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Path analysis of adolescents' reproductive health education on college students' sexual behavior

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ABSTRACT

Young people are vulnerable to reproductive health (RH) problems due to their engagement in risky sexual behavior. Study of adolescents' RH education effects on the behavior of the young will add evidence about aspects that directly/indirectly affect the behavior. This study intended to explore the influence of adolescents' RH education and other associated factors on college students' sexual behavior using path analysis. A cross-sectional study was conducted from March to Mei 2021 in Solo Raya Residency, Central Java, Indonesia. A sample of 20-24 years old college students from public dan two private universities (n=375) participated. An online questionnaire was used to collect the data. Path analysis was conducted to identify relationships between variables. Path analysis demonstrated that sexual behavior was directly affected by age and pornography access, regardless the gender. Even though factors that influenced sexual behavior differed among female and male students, RH education was proved to indirectly influence sexual behavior irrespective the gender. Overall, sexual behavior was influenced by RH education in the complex mechanism. Improving the information delivery of RH education is needed to ensure all youth, irrespective of gender, benefit from this program. Further study in a more significant setting in Indonesia is required.

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1. INTRODUCTION

Risky sexual behavior affects future reproductive health (RH) as it increases the risk of getting infected by sexually transmitted diseases (STDs) and having an unintended pregnancy [1]. That might increase morbidity risk during childbirth and reduce opportunities for good education and well-being in the future [2], [3]. Data showed about 23% of the overall disease burden was contributed by teen pregnancies related to the escalation incidence of unsafe abortion and maternal morbidity and mortality [3].

Indonesia poses a similar challenge regarding Indonesian adolescents' RH. Data indicate about 18% of new cases of human immunodeficiency virus (HIV) infection in 2019 were young people aged 15-24 years old. Although premarital sexual activity in Indonesia is unacceptable and most teenagers do not show sexual permissiveness, the trend of premarital sex has increased over the last two decades [4]–[6]. Indonesian demographic health survey (IDHS) data showed the escalation of premarital sex behavior in 3 periods of the survey. The 2017 IDHS informed that 8% of boys and 2% of girls aged 15-24 reported experiencing sexual intercourse [5]. This fact needs cautious attention since there is a tendency to underreport sexual experience shown in a previous study by O'Donnell *et al*. [7] thus, indicating a more significant of youth were at risk of STD and teen pregnancy.

Youth sexual behavior was shaped by a complex array of individual and environmental factors [8]. A previous study found that factors such as age, sex, and pornography access significantly affect youth sexual behavior [9]–[11]. Other individual characteristics, adolescents' health literacy contributed to sexual behavior as well. Nevertheless, this research topic did not gain much attention [12]. Peer factors are a strong determinant of the sexual behavior of adolescents. Parent-child sexual communication affects sexual behavior as well, this communication is mainly done by the mother [13]–[15]. The school environment is also a direct determinant of sexual behavior by providing RH education in schools. A study proves that curriculum-based comprehensive sexual education (CSE) improves adolescent safe sexual behavior [16]–[18]. There is a long-term effect of educational intervention on sexual health behavior that can last up to three years after the educational intervention [19], [20].

The Indonesian government has not yet implemented CSE on a school basis. The effort to educate adolescents about RH was delivered through a program called "*pusat informasi dan konseling remaja* (PIK-R)" or adolescent center of information and counselling (ACIC). ACIC was a peer-led RH education, that was implemented nationally as additional extracurricular activities in some junior or high schools in each province. Since the program's activity was not similar in each unit of ACIC, evaluating this program's effectiveness on adolescent RH on a national scale was difficult to measure. Little is known about this program's effect on RH knowledge and behavior in adolescents' next developmental stage.

Therefore, this study intended to explore the association of RH education from the ACIC program, individual factors, and proximal determinants of adolescent health (family and peer) toward the sexual behavior of college students using path analysis. Path analysis gives cautious consideration about the correlation mechanisms that may exist among the independent variables. Its result differentiates the three types of effects namely direct, indirect, and total effects, which lead to a more comprehensive understanding of the association between variables [21]. Moreover, path analysis of this topic of research did not gain much attention. Regarding the selection of the study population, this study was conducted in Solo Raya Residency to offer new understandings of sexual behavior and its associated factor in a semi-urban area.

