

Research Article

The Effect of a Theory-Based Educational Intervention on Reducing Aggressive Behavior among Male Students: A Randomized Controlled Trial Study

Mohammad Hossein Kaveh ¹, Ehtesham Ghaysari ², Leila Ghahremani ¹,
Elahe Zare ² and Hale Ghaem ³

¹Research Center for Health Sciences, Institute of Health, Department of Health Promotion, School of Health, Shiraz University of Medical Sciences, Shiraz, Iran

²Department of Health Promotion, Faculty of Health, Shiraz University of Medical Sciences, Shiraz, Iran

³Research Center for Health Sciences, Institute of Health, Department of Epidemiology, School of Health, Shiraz University of Medical Sciences, Shiraz, Iran

Correspondence should be addressed to Mohammad Hossein Kaveh; mhkaveh255@gmail.com

Received 20 April 2022; Revised 30 July 2022; Accepted 7 August 2022; Published 23 August 2022

Academic Editor: Supat Chupradit

Copyright © 2022 Mohammad Hossein Kaveh et al. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Introduction. One of the most challenging issues in public health is preventing aggression and violent behavior, generally in the adolescent population. Intervention studies in this field, especially in Iran, were few. Moreover, their findings are controversial. Therefore, this study was conducted to investigate the effect of educational intervention based on the theory of planned behavior (TPB) on reducing aggression among male students. **Method.** This study used a randomized controlled trial design. The sample comprised 98 middle school students aged between 13 and 16 years (14.28 ± 0.7). Educational intervention for the experimental group consisted of five sessions of 45-60 minutes. Data were collected using two self-administered questionnaires to measure aggression and constructs of TPB. Data were analyzed using paired *t*-test, independent *t*-test, and chi-square test at a significance level of 0.05. **Results.** After the intervention, the experimental group showed a significant increase in all TPB constructs except the subjective norms, compared to the control group ($p < 0.001$). After two months of intervention, the mean score of the aggression behaviors in students in the experimental group showed a remarkable improvement in the experimental group, while the control group showed no significant difference. **Conclusion.** The findings of this study showed that the theory-based educational intervention was effective on the improvement of aggressive behavior. To achieve a significant change in perceived mental norms, more training sessions are recommended, and emphasis is placed on educating parents, peers, and school staff.

1. Introduction

Aggression is the most important risk factor in psychopathology and is a sign of disorders among adolescents and is one of the most common and uncomfortable behaviors among deviant behaviors in humans [1, 2]. In psychology, the term aggression refers to overt verbal or physical behaviors that can lead to physical and psychological harm to oneself, others, or objects in the environment which are seen as predictors of more serious youth violent behaviors [3, 4].

This behavior is manifested in various forms such as shouting or pushing and even more serious actions such as hitting, kicking, or punching to more severe actions such as stabbing, shooting, or killing [5]. Aggressive behavior and violence have serious negative outcomes including anger, anxiety, guilt, shame, delinquency behaviors, social isolation, violence, and academic failure in the future [6–8].

Both Western and Eastern countries are faced with this serious mental health problem [9], because studies have shown that there is a significant relationship between

aggression and ideation of suicide and depression. It also causes drug abuse and delinquency and violation of the rights of others [10, 11]. Recent studies in several countries have shown that the prevalence of such behaviors among adolescents has increased [12, 13]. A review study in India found that 17.7% to 66.5% were involved in physical aggression and it was also high (56.8%) for verbal aggression [14]. Another study done by Bucur et al. [15] found that 35.87% of teenagers have taken part in a physical fight during the previous 12 months.

There are gender differences in various kinds of aggression [16]. Evidence found physical aggression to be more among boys and verbal aggression was more in girls [17–19]. The results of one study on gender differences in aggression using electroencephalography (EEG) and electrocardiography (ECG) analysis showed that physical and reactive/overt aggression was stronger in men. In addition, aggressive videos revealed prominent gender-related patterns in γ -signals [20]. As well as, Fahlgren et al. reported that aggression was significantly related to trait anger only for male [21].

It is noteworthy that aggressive behavior tends to peak during middle school years [22], because during this period of life, there is significant brain growth in the areas that make up processes related to reactive aggression, such as threat assessment, self-control, and decision-making [23].

Aggression is influenced by a series of individual, academic, family, and social variables in adolescence [19]. Among the risk factors at the individual level that are effective in creating aggressive behaviors are low self-esteem and low life satisfaction. At the school level, factors such as negative attitudes towards school and school staff and negative social relationships with classmates can also be mentioned. At the family level, factors such as lack of emotional cohesion among family members and negative economic and social conditions were effective in the occurrence of aggressive behavior [20]. Even, parental support can have a positive effect, especially in relation to adolescent cognitive development and behavior in the school environment [4]. Almost half of all disciplinary referrals in schools are due to arguing with a teacher or principal or failing to comply with an instruction given by a teacher and aggressive behaviors [21]. The study done by Poling et al. showed the relationship between parental psychological control and adolescent aggression [22]. In addition, exposure to community violence has been reported as one of the risk factors affecting aggression in adolescents [24].

Research depicted that peers have a dramatic influence on aggressive behaviors during adolescence [4, 25]. Peer pressure becomes more difficult to resist in adolescence, because the views of peers are often more important than those of parents. When adolescents form relationships with people who present aggressive behaviors, they were likely to engage in these behaviors themselves. Therefore, if a significant individual engages in aggressive behavior, the adolescents may behave in the same way. Also, if adolescents spend time with deviant peers who use drugs, do not go to school regularly, and are physically aggressive, they were more likely to take part in aggressive behaviors [26]. Hence,

a person's attitude towards aggressive behavior is influenced by the attitude and behaviors of proaggression among their peers [27].

Another factor affecting aggression is social norm because the person's decision in high-risk situations is so relevant to the extent that individuals believe that others in their immediate environment would approve or support such behaviors [28]. The study by Finigan-Carr et al. showed that parental support plays a positive role in the lives of adolescents because it can help mitigate the effects of negative economic and social conditions on adolescent aggressive behavior [4]. Evidence has shown that students who receive a sense of respect and support from friends, peers, and teachers in the school environment express a positive attitude towards school and teachers and have not usually exhibit behavioral problems such as aggression [12].

