi: 10.3390/adolescents3030028.
- [54] M. B. Tannenbaum *et al.*, "Appealing to fear: a meta-analysis of fear appeal effectiveness and theories," *Psychological Bulletin*, vol. 141, no. 6, pp. 1178–1204, Nov. 2015, doi: 10.1037/a0039729.
- [55] J. Thrul, M. Stemmler, A. Bühler, and E. Kuntsche, "Adolescents' protection motivation and smoking behaviour," *Health Education Research*, vol. 28, no. 4, pp. 683–691, 2013, doi: 10.1093/her/cyt062.
- [56] M. Octamelia, G. Sabrin, R. Ratnaningsih, S. Susanti, and S. Febrianti, "Effect self efficacy, emotional support, and informational support on sexual behavior adolescents," *International Journal of Nursing and Health Services (IJNHS)*, vol. 6, no. 2, pp. 96–103, Apr. 2023, doi: 10.35654/ijnhs.v6i2.677.
- [57] M. H. Swahn *et al.*, "Sexual victimization, self-efficacy to refuse sex while drinking, and regretting alcohol-involved sex among underserved youth in Kampala, Uganda," *International Journal of Environmental Research and Public Health*, vol. 19, no. 4, p. 1915, Feb. 2022, doi: 10.3390/ijerph19041915.
- [58] P. N. Prabamurti *et al.*, "Self-efficacy about sexual behavior among Islamic boarding school students," *Kemas*, vol. 20, no. 2, pp. 168–174, 2024, doi: 10.15294/kemas.v20i2.49162.
- [59] M. Paciello, G. Corbelli, I. di Pomponio, and L. Cerniglia, "Protective role of self-regulatory efficacy: a moderated mediation model on the influence of impulsivity on cyberbullying through moral disengagement," *Children*, vol. 10, no. 2, p. 219, Jan. 2023, doi: 10.3390/children10020219.
- [60] D. Cordova, K. Coleman-Minahan, T. Romo, E. A. Borrayo, and S. Bull, "The role of social capital, sex communication, and sex refusal self-efficacy in sexual risk behaviors and HIV testing among a diverse sample of youth," *Adolescents*, vol. 2, no. 1, pp. 30–42, Jan. 2022, doi: 10.3390/adolescents2010004.
- [61] L. Cerniglia and I. di Pomponio, "Decoding adolescent decision making: neurocognitive processes, risk perception, and the influence of peers," *Adolescents*, vol. 4, no. 2, pp. 222–225, Apr. 2024, doi: 10.3390/adolescents4020015.
- [62] K. Vakilian and A. Keramat, "The correlation between perceived peer norms in attitude and self-efficacy premarital sexual behavior," *The Open Public Health Journal*, vol. 13, no. 1, pp. 555–558, Oct. 2020, doi: 10.2174/1874944502013010555.
- [63] A. Bandura, "Toward a psychology of human agency: pathways and reflections," *Perspectives on Psychological Science*, vol. 13, no. 2, pp. 130–136, Mar. 2018, doi: 10.1177/1745691617699280.
- [64] E. J. Kim *et al.*, "A meta-analysis of the effects of comprehensive sexuality education programs on children and adolescents," *Healthcare*, vol. 11, no. 18, p. 2511, Sep. 2023, doi: 10.3390/healthcare11182511.
- [65] E. E. Altgelt and A. L. Meltzer, "Associations between premarital factors and first-married, heterosexual newlywed couples' frequency of sex and sexual satisfaction trajectories," *The Journal of Sex Research*, vol. 58, no. 2, pp. 146–159, Feb. 2021, doi: 10.1080/00224499.2019.1695722.
- [66] V. F. Simak, S. Renteng, and K. Kristamuliana, "The effect of interactive media on adolescent behavior to prevent risky sexual in Manado City," *Jurnal Kesehatan Pasak Bumi Kalimantan*, vol. 5, no. 2, pp. 150–155, Jan. 2023, doi: 10.30872/j.kes.pasmi.kal.v5i2.8767.




- [67] M. I. Ventura-Miranda, A. Alcaraz-Córdoba, T. Alcaraz-Córdoba, G. Molina-Torres, I. M. Fernandez-Medina, and M. D. Ruiz-Fernández, "Adolescents' perceptions of sexuality: a qualitative study," *Healthcare*, vol. 11, no. 20, p. 2757, Oct. 2023, doi: 10.3390/healthcare11202757.
- [68] S. M. Amin *et al.*, "The mediating role of emotional intelligence in the relationship between sexual health literacy and sexual communication self-efficacy among married nursing students," *BMC Nursing*, vol. 24, no. 1, p. 653, Jun. 2025, doi: 10.1186/s12912-025-03157-y.
- [69] Z. P. Sheikhi, F. B. Moghadam, and A. Navidian, "Effect of pre-marital sexual counseling on self-efficacy and sexual function of Iranian newlywed women," *International Journal of Women's Health and Reproduction Sciences*, vol. 9, no. 2, pp. 111–117, Sep. 2019, doi: 10.15296/ijwhr.2021.20.
- [70] R. Tahriani, B. B. C. Pratiwi, and P. Pujiarohman, "Risky sexual behavior in adolescents," *Jurnal Biologi Tropis*, vol. 25, no. 4, pp. 5654–5661, Oct. 2025, doi: 10.29303/jbt.v25i4.10117.
- [71] T. A. Treat, W. R. Corbin, and R. J. Viken, "Protective behavioral strategies for sexual aggression and risky sexual behavior," *Aggressive Behavior*, vol. 47, no. 3, pp. 284–295, May 2021, doi: 10.1002/ab.21949.
- [72] A. C. Tyas, H. Zahro, P. F. Salsabila, A. Ismail, and B. Murti, "Meta-analysis: factors related with premarital sexual behavior in adolescents," *Journal of Health Promotion and Behavior*, vol. 9, no. 3, pp. 209–225, 2024, doi: 10.26911/thejhp.2024.09.03.03.

BIOGRAPHIES OF AUTHORS






Erni Gustina    is a Ph.D. candidate, Doctoral Program in Public Health, Faculty of Public Health, Universitas Airlangga, Surabaya, Indonesia. Her research focuses on public health, adolescent health, maternal and child health, population and reproductive health, and family health. She can be contacted at email: erni.gustina-2022@fkm.unair.ac.id; erni.gustina@ikm.uad.ac.id.



Ira Nurmala    is a professor of public health education at the Faculty of Public Health, Universitas Airlangga. In 2010, she received a Fulbright scholarship and got her Ph.D. in Health Promotion from The College of Public Health, University of Georgia, USA. She has published several papers in adolescent health and the professional development of public health professionals. She also wrote books on professional development, health promotion, and adolescent health. She has an ongoing project named Health Educator for Youth (HEY) that provides training for students. She can be contacted at email: iranurmala@fkm.unair.ac.id.



Nunik Puspitasari    is a lecturer at Department of Epidemiology, population biostatistics and health promotion, Faculty of Public Health, Universitas Airlangga, Surabaya, Indonesia. Her research interests on public health, population and reproductive health, maternal, and child health. She can be contacted at email: nunik-p@fkm.unair.ac.id.