2. RESEARCH METHOD

2.1. Design and study sample

This cross-sectional study was conducted from March to May 2021. Three universities (public and two private universities) in Solo Raya Residency Central Java, Indonesia, were chosen purposively, with consideration of geographical location and the number of students in each university. The total population was 36,676 college students aged 20-24 at that three universities. The minimum sample was 352 that calculated using a formula for a population proportion in sample size 2.0 using a 95% confidence level and anticipated population proportion of 0.22 [7]. Of the population, 375 unmarried college students (female and male) college students participated. The sample was chosen using a multistage sampling method by faculty and the study program.

Ethical approval was obtained from the Health Research Ethics Committee, Faculty of Medicine, Universitas Muhammadiyah Surakarta (approval number 3609/B.2/KEPK-FKUMS/VIII/2021). Since this study asked about students' private information, informed consent was obtained from them. Data were collected through self-administered online questionnaires using Google Forms. The link to the online questionnaire was distributed through WhatsApp to the proposed subjects. A maximum of three WhatsApp messages were sent daily as a reminder.

2.2. Questionnaires

The independent variables were age, sex, RH knowledge, pornography access, health literation, peer influence, mother-child RH communication, father-child RH communication, RH information access, and exposure to the RH education program from ACIC. The questionnaire used to measure health literation was the Indonesian version of the ehealth literacy scale (eHEALS) that was validated by Wijaya and Klopping [22]. Measurement of other variables used modified WHO illustrative questionnaire for interview-surveys with young people [23]. The internal consistency of the questionnaire was acceptable (Cronbach alpha coefficient was 0.886 and all item-total correlation was more than 0.3)

The questionnaire on sexual behavior consists of 10 items asking whether respondents ever experienced shared-sexual activity (kissing, necking, petting, and intercourse (KNPI)) with the opposite sex during college. Categorized as 'risky' (based on the Indonesian context) if reported had ever done either of KNPI. Exposure to RH education from ACIC was measured by 5 items asking about their participation in RH education provided by ACIC such as attending monthly RH education sessions, unregular education sessions by ACIC members, utilizing RH counseling service, or reading wall magazines about RH topics during high school. Respondents who attend one of the above activities were categorized as 'yes'.

Hence, peer influence is measured by 9 items of the Guttman scale. Respondents were categorized as 'non-supportive' if either their peer's subjective norm, peer sexual activity, or peer pressure was supported to engage in risky sexual behavior. Pornography access is defined as respondents' reports about their access to sexual content through social media during the college period, categorized as 'yes' or 'no'. RH knowledge item consists of 28 items in true-false question type. Respondents were categorized as 'high' for RH knowledge if their total score were above the median of the respondents' total score. Mother or father-child RH communication was measured by 4 items asking about their connectedness to discuss with their parents about RH. Respondents who stated that ever discussed any RH topic at least once during college and report that discussions with their parents easily were categorized as 'often'.

2.3. Statistical analysis

The statistical analysis was performed using STATA 14.0 version. All the categorical data were analyzed using logistic regression to analyze risky sexual behavior based on all predictors and calculate the odds ratio at a 95% confidence interval. Path analysis was deployed to investigate the correlation between all the predictors of risky sexual behavior. A generalized structural equation model (GSEM) using the partial least square technique in path coefficient analysis was used to investigate the direct and indirect effects. The Akaike information criterion (AIC) and Bayesian information criteria (BIC) value was used to examine the quality of the final model.

3. RESULTS

3.1. Characteristics of respondents

Table 1 informs about the respondents' characteristics. The majority of the respondents studied in non-health discipline faculty. About 3.4% of the students (1.8% female and 6.2% male) reported intercourse activity during college. Based on their current source of RH information, about 20% of the students get RH information from learning material during college. Half of the students communicate RH information with their mothers.

Table 1. College students' characteristics (n=375)

Variables	Categories	Mean (SD)	n (%)
Age		20.5 (0.8)	
Gender	Female		229 (61.1)
	Male		146 (38.9)
Faculty	Health discipline		30 (8.0)
	Non-health discipline		345 (92.0)
Health literation	High		177 (47.2)
	Low		198 (52.8)
RH education	Yes		82 (21.9)
	No		293 (78.1)
Peer influence	Supportive		250 (66.7)
	Not supportive		125 (33.3)
RH knowledge	High		155 (41.3)
	Low		220 (58.7)
Mother-child RH communication	Often		211 (56.3)
	Rare		164 (43.7)
Father-child RH Communication	Often		31 (8.3)
	Rare		344 (91.7)
Sexual activity	Kissing		57 (15.2)
	Necking		33 (8.8)
	Petting		23 (6.1)
	Intercourse		13 (3.4)
RH education activity (who exposed to RH education (n =82))	Attending monthly education sessions by ACIC member		11 (13.4)
	Attending unregular education sessions by ACIC member		54 (66.0)
	Utilizing RH counselling service		8 (9.8)
	Read wall magazine about RH topics		11(3.4)

3.2. Factors related to risky sexual behavior

Table 2 displays information about the bivariable analysis of associated factors of risky sexual behavior. It can be seen from the table, older students, and males, who accessed pornography, and had a non-supportive peer influence were more likely to engage in risky sexual behavior. Interestingly, being exposed to RH education is not significantly associated with sexual behavior.