Prevention is important in early adolescence because during this time dating and norms of behavioral are formed [29]. School can be an unrivaled opportunity to implement and evaluate the effectiveness of juvenile aggression prevention education programs [30]. Many prevention strategies include surveillance (e.g., metal detectors and guards) and deterrence (e.g., disciplinary rules and zero tolerance policies). And there are psychosocial programs, with many schools reporting that they use one or more of these prevention strategies to deal with behavioral problems [31]. Also, the results have shown that many schools use mental health strategies, social services, and prevention services for students and their families. However, there is little indication that these school-promoted programs are widely adopted or, once adopted, are faithfully implemented [32]. Evidence has shown that RTC studies have been effective in reducing aggressive behavior [29, 33, 34]. Waschbusch et al. pointed in meta-analytic study of school-based interventions that a theory of change be used for the intervention in order to decide on the proximal goals of the intervention as well as on the methods of achieving better goals and also recommended that it is better to use experimental interventions so that we can better adapt the values or culture of a school [35].

Due to the adverse and multiple consequences of aggression in adolescents, especially in terms of psychosocial health in adulthood for instance, behaviors such as sexual assault, driving and shooting, road rage and hitting, and more serious forms of violence [36], it is necessary to identify appropriate intervention [37]. Effective education and public awareness-raising are fundamental strategies for preventing aggression and violence [38]. Individual empowerment and the development of personal skills, as emphasized in the Ottawa Charter on Health Promotion, are fundamental steps in aggression prevention programs [39]. Various factors, including identifying and targeting behavior determinants through appropriate planning and based on scientific theory and evidence, affect the effectiveness of educational programs [40]. Health education is a helpful strategy that bridges the gap between information and health behaviors. There may be many obstacles to changing behavior, in which theories and educational models are responsible for identifying these factors and

adapting them to existing cultural and social factors [41]. Theories of behavior change have played a constructive role in identifying determinants of aggressive behavior and are a useful guide to designing educational interventions [42].

According to the available evidence, individual and interpersonal determinants play a role in the occurrence of aggressive behavior [43–45]. In the present study, theory of planned behavior (TPB) was selected as a framework for planning the intervention and evaluating its impact. TPB is one of the models of behavior change that is well known and predicts the occurrence of a particular behavior [42]. Several studies have shown the ability of TPB to predict aggressive behavior [4, 46, 47]. This theory was used to identify behavioral determinants or to design educational interventions in various areas of health, including low-consumption snacks, watching TV, and using the brush and dental floss, and physical activity has been used [48, 49]. According to TPB, intention and behavior are under the influence of attitudes and subjective norms and perceived behavioral control. It also describes perceived behavioral control based on a person's belief in an individual ability to perform the behavior and how easy or difficult it is to perform that behavior [50]. The construct of TPB helps us better examine interpersonal factors, especially primary groups such as family, peers, and friends [4] and individual factors such as a person's attitude and belief. So it seems that this theory can be used for the design and evaluation of educational intervention. The goals of educational intervention based on TPB were to (1) minimize aggressive behavior and prevent the onset of aggressive behaviors among students, (2) increase students' knowledge about issues related to aggression, (3) increase students' knowledge about the impact of peers and family on aggressive behaviors, (4) train and practice essential skills, (5) create positive attitudes in participants to control anger and manage emotions, and (6) increase students' perceived ability or self-confidence to perform learned skills in controlling and preventing aggression.

While several theoretical explanations for applying the extended TPB model to aggression have been proposed [47, 51, 52], only a limited amount of empirical evidence that supports the application of the TPB to the study of aggression behaviors has been reported thus far. This study was aimed at investigating the effect of theory-based educational intervention on reducing aggression behavior among male students in Bushehr city.

2. Materials and Methods

2.1. Study Design and Participants. The present study was a randomized controlled trial design that was conducted on male students aged 13 to 16 years in 2016 in Bushehr city, Iran. The sample size was determined by using the following formula [53], based on similar previous study [54], in which the mean score and standard deviation of the study objectives in the intervention and control groups were, respectively, 24.56 ± 3.39 and 20.93 ± 5.24 . Also, considering the error of the first type 5%, the test power was 80% with 95% confidence, and taking into account the loss of samples,

the sample size was set as $n = 98$ where each of the intervention and control groups had $n = 49$.

$$n = \frac{\left(Z_{1-(\alpha/2)} + Z_{1-\beta} \right)^2 (\delta_1^2 + \delta_2^2)}{(\mu_1 - \mu_2)^2}. \quad (1)$$

Participants were selected by selected multistage cluster sampling. For this purpose, in the first phase, we randomly selected four schools from list of public schools ($n =$ eighteen) in Bushehr city and then randomly assigned two schools to the intervention and two schools to the control group. Finally, randomly one class selected in each school and invited students' participation in the study. In order to prevent data contamination between the intervention and control groups, random allocation was done at the cluster (i.e., school) level. Inclusion criteria were being an eighth-grade male student, regular attendance at school, have informed consent, no history of taking sedatives, and did not attend other educational and therapeutic classes at the same time. Exclusion criteria were students who have not to want to participate in the study and students who did not attend more than two sessions. Figure 1 presents the CONSORT diagram of the study.

The participants have voluntarily entered the study in order to comply with ethical principles, the study was approved by the Research Council of Shiraz University of Medical Sciences, and related permission was obtained from Bushehr County Department of Education. All participants were informed about the quality of the project implementation, the confidentiality of information, and the purpose of the project, and their written informed consent was obtained. As well as, the informed consent was signed by their parents. Participants were also assured that their information would remain confidential.

2.2. Research Tools. Data were collected using two self-administered questionnaires before and two months after the completion of educational intervention in the studied groups. The first part of the first questionnaire included demographic information (student's age and parents' levels of education and occupations). The second part used aggression questionnaire developed by Buss and Perry [55]. This questionnaire evaluates four types of aggressive behaviors (physical, verbal, anger, and hostility) and a self-report tool that contains 29 phrases in a completely different 5-degree spectrum (5, is somewhat similar to me (4), not it looks like me, not like me (3), it is not like me (2), and it is not like me at all (1), and the whole score was obtained with the total score of the subscales. Content validity and reliability of the Persian version of this questionnaire were confirmed by Samani [56]. In the present study, alpha was 0.78 which indicates the good internal reliability of the questionnaire.

