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Effect of the extensive parallel process model on high-risk sexual behaviors of adolescent girls: A randomized control trial

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Abstract

The present study aims to determine the effect of the extensive parallel process model on high-risk sexual behaviors of adolescent girls. This randomized control trial study employed a pre- and post-test design, incorporating both intervention and control groups, and involved 50 female students in the 2019. The primary instruments employed for data collection in this study comprised a demographic questionnaire encompassing age, educational level, parental education, and birth order of the child within the family. Additionally, the Iranian Adolescents Risk-Taking Scale served as a standardized tool for assessing risk-taking behaviors among Iranian adolescents. Before the intervention, the independent t-test conducted between the test and control groups revealed no statistically significant difference in high-risk sexual behaviors (P=0.23). However, after the intervention, a significant difference was observed between the two groups as indicated by the independent t-test (P<0.01). The ANCOVA test, employed to discern differences while controlling for pre-test effects, demonstrated statistical significance (Eta=0.27, P<0.01), underscoring the enduring impact of the intervention on high-risk sexual behaviors. In conclusion, the efficacy of the extensive parallel process model in mitigating sexual risk-taking behaviors among adolescents underscores its capacity to foster a heightened understanding of the gravity inherent in sexual issues.

Keywords: Extensive Parallel Process Pattern, Risky Behaviors, Sexual, Adolescents, Nursing.

1 | Introduction

Adolescence represents a crucial developmental stage [1]. According to the most recent census in Iran, the adolescent demographic constitutes 8% of the nation's total population, totaling 12 million individuals [2]. This phase is characterized by significant cognitive, belief, physical, and behavioral transformations [1]. Noteworthy features of this period encompass a proclivity for thrill-seeking, risk-taking behaviors, and a sense of invulnerability [3]. Concurrently, adolescence marks the onset of romantic relationships and a burgeoning interest in sexual experiences [4]. Imagination, fantasies, and romantic sentiments often contribute to early sexual encounters during this phase [5]. Particularly within the contemporary generation, the ubiquity of social communication and the proliferation of virtual spaces have accelerated the emergence of sexual curiosities at an earlier age than in previous eras [6]. Driven by a desire to surpass boundaries, adolescents exhibit a pronounced inclination toward engaging in high-risk behaviors, including sexual relations [7].

The engagement in high-risk sexual behaviors during adolescence has adverse implications for the mental and social well-being of adolescents, exerting lasting effects on their quality of life in adulthood as well [8]. Research underscores the imperative for adolescents, particularly girls, to possess comprehensive knowledge concerning diverse facets of sexual issues. This em-

phasis on sexual education is grounded in its pivotal role in shaping health behaviors, fostering healthy sexual practices, and contributing to the mental well-being of adolescents [9]. Notably, sexual education emerges as a catalyst for the development of sexual self-efficacy and the mitigation of sexual risks [10]. Consequently, education assumes a pivotal role in the mitigation of high-risk sexual behaviors [11]. A critical prerequisite for effective sexual education lies in comprehending the patterns of high-risk behaviors exhibited by teenagers [12]. Moreover, interventions informed by structured theories have demonstrated efficacy in diminishing high-risk behaviors within this demographic [13].

Empirical evidence supports the preventive efficacy of sexual education in averting high-risk behaviors [14]. This preventive impact is attributed to the heightened awareness and improved health beliefs instilled through such educational initiatives, rendering individuals more attuned to the nuances of high-risk sexual behaviors [15]. Notably, research posits that educational programs grounded in theoretical frameworks exhibit heightened efficacy. The utilization of behavior change patterns and theories enhances the likelihood of augmenting the effectiveness of health education initiatives [16]. Among the contemporary models employed for crafting health messages and mitigating diseases and high-risk behaviors, the Extended Parallel Process Model has gained prominence [17]. According to this model, individuals must first perceive a threat and subsequently, upon grasping the issue, anticipate requisite behaviors. Informed decision-making follows an evaluation of the associated benefits and obstacles, facilitating the adoption of preventive behaviors [18]. The model posits that a heightened perception of risk motivates individuals to address the imminent threat, as the fear induced by perceived threats prompts the adoption of strategies to mitigate health risks [19]. The extensive parallel process model has found application in instructing diverse populations, including heart patients, drug abusers, AIDS patients, and those at risk of traffic accidents, underscoring its effectiveness in varied contexts [20].

Given the paramount significance of the health of adolescent girls, who represent the prospective mothers of society, and recognizing the susceptibility of this demographic to high-risk sexual behaviors, the influence of health theories in heightening sensitivity and instigating motivation for protection gains heightened relevance. Therefore, the present study aims to determine the effect of the extensive parallel process model on high-risk sexual behaviors of adolescent girls.