Table 2. Bivariate analysis of risky sexual behavior based on exposure to RH education, individual factor, and proximate determinant factor using (n=375)

Factors		*b*	Crude OR (95% CI)	p-value
Age (year)		0.67	1.95(1.44,1.64)	<0.001
Gender	Female[b] vs Male	1.34	3.81(2.12,6.85)	<0.001
RH Knowledge	High vs Low[b]	0.05	1.05(0.60, 1.84)	0.860
Pornography access	Yes vs No[b]	2.48	11.95(4.66, 30.67)	<0.001
RH information access	Yes vs No[b]	0.47	1.60(0.86, 2.96)	0.134
Health literation	High[b] vs Low	0.48	1.62(0.91, 2.87)	0.099
Exposure to RH education	Yes vs No[b]	-0.36	0.69(0.33-1.43)	0.322
Peer influence	Supportive[b] vs not supportive	1.21	3.36(1.90, 5.95)	<0.001
Mother-child RH communication	Often[b] vs rare	0.42	1.52(0.87, 2.66)	0.139
Father-child RH communication	Often[b] vs rare	-0.21	0.82(0.41, 1.60)	0.548

OR=odd ratio. [a]likelihood ratio test, [b]the reference category.

3.3. Path analysis of determinants of risky sexual behavior among female and male students

Based on the multicollinearity test, there was high multicollinearity between age and gender. Since there were significant differences in sexual behavior among female and male students, two path models based on gender were analyzed separately (Figure 1 and 2). The final path model was developed based on the literature review to predict the association between the independent variable and dependent variable and explain detailed in Table 3 and 4.

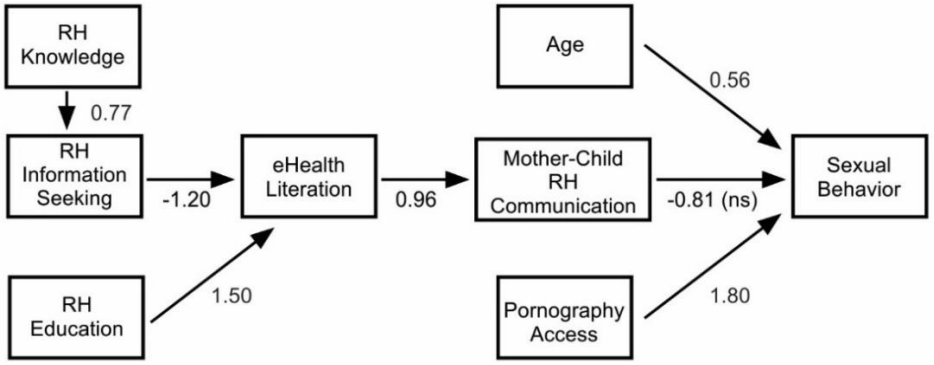

Figure 1. Structural model of path analysis factor associated with sexual behavior among male students

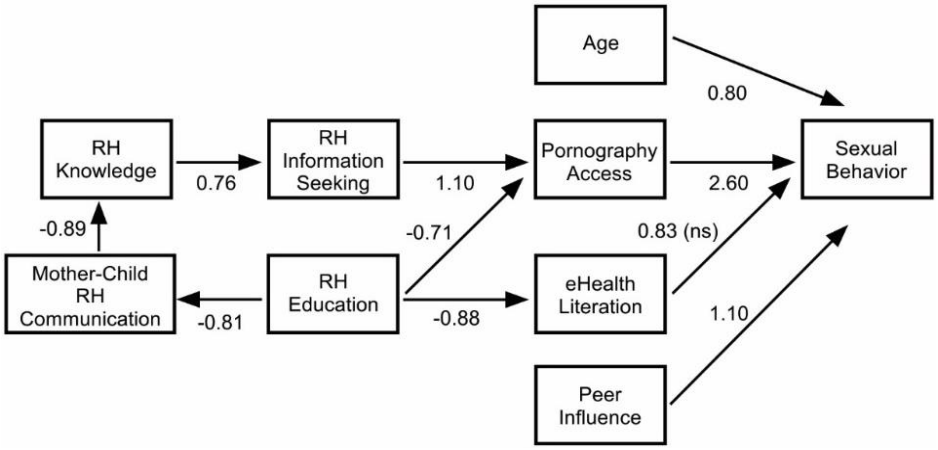

Figure 2. Structural model of path analysis factor associated with sexual behavior among female students