The second one was a researcher-made questionnaire that was designed using valid scientific sources [47, 57] to the determinants of aggression behavior using TPB. It was consisted of 57 items of a five-point Likert scale from totally agree to totally disagree (score from 1 to 5) designed and used. In this questionnaire, the attitude was measured with

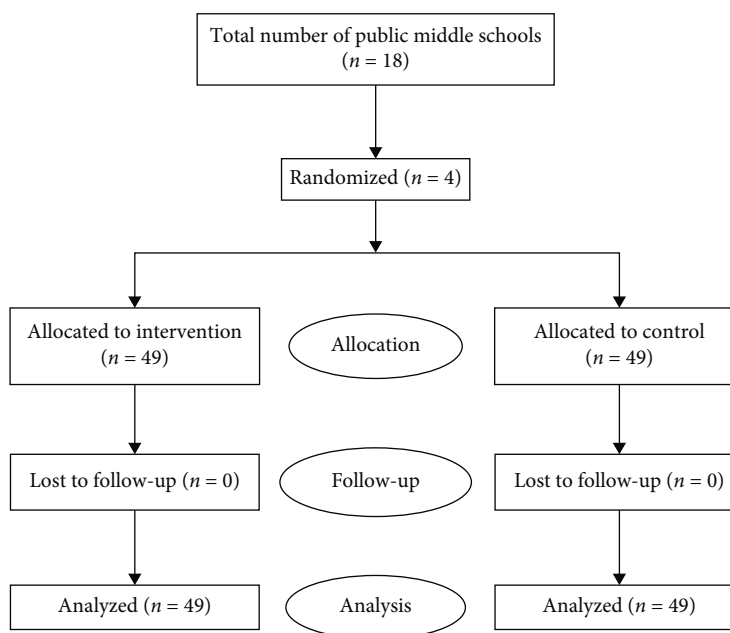


FIGURE 1: CONSORT flow diagram.

20 items (for example, in general, when it comes to anger, it is a mistake to deal with others physically), higher scores indicate a negative attitude towards aggression and, subjective norms using 6 items (for example, if someone beats me, my family expects me to beat them) were measured. The perceived behavioral control construct consists of 26 items (for example, it is easy for me to stop the verbal argument), and the ultimately behavioral intention to aggression was measured and used, consisting of 5 items (for instance, I want to learn how to manage my self-anger). The knowledge measuring tool was 30 questions. Out of the thirty questions, six of them were multichoice types (scoring from 0 to 1). The correct answer was given a score of one, and the wrong answer was given a score of zero. Twenty-four of the other questions were asked (yes, no, and I do not know). The score was from 0 to 1, which had the correct answer for score 1 and the false answer had zero scores (for example, listening greatly to control anger). Its content validity was confirmed by a group of health promotion and psychology specialists ($n = 10$). Also, $CVR = 0.73$ and $CVI = 0.86$ confirm the validity of this tool [58]. Its reliability was determined by conducting a pilot study and calculating Cronbach's alpha coefficient. Cronbach's alpha coefficient was calculated as 0.681 in knowledge construct, 0.753 in attitude, 0.723 in perceived behavioral control, 0.692 in subjective norms, and 0.781 in behavioral intention.

2.3. Intervention. The educational intervention for the experimental group included five sessions, and each session took about one hour. The sessions were delivered over a period of 1 month with one session each week by giving presentations, group discussions, asking and answering questions, presenting educational films and images, and power points. The educational programs were performed by MSc of health education and promotion. How to complete the question-

naire was explained to the students, and the questionnaires were filled out before and two months after the educational intervention by experimental and control groups. Since the number of questions in the questionnaires was large, and filling them in one session may affect the answers; it was decided that the students would complete the questionnaires in two consecutive days. First, the aggression questionnaire and demographic information were completed, and the next day, the TPB-based questionnaire was completed. The details of the training sessions are shown in Table 1. The student of control group received no educational program. They were only asked for filling out questionnaires. At the end of study, one educational session about aggression management skill was held for control group, too.

2.4. Statistical Analysis. Data were analyzed using SPSS16 software at significance level of 0.05. First, the normality of data was tested using the Shapiro-Wilk test ($p \geq 0.5$). Demographic variables were compared between two groups with the chi-square test. Constructs of TPB were compared between two groups with an independent t -test. Also, the mean scores of the two groups on aggression behaviors and TPB constructs were compared via paired samples t -test before and after the intervention.

3. Results

The participants in this study were 98 students. The mean (SD) age of the participants was 14.49 ± 0.77 years in the intervention group and 14.06 ± 0.56 years in the control group. Chi-square test showed that there was no statistically significant difference between the two groups of test and control in terms of fathers' education, mother's education, father's job, and mother's job (Table 2).

TABLE 1: Summary of training sessions based on TPB to prevent and control aggression behaviors.

| Lesson | Educational method | Educational content |
|---|--|--|
| First session | Lecture | Introduction to the goal of intervention and activities. This session was held with the object of breaking the ice of communication-explaining the intervention. |
| Second session (knowledge, attitude) | Questions and answers session, lecture | The definition of aggression, the symptoms of aggression and situations that cause anger and aggression, and how to control and prevent aggression. Provide statistics on the prevalence and incidence of aggressive behavior in Iran. |
| Third session (subjective norms) | Role-play Video lecture | Discussing and examining beliefs individual and social and normative beliefs about aggression behaviors. Also, identifying social factors influencing such as parents and siblings' peer influence, teachers, and pressure. Interpersonal skill training and effective communication was held in the presence of parents or a family member and other school staff. |
| Fourth session (perceived behavioral control) | Video clips, discussion | Anger management skills by using relaxation techniques through breathing, practicing step-by-step relaxation, coping with negative thoughts, and making changes in the environment were teach. One student who was able to control aggressive was invited to talk about experiences of aggression and effects of aggression and the how to control of aggression. |
| Fifth session | Brain storming, questions and answers, lecture | Problem-solving, self-control, and decision-making skills were taught, and benefits and barriers to aggression prevention were discussed. |

TABLE 2: Comparing demographic variables of participants in intervention and control groups.

| Variable | | Intervention group N (%) | Control group N (%) | <i>p</i> value* |
|--------------------|----------------|-----------------------------|------------------------|-----------------|
| Fathers' education | Illiterate | 4 (8.2) | 0 | 0.156 |
| | Elementary | 2 (4.1) | 0 | |
| | Secondary | 8 (16.3) | 11 (22.4) | |
| | Diploma | 10 (20.4) | 10 (20.4) | |
| | Graduate study | 25 (51) | 28 (57.1) | |
| Mother's education | Illiterate | 4 (8.2) | 2 (4.1) | 0.296 |
| | Elementary | 7 (14.3) | 2 (4.1) | |
| | Secondary | 10 (20.4) | 8 (16.3) | |
| | Diploma | 13 (26.5) | 17 (34.7) | |
| Father's job | Graduate study | 15 (30.6) | 20 (40.8) | 0.114 |
| | Unemployed | 4 (8.2) | 5 (10.2) | |
| | Open market | 33 (67.3) | 23 (46.9) | |
| Mother's job | Staff | 12 (24.5) | 21 (42.9) | 0.16 |
| | Employed | 7 (14.3) | 10 (20.4) | |
| | Housewife | 42 (85.7) | 39 (79.6) | |

*Chi-square.