2 | Methods

2.1 | Study design

A randomized control trial investigation was conducted at the Islamic Azad University of Chalus, Iran, to evaluate the impact of the Extended Parallel Process Model on high-risk sexual behaviors among adolescent girls.

2.2 | Ethics consideration

The present study obtained ethical approval from the Ethics Committee of Islamic Azad University, Chalus branch, Iran, under the reference number IR.IAU.CHALUS.REC.1399.002. Written consent from the parents was secured for the participation of all individuals involved in the study. The confidentiality and anonymity of the collected information were explicitly guaranteed. Additionally, the research participants were informed of their right to withdraw from the study at any point if they chose not to continue their involvement in the research.

2.3 | Participants

This experimental study employed a pre-test-post-test design, incorporating both intervention and control groups, and involved 50 female students in the 2019. The intervention comprised an instructional approach implemented through eight training sessions, each lasting 30-45 minutes, conducted twice weekly on Mondays and Wednesdays. These sessions were organized in small groups comprising 6-7 participants, adhering to the principles of the Extended Parallel Process Model. In terms of inclusion criteria, the study enrolled second-year high school students who were single and lacked any history of marriage or divorce. Criteria for exclusion encompassed participants missing more than one session during the research process and individuals expressing unwillingness to continue their participation in the study.

2.4 | Sample size

The sample size of this research was calculated with G*Power statistical software, a study by Shirzadi et al., (2015) with an effect size of 1.1, test power of 95%, significance level of 0.05, and a confidence interval of 95% with the number of 50 people [21]. First, the researcher selected a list of students who had the conditions to enter the study. Then, based on this list, 50 people were selected by a simple random method. In the following, these 50 samples were divided into two intervention and control groups by random allocation. After preparing the sampling frame, for random allocation, the researcher prepared sealed envelopes in which group X (control group) and O (intervention group) were

written and given to the representative of the school classes. Randomization was done by the researcher before taking the pre-test. None of the groups were in contact with each other and did not know about the implementation protocol process.

2.5 | Intervention

The primary instruments employed for data collection in this study comprised a demographic questionnaire encompassing age, educational level, parental education, and birth order of the child within the family. Additionally, the Iranian Adolescents Risk-Taking Scale (IARS), developed in 2010 by Zadeh Mohammadi and colleagues, served as a standardized tool for assessing risk-taking behaviors among Iranian adolescents. This questionnaire, rooted in the Iranian cultural context and adapted from analogous Latin scales, encompasses various dimensions of proclivities toward high-risk behaviors, including but not limited to dangerous driving, alcohol consumption, substance use, violence, smoking, and engagement in sexual behaviors. Within the IARS, two dimensions specifically pertain to high-risk sexual behaviors, comprising 11 questions: 6 related to sexual behavior and 5 associated with the inclination toward opposite-sex interactions. Responses were recorded on a 5-item Likert scale (ranging from "I completely disagree" to "I completely agree"), resulting in a total score ranging from 11 to 55, where higher scores denote increased propensities for high-risk behaviors. The reliability of this questionnaire was affirmed in previous studies, with Cronbach's alpha coefficients of 0.85 and 0.75 reported in the relevant literature [22, 23]. In the current study, the reliability of the questionnaire yielded Cronbach's alpha coefficients of 0.87 for the sexual behavior dimension and 0.83 for the dimension concerning interactions with the opposite sex. The questionnaire's validity was substantiated by a panel of 10 faculty members from Azad University and the University of Medical Sciences.

The intervention phase comprised eight training sessions, each lasting 30-45 minutes, conducted biweekly on Mondays and Wednesdays in groups of 6-7 participants. The instructional content was aligned with the principles of the extensive parallel process theory. The sessions covered diverse topics, including the assessment of threats, perception severity, and vulnerability of adolescents to physical and sexual maturation. Subsequent sessions delved into psychological changes during puberty, new needs, differences between genders, understanding compatibility, values, communication types, boundaries, and criteria for selecting friends. The content further explored responsibility, sexual restraint, healthy sexual tendencies, coping mechanisms against high-risk sexual behaviors, sexually transmitted diseases, cultural and social norms related to gender, warning signs of mental health, and awareness about sexual behavior and restraint. The final session involved evaluating teenagers' understanding, and post-test data were collected two weeks after the intervention. The researcher expressed gratitude to the participants for their cooperation and contribution to the study.

2.5 | Statistical analysis

The statistical analysis of the data was executed using SPSS software (version 16.0, SPSS Inc., Chicago, IL, USA). Descriptive statistics were employed to elucidate the central tendency and variability of continuous variables, with mean accompanied by standard deviation (SD), while categorical variables were presented through frequencies and percentages. In addition, a suite of statistical tests, including the Fisher's exact test, independent t-tests, paired t-tests, and the analysis of covariance (ANCOVA), were systematically applied to assess various aspects of the study. The significance level in this study was 0.05.