Figure 1 shows the factor associated with risky sexual behavior among male college students. The direct line shows that an increase in age directly associates with an increase in risky sexual behavior. Table 3 describes that access to pornography significantly higher their risk to engage in risky sexual behavior (standardized path coefficient (*b*)=2.66; 95%CI (1.13, 4.19); p=0.008). There was the main path that shows

the indirect effects of the variable. The more they know about RH, the more they accessed RH information, which led to the state having high health literacy rate.

Figure 2 demonstrates the associated factor of risky sexual behavior among female college students. The variable that affects directly sexual behavior was similar, which is age and pornography access. Table 4 present that compared to the male model of path analysis, the influence of pornography access was significantly stronger (*b*=2.66; 95% CI (1.13, 4.19); p=0.001) in female students. Moreover, peer had a more noticeable effect on female students than male students, the result showed that non-supportive peer influence affects risky sexual behavior.

Hence, two main paths show the indirect effects of RH education. The first path showed that female students who learned RH education in high school were less likely to access pornography. The second path shows the indirect effect of RH education through mother-child RH communication. Students who learned RH education more often discussed RH issues with their mothers. Thus, increasing their RH knowledge, and increasing the likelihood to access RH information on the internet. Interestingly, those who accessed RH information higher likely to access pornography. This could be indicating that, to some extent, RH information on the internet misguide female students to access pornography. Based on the detail of path coefficient in Table 4 confirms that these two paths were statistically significant.

Table 3. Direct and indirect factors related to sexual behavior among male students (n=146)

Dependent variable	Independent variable	*B* (95% CI)[a]	Se	p-value[b]
Direct Effect				
Risky sexual behavior	← Age (highest)	0.79 (0.22, 1.37)	0.23	0.014
	← Pornography access (yes)	1.78 (0.47, 3.09)	0.66	0.008
	← Mother-child RH communication (rare)	-0.81 (-1.64, 0.01)	0.42	0.052
Indirect Effect				
Mother-child RH communication (rare)	← Health literation (low)	0.96 (0.21, 1.72)	0.39	0.013
Health literation (low)	← RH education (yes)	-1.50 (-2.58, -0.43)	0.55	0.006
	← RH information access (yes)	-1.21 (-2.09, -0.33)	0.45	0.007
RH information access(yes)	← RH knowledge (high)	0.77 (-0.02, 1.57)	0.41	0.057

[a] *b*=standardized path coefficient. [b] GSEM (log likelihood=-324.99, AIC=671.99, BIC:704.81, degree of freedom=11)

Table 4. Direct and indirect factors related to sexual behavior among female students (n=229)

Dependent variable	Independent variable	*B* (95% CI)[a]	Se	p-value[b]
Direct Effect				
Risky sexual behavior	← Age (highest)	0.79(0.22, 1.37)	0.29	0.007
	← Pornography access (yes)	2.66(1.13, 4.19)	0.78	0.001
	← Peer Influences (not supportive)	1.15(0.11, 2.20)	0.53	0.030
Indirect Effect				
Pornography access(yes)	← RH education(yes)	-0.71(-1.37, -0.04)	0.34	0.035
	← RH information access(yes)	1.09(0.46, 1.73)	0.33	0.001
RH information access(yes)	← RH knowledge(high)	0.76(0.14, 1.37)	0.32	0.017
RH knowledge(high)	← Mother-child RH communication(rare)	-0.89(-1.53, -0.25)	0.32	0.006
Mother-child RH communication(rare)	← RH education(yes)	-0.82(-1.59, -0.02)	0.33	0.043

[a] *b*=standardized path coefficient. [b] GSEM (log likelihood=-598.3199, AIC=1222.64, BIC:1267.278, degree of freedom=13)

4. DISCUSSION

The prevalence of premarital sex among college students in the present study was considered low compared to other cities in Indonesia, which ranged from 14-37%. Based on the 2017 IDHS, the prevalence of premarital sex reported by males aged 20-24 years old was higher, which was 14% [5]. This prevalence of premarital sex was also lower than in the previous study among adolescents in the urban area (Denpasar City) which was 13.8% [6], and in another study among college students in Palangkaraya City, Capital of Central Kalimantan Province which was 38.8%, respectively [24]. Meanwhile, compared to college students in another country in Asia based on a previous study, the prevalence of premarital sex was 13.3% among male students and 5% among females [25]. This, probably indicates that sexual behavior among college students in the semi-urban area was different than in urban areas. As shown in the study of premarital sexual behavior in suburban area in West Java Indonesia that find the prevalence of student who had sexual intercourse only 0.7% [26]. However, this still means that many students were at risk of STDs. Therefore, this issue should be addressed.