The results indicated that based on independent *t*-test, before the intervention, there were no significant differences between the mean scores of TPB constructs in experimental and control groups, except for the perceived behavioral control. However, there were significant differences between the two groups, except for the subjective norm construct two months after the intervention ($p < 0.001$). Paired sample *t*-test showed that mean scores of knowledge, attitude, perceived behavioral control, and behavioral intention increased in the experimental group ($p < 0.001$). In the control group, the mean scores of these constructs did not change significantly (Table 3).

According to Table 3, Cohen's *d* as effect size coefficient indicates the high effectiveness of the intervention in this

study, which had a higher effect coefficient belonging to knowledge (Cohen's $d = 1.97$).

In within-group analysis, there were no significant differences in control groups after the intervention in the mean scores of verbal aggression, physical aggression, hostility, and anger; however, in the experimental group after the intervention, the mean score of verbal aggression, physical aggression, hostility, and anger showed significant enhancement than the control group ($p < 0.001$). This result could indicate they have more reducing or controlling aggressive behavior skills in the experimental group (Table 4).

According to Table 4, Cohen's *d* as effect size coefficient indicates the high effectiveness of the intervention in this

TABLE 3: Comparison of mean scores on TPB's constructs within and between experimental and control groups of students, pre- and postintervention.

| Construct | Group | Preintervention | | Postintervention | | <i>p</i> value (paired <i>t</i> -test) | Effect size ^b (Cohen's <i>d</i>) |
|-----------------------------|-------------------------------|-----------------|-------|------------------|-------|--|--|
| | | Mean | SD | Mean | SD | | |
| Knowledge | Experimental (<i>n</i> = 49) | 13.65 | 4.08 | 21.40 | 3.46 | <0.001** | 1.97 |
| | Control (<i>n</i> = 49) | 14.65 | 4.03 | 14.18 | 3.84 | 0.527 | — |
| Attitudes | <i>p</i> value ^a | 0.241 | | <0.001** | | — | — |
| | Experimental (<i>n</i> = 49) | 70.92 | 11.39 | 80.18 | 5.77 | <0.001** | 1.76 |
| Subjective norms | Control (<i>n</i> = 49) | 68.65 | 10.93 | 64.30 | 12.27 | 0.032 | — |
| | <i>p</i> value* | 0.422 | | <0.001** | | — | — |
| Behavioral intention | Experimental (<i>n</i> = 49) | 15.83 | 4.21 | 15.08 | 3.72 | 0.151 | 0.40 |
| | Control (<i>n</i> = 49) | 16.45 | 4.54 | 16.64 | 3.91 | 0.789 | — |
| Perceive behavioral control | <i>p</i> value* | 0.555 | | 0.156 | | — | — |
| | Experimental (<i>n</i> = 49) | 11.06 | 4.20 | 14.59 | 5.06 | <0.001** | 0.06 |
| Perceive behavioral control | Control (<i>n</i> = 49) | 15.28 | 6.96 | 14.93 | 5.08 | 0.757 | — |
| | <i>p</i> value* | 0.291 | | <0.001** | | — | — |
| Perceive behavioral control | Experimental (<i>n</i> = 49) | 90.22 | 14.40 | 106 | 10.90 | <0.001** | 1.43 |
| | Control (<i>n</i> = 49) | 82.61 | 15.12 | 87.18 | 15.43 | 0.173 | — |
| | <i>p</i> value* | 0.012*** | | <0.001** | | — | — |

^aIndependent sample *t*-test. ^bEffect size of Cohen's *d*. ***p* < 0.001 and ****p* < 0.05.

TABLE 4: Comparison of mean scores of each type of aggressive behaviors between experimental and control groups of students, pre- and postintervention.

| Construct | Time | Experimental group (<i>n</i> = 49) Mean (SD) | Control group (<i>n</i> = 49) Mean (SD) | <i>p</i> value* | Effect size ^b (Cohen's <i>d</i>) |
|-----------|------------------|--|---|-----------------|--|
| Verbal | Preintervention | 15.48 (3.80) | 14.77 (3.36) | 0.706 | 0.41 |
| | Postintervention | 16.93 (3.17) | 14.51 (2.9) | 0≥.0001** | |
| Physical | Preintervention | 30.42 (7.64) | 26.57 (7.71) | 0.810 | 0.32 |
| | Postintervention | 32.53 (5.40) | 26.24 (5.12) | 0≥.0001** | |
| Hostility | Preintervention | 25.97 (6.64) | 22.38 (6.14) | 1 | 0.26 |
| | Postintervention | 27.57 (5.43) | 22.38 (5.21) | 0≥.0001** | |
| Anger | Preintervention | 22.91 (5.20) | 20.28 (4.32) | 0.240 | 0.56 |
| | Postintervention | 25.46 (3.89) | 21.79 (7.79) | 0≥.0001** | |

*Paired *t*-test. ***p* < 0.001.

study, which had a higher effect coefficient belonging to score of anger among students (Cohen's *d* = 0.56).

4. Discussion and Conclusion

This study was conducted with the aim of reducing aggression and controlling aggression behaviors while improving attitudes, subjective norms, and perceived behavioral control among male students in Bushehr.

Due to the limited interventional studies in the field of aggressive behaviors based on TPB, it is referred to intervention studies based on this theory but in other research topics.

This study showed that the intervention and control groups did not differ meaningfully from the point of view of demographic variables. The absence of differences between the studied groups from the point of view of demographic variables showed that the stages of the study, including sampling, were done with high and appropriate accuracy and the confounding effect and demographic variables were controlled. Therefore, the attribution of changes observed in the intervention group is powerful.

The results of the study showed that in the experimental group, the mean score of knowledge related to aggression after the intervention was significant. However, there was no significant difference in the control group. This finding is consistent in line with several studies on young adults and adolescents that show that educational intervention programs have increased the individual's knowledge in the experimental group [59, 60], also, corroborated the findings of Khaleghi et al. [61].