3 | Results

3.1 | Participants

The results of the independent t-test indicate that there is no statistically significant difference between the intervention and control groups concerning age (P=0.08) and the birth rank of the child within the family (P=0.66). Additionally, Fisher's exact test reveals that there is no significant disparity in the educational levels between the control and intervention groups (P=0.08), thereby establishing homogeneity between the two groups.

3.2 | The effect of the extensive parallel process model on high-risk behaviors of adolescent girls

As depicted in Table 1, the incidence of high-risk sexual behavior within the control group measured 26.28 (SD=2.40) before the intervention and 27.72 (SD=2.87) post-intervention. The paired t-test conducted to assess pre- and post-intervention differences did not yield statistical significance (P=0.09). Furthermore, within the control group, dimensions of sexual behavior (P=0.89) and sexual relationships (P=0.07) exhibited no significant disparities before and after the intervention period. In the intervention group, the pre-intervention occurrence of high-risk behavior was 25.84 (SD=4.20), contrasting with 21.62 (SD=2.87) post-intervention. The paired t-test detected a statistically significant difference pre-intervention (P<0.01). Similarly, the paired t-test demonstrated a significant variance in the intervention group both before and after the intervention concerning the dimensions of sexual behavior (P<0.01) and sexual relations (P<0.01).

The initial independent t-test did not reveal any statistically significant distinction in high-risk sexual behavior between the intervention and control groups before the intervention (P=0.23). However, after the intervention, a notable divergence emerged as indicated by the independent t-test (P<0.01). Specifically, the intervention group exhibited a lower rate of high-risk sexual behavior post-intervention. The application of an ANCOVA test, designed to mitigate the influence of pre-test measures, underscored a significant difference between the two groups (P<0.01). Notably, approximately 27% of the observed changes were attributed to the impact of the independent variable, specifically the extensive parallel process model training, on the high-risk behaviors manifested by adolescents.

Table 1. Dimensions of high-risk sexual behavior before and after the intervention (N=50).

	Groups	
	Control (N=25)	**Intervention (N=25)**
Sexual behavior		
Before	13.68 (SD=2.61)	13.96 (SD=2.22)
After	13.72 (SD=2.24)	11.56 (SD=2.48)
P-value	0.89	<0.01
Sexual relationship		
Before	12.60 (SD=2.27)	12.70 (SD=2.04)
After	12.12 (SD=3.24)	10.08 (SD=1.91)
P-value	0.07	<0.01
Total		
Before	26.28 (SD=3.40)	25.84 (SD=4.02)
After	27.72 (SD=2.86)	21.64 (SD=2.89)
P-value	0.09	<0.01

Values are given as a mean for continuous variables.
P-value was obtained with a paired t-test.

4 | Discussion

The findings of the present investigation indicate that the extensively developed process model effectively mitigates high-risk sexual behaviors. This aligns with a study by Rahmani et al., (2017), where the imparting of sexual education to adolescents was demonstrated to diminish their susceptibility to sexual risks and enhance social self-efficacy [24]. Furthermore, Fisher et al., (2020) has asserted that sexual education contributes to a reduction in high-risk sexual behaviors among adolescents, a stance in harmony with the outcomes of the current study [11]. In a parallel vein, Heidarnia et al., (2015) posited in their research that education grounded in health belief patterns enhances awareness and knowledge, fostering balanced and rational behaviors in teenagers [25], a concordance with the present study's findings.

Darabi et al., (2017) conducted a study indicating that education founded on cognitive theories enhances the awareness and comprehension of age-specific issues among adolescent girls [26]. Furthermore, Pavelová et al., (2021) contends that providing training in the management of sexual behaviors in adolescents augments understanding and fortifies protection against sexual risks in girls [27]. A study by Mediawati et al., (2022) emphasizes the efficacy of education concerning sexual issues in averting high-risk sexual behaviors [28]. Collectively, these investigations underscore the role of education in diminishing and preventing irresponsible sexual behaviors, a conclusion congruent with the findings of the present study.

According to Scull (2022), sexual education not only heightens sexual awareness in teenagers but also prompts a more profound examination of interpersonal relationships, particularly those involving the opposite sex [14]. Such educational interventions should encompass cognitive domains, facilitating the acquisition of information and knowledge, emotional spheres, fostering comprehension of values and attitudes, as well as behavioral dimensions, enhancing communication skills and decision-making abilities [7, 26]. Consequently, the discernment of high-risk behavior patterns in adolescents emerges as a primary imperative within the educational framework for this age group [29], a concordance with the findings of the current study.