This study suggests that pornography access had the highest direct influence on the sexual behavior of youth. This finding supports a previous study that found the same result [27]. Data from this study showed that more males accessed pornography than females (77.4% compare to 39.7%, respectively). However, path analysis indicates that pornographic content had a more negative influence on female students. Another study about the sexual behavior of college students also find the same results that even females were less accessed

pornographic information, but the influence was higher to increase risky sexual behavior [25]. This might be explained by the result of Bleakley *et al*. [28] study that found intention to have premarital sex is determined by perceived normative pressure to have sex. Hence, exposure to pornographic content increases the degree to which youth believe their peers are having premarital sex [29]. Regarding the result that peer influence was more pronounced among females [30], this could explain why the female was more get influenced by pornographic content than males. Communication awareness about this effect is needed. Health educators need to educate youth to counter these beliefs, as well.

This study supports previous studies that youth sexual behavior was influenced by many factors and complex. The factors associated with sexual behavior differed by gender. In females, proximate determinants (peers, parents, and school) are proven to affect sexual behavior [31]. Interestingly, RH education was indirectly affected by sexual behavior, through pornography access. Female students who expose to adolescents' RH education had less likely to access pornographic content, and in turn, were less likely to engage in risky sexual behavior. This result was supported by a previous study that adolescents who were exposed to RH education by ACIC were less likely to perform negative behavior such as searching for pornographic information [32]. Other qualitative studies in Indonesia, found similar proof, that ACIC consultation sessions prevent the respondent to access pornography [33].

The ACIC program educates students about RH information namely sexuality, STDs, and drug abuse. It also encourages females to communicate openly about RH with their mothers, which was previously considered taboo. Previously, teenagers thought their mothers were not open to discussing sexuality, thus limiting them from discussing it [34]. Mother-child discussions about RH increase knowledge and trigger female students to access the information independently. Unfortunately, this behavior encourages them to access pornographic content. A similar study in Korea found the same result. High daily usage of the Internet among students increases risky sexual behavior [35]. This stressed the need to increase adolescent eHealth literation so that they had the knowledge and skills needed to select content on the internet [36].

On the other hand, in male students, pornography access was not influenced by other external factors namely peer influence or RH education. The effect of RH education on male adolescence was different compared to females. RH education significantly affects their eHealth literation, hence, that skill increased the likelihood to communicate about RH with the mother. However, the effect of mother-child RH communication was not statistically significant to influence sexual behavior. Nevertheless, the previous study did not support this finding. The previous study about RH information health-seeking in adolescents suggested that most boys search for RH information on their own [37]. The most sounding reason for the male risky behavior was the notion of sexual activity fits the male sexual script and they are less punished for sexual initiation than females [38]. However, RH education may potentially benefit by giving a positive impact on males with an improvement in their information delivery. Considering the preference of male youth to access information on the Internet, improvement can be done using digital media and information technology, such as using website-based education [39], [40].

Nevertheless, this finding should be interpreted with several limitations. First, this study samples were representative of college students in a semi-urban area where most of the community was Javanese and Islam. The majority of the students were from non-health disciplines. This might not represent all Indonesian college student's characteristics. Second, regarding the use of an online survey to measure sexual experience, there was a high possibility of under-reporting sexual behavior. The last, this present study was conducted in the little setting of Central Java Province Indonesia. Owing to this finding being novel in literature for youth sexual behavior in the Indonesian context, future study is needed to be conducted in a bigger setting.

5. CONCLUSION

Overall, sexual behavior was influenced by many factors in complex mechanisms. Factors that influenced sexual behavior were different among female and male students. Factors that affect the sexual behavior of female students directly was age, pornography access, and peer influence, while the indirect factor was RH education, mother-child communication, RH knowledge, and RH information access. Meanwhile, factors that affect the sexual behavior of male students directly were age and pornography access. Improvement of the information delivery of RH education is needed to make sure all youth, irrespective the gender, benefit from this program. Further study about these topics in a bigger setting in Indonesia is needed.

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