There was no significant difference in attitudes between the experimental group and the control group before the intervention. Although, after the intervention, no significant increase in attitude was shown in the adolescents of the experimental group. But, the average scores of this group indicate a negative attitude towards aggression. This finding may be because the educational intervention had an effect on modifying the correct attitude towards aggression in the participants of the intervention group. In the control group, the average scores indicate their positive attitude towards aggression. This result is in line with those reported by Sainsbury et al. [62] and Bai et al. [63].

As the findings of the present study indicated, the mean subjective norm score of the experimental group had no significant difference after the educational intervention, compared to that of the control group. These results agreed with some studies such as Zhao et al. [64] and Jalambadani et al. [65], while in the results of the study, Shalmai et al. had a significant increase in the subjective norms of the group after intervention [66]. Subjective norms are more influenced by the judgment of others, including parents, siblings, friends, and teachers. To achieve a significant change in perceived mental norms, more training sessions are recommended, and emphasis is placed on educating parents, peers, and school staff.

Also, the results of the present study showed that the mean behavioral intention score related to aggression in the experimental group after the intervention was significantly different. However, in the control group, the mean score of behavioral intention in relation to aggression before and after the intervention was not significant. The results of other studies were consistent with the results of this study [59, 67, 68].

The mean score on perceived behavioral control in the present study showed that before the intervention, students had a low ability to control aggression, while after the intervention, the mean score on perceived behavioral control increased significantly. However, there was no significant difference in the control group. This is consistent with the results of Karimy et al. [69] and Didarloo et al. [70]. The individual intends to perform a behavior when he realizes that the behavior is under his or her control. Sense of control will make them strive to succeed in what they want [67].

Verbal aggression is reactive and overactive to other cases of aggression that were studied in this study. This aggression is defined as a defensive response to perceived stimuli of intimidation or stimulus-inducing enmity [71]. The results of this study showed that verbal aggression was significantly different in the experimental group after the intervention, while there was no significant difference in the control group. Studies have shown that those who believe that aggression is an appropriate response were more aggressive than those who considered aggression to be inadequate or unacceptable in a social situation [4]. In the present study, physical aggression was also studied, and the results showed that the mean scores of physical

aggression in the experimental group after the intervention were significantly different. However, there was no significant difference in the control group. The results of this study are consistent with the results of studies by Fares et al., Hirshfeld et al., and Özabacı [72–74]. In this study, the parameters of anger and hostility were also studied. Results showed that there was a significant difference after the intervention. In a study by Vakili et al., the results showed that the level of verbal violence and anger among Spanish students was high [75]. It seems that education in schools can be an important means to reduce anger among students.

In current study, Cohen's d as effect size coefficient indicates the high effectiveness of the intervention in this study ($d = 0.56$). But, the results of a meta-analysis showed that school interventions reduce aggression with small effect sizes ($d = 0.21$) [76]. As well, evidence has also shown that cognitive behavioral interventions at schools have been effective in reducing aggression with small effects ($d = 0.22$) [77].

Education can able to improve the performance of clinical staff in reducing the escalation of aggressive behavior [78]. And it even leads to a change in attitude and understanding as well as more confidence in the management of aggression in nurses [79]. It is recommended to use this theory in clinical employees who are exposed to aggression for further research.

Although the current research has several strengths, including a theory-based study and a randomized controlled trial, it has certain limitations. Limitations of this study are as follows: (1) this study was conducted in male students so the results may not be generalizable to female students, and it should be noted that Iran's education policy has considered restrictions for the presence of researchers or teachers of the opposite sex in schools. In addition, the enrollment of female students and other grades in the study required a larger sample size and a larger number of schools, which was not possible due to the time and resources allocated to the master's thesis. (2) It was conducted only in the age group of adolescents. (3) Since the questionnaire was completed by the students themselves, social desirability may have occurred.

The results of this study were in favor of the effectiveness of an educational intervention based TPB on improving the determinants of aggression behavior. Since aggression is a social behavior and a change in the process is time-consuming, therefore it is suggested that training be provided in a long follow-up so that students have the opportunity to practice techniques and skills to change their behavior.

Data Availability

Data used in the analysis as well as all programs used for the analysis may be obtained by contacting the corresponding author on reasonable request.

Ethical Approval

Collection of the data was done after obtaining the necessary confirmation from the relevant authority and obtaining the code of ethics (IR.SUMS.REC.1395.142).

Conflicts of Interest

The authors have no conflict of interest in the publication of this article.

Acknowledgments

This project was financially supported by the Shiraz University of Medical Sciences. The present research is based on the master's thesis to project number: 11778. The authors appreciate all colleagues of the study, including affiliated students, officials from the School of Health Education in Bushehr, and school officials.

References

- [1] J. M. Ostrov, D. Murray-Close, S. A. Godleski, and E. J. Hart, "Prospective associations between forms and functions of aggression and social and affective processes during early childhood," *Journal of experimental child psychology*, vol. 116, no. 1, pp. 19–36, 2013.
- [2] J. N. Onukwufor, "Physical and verbal aggression among adolescent secondary school students in rivers state of Nigeria," *British Journal of Education*, vol. 1, no. 2, pp. 62–73, 2013.
- [3] R. F. Marcus, *The Development of Aggression and Violence in Adolescence*, Springer, 2017.
- [4] N. M. Finigan-Carr, T. L. Cheng, A. Gielen, D. L. Haynie, and B. Simons-Morton, "Using the theory of planned behavior to predict aggression and weapons carrying in urban African American early adolescent youth," *Health Education & Behavior*, vol. 42, no. 2, pp. 220–230, 2015.
- [5] J. J. Allen and C. Anderson, "Aggression and violence: definitions and distinctions," in *The Wiley handbook of violence and aggression*, P. Sturmey, Ed., pp. 1–14, John Wiley & Sons, UK, 2017.
- [6] P. Muratori, I. Bertacchi, C. Giuli, A. Nocentini, and J. E. Lochman, "Implementing coping power adapted as a universal prevention program in Italian primary schools: a randomized control trial," *Prevention science*, vol. 18, no. 7, pp. 754–761, 2017.
- [7] G. L. Gillespie, S. Bresler, D. M. Gates, and P. Succop, "Post-traumatic stress symptomatology among emergency department workers following workplace aggression," *Workplace Health & Safety*, vol. 61, no. 6, pp. 247–254, 2013.
- [8] E. Viottini, G. Politano, G. Fornero et al., "Determinants of aggression against all health care workers in a large-sized university hospital," *BMC health services research*, vol. 20, no. 1, pp. 1–9, 2020.
- [9] H. Masud, M. S. Ahmad, K. W. Cho, and Z. Fakhr, "Parenting styles and aggression among young adolescents: a systematic review of literature," *Community Mental Health Journal*, vol. 55, no. 6, pp. 1015–1030, 2019.
- [10] H. Sourì, "The effect of group logo therapy training on frustration and aggression of male high school students," *Knowledge & Research in Applied Psychology*, vol. 16, no. 1, pp. 118–125, 2015.
- [11] O. O'Donnell, A. House, and M. Waterman, "The co-occurrence of aggression and self-harm: systematic literature review," *Journal of affective disorders*, vol. 175, pp. 325–350, 2015.