The utilization of the extensive parallel process model assumes a pivotal role in cultivating sensitivity to the gravity of health risks and enhancing awareness [30]. The heightened awareness of sexual matters contributes to increased sensitivity towards inappropriate sexual behaviors, emotional regulation, and sexual prudence in adolescents [31, 32]. According to the expansive parallel process model, individuals are inclined to be more attuned to addressing a perceived disease or health risk if they believe themselves to be highly susceptible to it [33]. Beyond motivation enhancement, this model augments individuals'

comprehension of high-risk factors [34]. Empirical evidence indicates a substantial disparity in perceived sensitivity between individuals exhibiting high-risk behaviors and those devoid of such behaviors (24), congruence with the outcomes of the present study, particularly in the context of the reduction observed in sexual behaviors and relationships among girls. Consequently, the objective of sexual education during adolescence transcends the mere dissemination of information; rather, it aims to empower adolescents in confronting sexual risks, guiding against erroneous behaviors, and managing sexual conduct within the bounds of societal norms [35].

Empirical investigations have indicated that education grounded in systematic theories holds significant promise in safeguarding the sexual health of girls [14]. When educational and health initiatives align with the specific needs and inquiries of learners, adhering to established health and educational models, can substantially elevate the standard of care and safeguarding measures for adolescents [36]. This alignment is consistent with the findings of the current study. The application of health and cognitive theories and models is anticipated not only to enhance awareness and knowledge among patients but also to contribute to the amelioration of the quality of nursing care delivery [37]. Consequently, it is recommended that managers and healthcare professionals, in the formulation of educational programs, integrate these health frameworks. Through the augmentation of awareness and sensitization among teenagers, these programs should aim to impart motivations for modifying erroneous behaviors and fortifying adherence to sexual abstinence behaviors.

4.1 | Limitations

The present study is geographically bound, and as such, the applicability of its findings to a broader population is subject to limitation. Caution is warranted when extrapolating the results to diverse contexts. Furthermore, the utilization of self-reported data to assess high-risk sexual behaviors introduces the potential for social desirability bias, wherein adolescents may either underreport or overreport their behaviors by perceived societal norms or expectations. This inherent limitation must be acknowledged in the interpretation of study outcomes. Additionally, the study's temporal focus on short-term outcomes may restrict the ability to conclude the enduring effects of the extensive parallel process model on high-risk sexual behaviors among adolescent girls, necessitating a recognition of the study's temporal constraints.

4.2 | Recommendations for future research

Conduct longitudinal studies to scrutinize the sustained impact of the extensive parallel process model on high-risk sexual behaviors among adolescent girls. This extended examination will provide valuable insights into the model's efficacy over the medium to long term. Employ a comprehensive research approach by integrating quantitative measures with qualitative methods. This combined methodology will facilitate a deeper understanding of the intricate mechanisms that underlie the impact of the extensive parallel process model, offering nuanced insights into participants' perceptions, experiences, and contextual influences on outcomes. Conduct a comparative analysis of the extensive parallel process model with alternative intervention approaches. This exploration aims to assess the relative efficacy of different models, elucidating their strengths and weaknesses in addressing high-risk sexual behaviors among adolescent girls. Investigate the feasibility and effectiveness of delivering the extensive parallel process model through online or digital platforms. This adaptation has the potential to enhance accessibility and scalability, particularly in contexts where in-person interventions may pose logistical challenges.

5 | Conclusions

In conclusion, the efficacy of the extensive parallel process model in mitigating sexual risk-taking behaviors among adolescents underscores its capacity to foster a heightened understanding of the gravity inherent in sexual issues. This cognitive model not only contributes to a reduction in high-risk sexual behaviors and relationships but also cultivates increased sensitivity among adolescents toward potential dangers. Consequently, adolescents approach relationships and sexual matters with enhanced comprehension and awareness. The utilization of educational methods grounded in theoretical frameworks and cognitive models emerges as a pivotal factor in engendering awareness and social competence among students.

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Authors' contributions

Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work: MT, FYG, SP, EM; Drafting the work or revising it critically for important intellectual content: MT, FYG, SP, EM; Final approval of the version to be published: MT, FYG, SP, EM; Agreement to be accountable for all aspects of the work in ensuring that

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Ethics approval and consent to participate

The study obtained ethical approval from the Ethics Committee of Gorgan University of Medical Sciences, identified by the code IR.GOUMS.REC.1401.140. Before participation, all individuals provided informed consent after receiving detailed information about the study's aims. Participants were explicitly in-formed of their right to withdraw from the study at any time if they chose to do so.

Competing interests

We do not have potential conflicts of interest with respect to the research, authorship, and publication of this article.

Availability of data and materials

The datasets used during the current study are available from the corresponding author on request.

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None.

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