- [12] T. I. Jiménez and E. Estévez, "School aggression in adolescence: examining the role of individual, family and school variables," *International Journal of Clinical and Health Psychology*, vol. 17, no. 3, pp. 251–260, 2017.
- [13] S. Crespo-Ramos, A. Romero-Abrio, B. Martínez-Ferrer, and G. Musitu, "Variables psicosociales y violencia escolar en la adolescencia," *Psychosocial Intervention*, vol. 26, no. 2, pp. 125–130, 2017.
- [14] M. Bhilwar and R. Kapoor, "Prevalence of aggression among school-going adolescents in India: a review study," *Indian Journal of Youth and Adolescent Health*, vol. 3, no. 4, pp. 39–47, 2016.
- [15] A. Bucur, S. Ursoniu, C. Caraion-Buzdea, V. Ciobanu, S. Florescu, and C. Vladescu, "Aggressive behaviors among 15–16-year-old Romanian High school students: results from two consecutive surveys related to alcohol and other drug use at the European level," *International Journal of Environmental Research and Public Health*, vol. 17, no. 10, p. 3670, 2020.
- [16] A. López Castedo, D. Álvarez García, J. Domínguez Alonso, and R. E. Álvarez, "Expressions of school violence in adolescence," *Psicothema*, vol. 30, 2018.
- [17] D. Dutt, G. K. Pandey, D. Pal, S. Hazra, and T. K. Dey, "Magnitude, types and sex differentials of aggressive behaviour among school children in a rural area of West Bengal," *Indian journal of community medicine: official publication of Indian Association of Preventive & Social Medicine*, vol. 38, no. 2, pp. 109–113, 2013.
- [18] S. Anjanappa, R. Govindan, and M. Munivenkatappa, "Prevalence and expression of anger in school going adolescents," *Archives of Psychiatric Nursing*, vol. 34, no. 1, pp. 35–40, 2020.
- [19] S. Upendra and C. Nirmal, "A study to assess the aggressive behaviour among students in selected schools in Pune city with a view to develop a booklet on prevention and control of aggressive behaviour," *International Journal of Health Sciences & Research (Www Ijhsr Org)*, vol. 5, no. 8, p. 377, 2015.
- [20] S. Im, G. Jin, J. Jeong et al., "Gender differences in aggression-related responses on EEG and ECG," *Experimental Neurobiology*, vol. 27, no. 6, pp. 526–538, 2018.
- [21] M. K. Fahlgren, J. C. Cheung, N. K. Ciesinski, M. S. McCloskey, and E. F. Coccaro, "Gender differences in the relationship between anger and aggressive behavior," *Journal of Interpersonal Violence*, vol. 37, no. 13-14, pp. NP12661–NP12670, 2022.
- [22] D. V. Poling, S. W. Smith, G. G. Taylor, and M. R. Worth, "Direct verbal aggression in school settings: a review of the literature," *Aggression and Violent Behavior*, vol. 46, pp. 127–139, 2019.
- [23] R. A. Lickley and C. L. Sebastian, "The neural basis of reactive aggression and its development in adolescence," *Psychology, Crime & Law*, vol. 24, no. 3, pp. 313–333, 2018.
- [24] T. Hamner, R. D. Latzman, and W. Y. Chan, "Exposure to community violence, parental involvement, and aggression among immigrant adolescents," *Journal of Child and Family Studies*, vol. 24, no. 11, pp. 3247–3257, 2015.
- [25] P. J. Fite, S. L. Rubens, T. M. Preddy, A. Raine, and D. A. Pardini, "Reactive/proactive aggression and the development of internalizing problems in males: the moderating effect of parent and peer relationships," *Aggressive Behavior*, vol. 40, no. 1, pp. 69–78, 2014.
- [26] C. Wakoli, G. Kiptiony, B. Chemwei, and H. Chonge, "Peer influence on aggressive behaviour of adolescents in secondary schools in Bungoma County," *International Journal of Arts Humanities and Social Sciences (IJAHSS)*, vol. 1, no. 3, pp. 59–66, 2016.
- [27] J. M. Beyers, R. Loeber, P.-O. H. Wikström, and M. Stouthamer-Loeber, "What predicts adolescent violence in better-off neighborhoods?," *Journal of Abnormal Child Psychology*, vol. 29, no. 5, pp. 369–381, 2001.
- [28] C. A. Gidycz, L. M. Orchowski, and A. D. Berkowitz, "Preventing sexual aggression among college men: an evaluation of a social norms and bystander intervention program," *Violence Against Women*, vol. 17, no. 6, pp. 720–742, 2011.
- [29] R. Meiksin, E. Allen, J. Crichton et al., "Protocol for pilot cluster RCT of project respect: a school-based intervention to prevent dating and relationship violence and address health inequalities among young people," *Pilot and feasibility studies*, vol. 5, no. 1, pp. 1–17, 2019.
- [30] R. W. Burke, "Social and emotional education in the classroom," *Kappa Delta Pi Record*, vol. 38, no. 3, pp. 108–111, 2002.
- [31] G. D. Gottfredson, D. C. Gottfredson, A. A. Payne, and N. C. Gottfredson, "School climate predictors of school disorder: results from a national study of delinquency prevention in schools," *Journal of Research in Crime and Delinquency*, vol. 42, no. 4, pp. 412–444, 2005.
- [32] S. J. Wilson and M. W. Lipsey, "School-based interventions for aggressive and disruptive behavior: update of a meta-analysis," *American Journal of Preventive Medicine*, vol. 33, no. 2, pp. S130–S143, 2007.
- [33] S. Klein Tunte, S. Bogaerts, E. Bulten et al., "Virtual reality aggression prevention therapy (VRAPT) versus waiting list control for forensic psychiatric inpatients: a multicenter randomized controlled trial," *Journal of Clinical Medicine*, vol. 9, no. 7, p. 2258, 2020.
- [34] M. E. Kunik, M. A. Stanley, S. Shrestha et al., "Aggression prevention training for individuals with dementia and their caregivers: a randomized controlled trial," *The American Journal of Geriatric Psychiatry*, vol. 28, no. 6, pp. 662–672, 2020.
- [35] D. A. Waschbusch, R. P. Breaux, and D. E. Babinski, "School-based interventions for aggression and defiance in youth: a framework for evidence-based practice," *School mental health*, vol. 11, no. 1, pp. 92–105, 2019.
- [36] K. Kircaburun, C. M. Kokkinos, Z. Demetrovics, O. Király, M. D. Griffiths, and T. S. Çolak, "Problematic online behaviors among adolescents and emerging adults: associations between cyberbullying perpetration, problematic social media use, and psychosocial factors," *International Journal of Mental Health and Addiction*, vol. 17, no. 4, pp. 891–908, 2019.
- [37] D. Younan, C. Tuvblad, L. Li et al., "Environmental determinants of aggression in adolescents: role of urban neighborhood greenspace," *Journal of the American academy of child & adolescent psychiatry*, vol. 55, no. 7, pp. 591–601, 2016.
- [38] B. Glick and J. C. Gibbs, *Aggression Replacement Training: A Comprehensive Intervention for Aggressive Youth*, Research Press, 2010.
- [39] A. Wilberg, L. Saboga-Nunes, and C. Stock, "Are we there yet? Use of the Ottawa charter action areas in the perspective of European health promotion professionals," *Journal of Public Health*, vol. 29, no. 1, pp. 1–7, 2021.
- [40] M. H. Kaveh, F. Darabi, M. Nazari, and H. Tabatabaee, "Effects of citizenship education on knowledge, attitude, subjective norm and behavioral intention of high school girls in shiraz,

- southern Iran," *Journal of Health Sciences & Surveillance System*, vol. 1, no. 1, pp. 6–13, 2013.
- [41] M. Sharma, *Theoretical Foundations of Health Education and Health Promotion*, Jones & Bartlett Learning, 2021.
- [42] A. Pakpour Hajiagha, I. Mohammadi Zeidi, and B. Mohammadi Zeidi, "The Impact of Health Education Based on Theory of Planned Behavior on the Prevention of AIDS among Adolescents," *Iran Journal of Nursing*, vol. 25, no. 78, pp. 1–13, 2012.
- [43] B. Kang, W. Pan, M. J. Karel, and E. S. McConnell, "Rejection of care and aggression among older veterans with dementia: the influence of background factors and interpersonal triggers," *Journal of the American Medical Directors Association*, vol. 22, no. 7, pp. 1435–1441.e1, 2021.
- [44] C. A. Robles-Haydar, M. B. Martínez-González, Y. A. Flórez-Niño, L. M. Ibáñez-Navarro, and J. J. Amar-Amar, "Personal and environmental predictors of aggression in adolescence," *Brain Sciences*, vol. 11, no. 7, p. 933, 2021.
- [45] L. S. Aloia and A. C. High, "Ameliorating the adverse consequences of verbal aggression: the buffering effect of esteem support on personal and relational outcomes," *Communication Reports*, vol. 33, no. 2, pp. 55–67, 2020.
- [46] J. E. Brown, "Intending to Be Aggressive: Applying the Theory of Planned Behavior to Reactive and Instrumental Adolescent Aggression," *Unpublished Master Thesis*, University of Saskatchewan, USA, 2006.
- [47] F. ZinatMotlagh, M. Ataei, F. Jalilian, M. MirzaeiAlavijeh, A. Aghaei, and K. K. Shirazi, "Predicting aggression among male adolescents: an application of the theory of planned behavior," *Health Promotion Perspectives*, vol. 3, no. 2, pp. 269–275, 2013.
- [48] A. Akaberi and A. Pakpour, "Factors associated with physical activity in adolescents in Qazvin: an application of the theory of planned behavior," *Journal of North Khorasan University of Medical Sciences*, vol. 4, no. 3, pp. 449–456, 2012.
- [49] A. Delshad Noghabi and M. Moshki, "The impact of education on the basis of the theory of planned behavior on the level and method of supervision of their parents on watching television by students," *Journal of Torbat Heydariyeh University of Medical Sciences*, vol. 1, no. 4, pp. 7–17, 2014.
- [50] C. A. Anderson, A. J. Benjamin Jr., P. K. Wood, and A. M. Bonacci, "Development and testing of the Velicer attitudes toward violence scale: evidence for a four-factor model," *Aggressive Behavior: Official Journal of the International Society for Research on Aggression*, vol. 32, no. 2, pp. 122–136, 2006.
- [51] K. Alimoradi, S. H. Davarpanah, P. Taymoori, A. Ostovar, and K. Rahmani, "Predicting physical and verbal aggression perpetration among teenage boys: an application of the theory of planned behavior," *International Journal of Human Rights in Healthcare*, vol. 15, no. 3, pp. 276–287, 2022.
- [52] F. Hanurawan, T. Chusniyah, H. Rahmawati, and F. D. Hutagalung, "t1Cyber aggression between intentions and cyber wellness of students: an application of TPB models," *International Journal of Instruction*, vol. 14, no. 2, pp. 67–82, 2021.
- [53] A. C. Tamhane and D. D. Dunlop, *Multiple Comparisons of Means, Statistics and Data Analysis from Elementary to Intermediate*, Upper Saddle River, pp. 475–476, NJ: Prentice-Hall, 2000.
- [54] G. L. Motasedian Talat, H. Kaveh Mohammad, and K. Sare, *Evaluation of the Effect of Mothers Training on Aggressive Behavior among Primary School Student an Application of Theory of Planned Behavior*, Shiraz University of Medical Sciences: Shiraz University of Medical Sciences, 2014.
- [55] A. H. Buss and M. Perry, "The aggression questionnaire," *Journal of personality and social psychology*, vol. 63, no. 3, pp. 452–459, 1992.
- [56] S. Samani, *Study of Reliability and Validity of the Buss and Perry's Aggression Questionnaire*, 2008.
- [57] C. K. Duru, "Antisocial Personality and Aggressive Behaviour Intention among Secondary School Children in Malaysia," *Unpublished Doctoral thesis*, Universiti Putra Malaysia, Malaysia, 2015.
- [58] D. F. Polit and C. T. Beck, *Nursing research: generating and assessing evidence for nursing practice*, Lippincott Williams & Wilkins, 2008.
- [59] A. Alami, S. B. Tavakoly Sany, H. Tehrani, E. Lael-Monfared, Z. Hosseini, and A. Jafari, "The effect of educational intervention on iron and vitamin D consumption based on the theory of planned behaviour in Iranian adolescent girls: a quasi-experimental study," *International Journal of Health Promotion and Education*, vol. 57, no. 6, pp. 316–331, 2019.
- [60] Y. Zhu, Z. Zhang, Y. Ling, and H. Wan, "Impact of intervention on breastfeeding outcomes and determinants based on theory of planned behavior," *Women and Birth*, vol. 30, no. 2, pp. 146–152, 2017.
- [61] A. A. Khaleghi, S. Jafarzadeh, P. Afzali Harsini, S. H. Kashfi, F. Mohammadkhab, and A. Khani Jeihooni, "Effect of educational intervention based on theory of planned behavior on aggression preventive behaviors in students," *Journal of Aggression, Conflict and Peace Research*, 2022.
- [62] K. Sainsbury, B. Mullan, and L. Sharpe, "Predicting intention and behaviour following participation in a theory-based intervention to improve gluten free diet adherence in coeliac disease," *Psychology & Health*, vol. 30, no. 9, pp. 1063–1074, 2015.
- [63] X. Bai, A. Wang, V. Plummer et al., "Using the theory of planned behaviour to predict nurse's intention to undertake dual practice in China: a multicentre survey," *Journal of Clinical Nursing*, vol. 28, no. 11–12, pp. 2101–2110, 2019.
- [64] X. Zhao, K. M. White, and Y. R. McD, "A TPB-based smoking intervention among Chinese high school students," *Substance use & misuse*, vol. 54, no. 3, pp. 459–472, 2019.
- [65] Z. Jalambadani, M. Delavari Heravi, and S. M. Noori, "Folic acid consumption based on the theory of planned behaviour in pregnant women," *Journal of Obstetrics and Gynaecology*, vol. 40, no. 1, pp. 37–39, 2020.
- [66] M. R. Shalmai, F. Rakhshani, A. Ramezankhani, and H. Soori, "Effect of education based on the theory of planned behavior on preventive behaviors of aggression," *Safety Promotion and Injury Prevention*, vol. 4, no. 1, pp. 39–46, 2016.
- [67] A. Khani Jeihooni, H. Jormand, N. Saadat, M. Hatami, R. Abdul Manaf, and H. P. Afzali, "The application of the theory of planned behavior to nutritional behaviors related to cardiovascular disease among the women," *BMC Cardiovascular Disorders*, vol. 21, no. 1, pp. 1–11, 2021.
- [68] M. Sabouri, E. Shakibazadeh, B. Mohebbi, A. Tol, M. Yaseri, and S. Babaei, "Effectiveness of an educational intervention using theory of planned behavior on health care empowerment among married reproductive-age women: a randomized controlled trial," *Journal of Education and Health Promotion*, vol. 9, no. 1, p. 293, 2020.

- [69] T. Karimy, M. Saffari, H. Sanaeinasab, K. Khalagi, and M. Hassan-Abadi, "Impact of educational intervention based on theory of planned behavior on lifestyle change of patients with myocardial infarction," *Iranian Journal of Health Education and Health Promotion*, vol. 3, no. 4, pp. 370–380, 2016.
- [70] A. Didarloo, N. Sharafkhani, R. Gharaaghaji, and S. Sheikhi, "Application of theory of planned behavior to improve obesity-preventive lifestyle among students: a school-based interventional study," *International Journal of Pediatrics*, vol. 5, no. 11, p. 6067, 2017.
- [71] G. N. Clarke, P. Rohde, P. M. Lewinsohn, H. Hops, and J. R. Seeley, "Cognitive-behavioral treatment of adolescent depression: efficacy of acute group treatment and booster sessions," *Journal of the American Academy of Child & Adolescent Psychiatry*, vol. 38, no. 3, pp. 272–279, 1999.
- [72] N. Fares, J. M. Ramirez, J. M. Cabrera, F. Lozano, and F. Salas, "Justification of physical and verbal aggression in Uruguayan children and adolescents," *The Open Psychology Journal*, vol. 4, no. 1, pp. 45–54, 2011.
- [73] D. R. Hirshfeld-Becker, B. Masek, A. Henin et al., "Cognitive behavioral therapy for 4- to 7-year-old children with anxiety disorders: a randomized clinical trial," *Journal of consulting and clinical psychology*, vol. 78, no. 4, pp. 498–510, 2010.
- [74] N. Özabacı, "Cognitive behavioural therapy for violent behaviour in children and adolescents: a meta-analysis," *Children and Youth Services Review*, vol. 33, no. 10, pp. 1989–1993, 2011.
- [75] V. Vakili, A. Zarifian, F. Movahhedianfar, M. Bijari, and M. Ziaee, "Prevalence of aggressive behaviors among the general population of Mashhad-Iran, 2014," *Journal of Fundamentals of Mental Health*, vol. 18, no. 3, pp. 139–144, 2016.
- [76] A. A. Alford and J. Derzon, "Meta-analysis and systemic review of the effectiveness of school-based programs to reduce multiple violent and antisocial behavioral outcomes," in *Handbook of School Violence and School Safety: International Research and Practice*, S. R. Jimerson, A. B. Nickerson, M. J. Mayer, and M. J. Furlong, Eds., pp. 593–606, New York: Routledge, 2nd edition, 2012.
- [77] T. N. Barnes, S. W. Smith, and M. D. Miller, "School-based cognitive-behavioral interventions in the treatment of aggression in the United States: a meta-analysis," *Aggression and Violent Behavior*, vol. 19, no. 4, pp. 311–321, 2014.
- [78] D. Chrzescijanski, W. Moyle, and D. Creedy, "Reducing dementia-related aggression through a staff education intervention," *Dementia*, vol. 6, no. 2, pp. 271–286, 2007.
- [79] J. Nau, R. Halfens, I. Needham, and T. Dassen, "Student nurses' de-escalation of patient aggression: a pretest-posttest intervention study," *International journal of nursing studies*, vol. 47, no. 6, pp. 699–708, 2010.