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RESEARCH ARTICLE

THE EFFECT OF A TRAINING PROGRAM BASED ON THE HEALTH BELIEF MODEL ON ELEMENTARY SCHOOL STUDENTS' BEHAVIORS TOWARD PREVENTING PLAYGROUND ACCIDENTS: A RANDOMIZED CONTROLLED TRIAL

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ABSTRACT

Purpose: The aim of the study is to investigate the effect of a training program developed based on the health belief model (HBM) on elementary school students' behaviors towards the prevention of playground accidents.

Methods: This randomized controlled trial was carried out from September 2016 to June 2017. Elementary school students were randomly assigned into an intervention group (n = 62) and a control group (n = 62). Data were collected using a Sociodemographic characteristics questionnaire, Injury behavior checklist and Injury attitudes questionnaire (IAQ). HBM based playground accidents prevention training program applied as four sessions.

Results: Participation in the training program reduced the mean scores obtained from the fate subscale and injury risk scores of the intervention group, increased their mean scores for the vulnerability/severity and preventability subscales ($p < 0.05$). The mean scores of the intervention from Injury Behavior risk significantly decreased in comparison to the control group. The power of the present study was found to be high in all the subscales of the IAQ and injury risk assessment.

Conclusion: The training program based on the HBM effective as a scientific guide for helping students achieve behavioral changes by evaluating their attitudes.

Keywords: playground accidents, elementary school, prevention, school nurse

INTRODUCTION

School playgrounds are the leading location for injury among school-age (7 to 12) children (1,2). During the elementary school years, when children are at great risk of injury, accidents that occur in playgrounds seriously threaten children's health and cause serious injuries that usually require medical treatment (1-3). Studies point out that playgrounds are where accidents occur and that children's behavior is the

main cause underlying the occurrence of these accidents (1,4).

School-age children under 15 years old comprise 26% of Turkey's population. (Turkish Statistical Institute [TSI], 2015 (5). National studies on protecting children from playground accidents limited compared with the existing international ones (1,6). It is frequently emphasized that there is a need for studies aimed at raising the awareness and prevention of playground accidents (1,2); for this, we must determine the risk of playground accidents and create widespread training programs to reduce that risk. Behavioral change theories can help to understand how injury prevention initiatives can be effective. One of the most widely applied behavioral theories for preventing injury is the health belief model (HBM) (7,8). This model argues that an individual's health behaviors are affected by his/her beliefs, values, and attitudes (8,9). Although the majority of the research on social-cognitive theories has focused on predicting health behaviors among teens and adults, consistent with these, a number of injury beliefs have been shown to predict children's risk-taking decisions during play, including beliefs about injury vulnerability, severity, and preventability (1).

Health education courses carried out in schools based on the HBM are effective at preventing injuries and increasing students' self-protection skills (10-12). School nurses are privy to a great deal of playground injury information. In order to address the injury problem, it is important for nurses to be aware of specific risk hazards present in playground environments and to understand student's relationships and interactions with those hazards. The school nurse plays an important role in preventing playground accidents and injuries occurring at school and providing health education to children (2).

The purpose of this study is to investigate the effect of a training program developed based on the HBM on elementary school students' behaviors with the goal of preventing playground accidents. In this sense, a training program based on the basic concepts of the HBM to protect school-age children from playground accidents can serve as a scientific guide to behavioral changes in children by evaluating their attitudes.

We tested 4 hypotheses: (1). There is a difference between the intervention group (IG) and control groups (CG) in the mean scores from the fate subscale of the injury attitudes questionnaire over time (pre-test, 15th day, 1st month, and 4th month after the intervention) (2). There is a difference between the IG and CG in the mean scores obtained from the vulnerability/severity subscale of the injury attitudes questionnaire over time (pre-test, 15th day, 1st month, and 4th month after the intervention) (3). There is a difference between the mean scores obtained from the preventability subscale of the injury attitudes questionnaire for the participants in the IG and CG over time (pre-test, 15th day, 1st month, and 4th month after the intervention) (4). There is a difference between the mean injury behavior risk scores obtained from the participants in the IG and CG over time (pre-test, 6 month after the pretest).

METHODS

Study design and Sample

This randomized controlled trial was conducted in an elementary school in a province in western Turkey between September 2016 and June 2017. The results were evaluated pre-test, post-test, and at the 1-month and 4-month follow-ups. Figure 1 contains a CONSORT flow diagram of the study design.

The study included children who were between the ages of 8 and 10, who were not to leave school for more than a year, who gave their verbal consent and whose parents provided their written consent. Of the students, those who had severe hearing or vision problems, learning disabilities, and were likely to leave school within a year were not included in the study.

A power analysis was performed to determine the number of participants required for each group. The study population consisted of 226 children, aged 8-10 years. Of them, 112 were girls and 114 were boys. The sample size study was calculated to be 102 by taking the study power as 80% and the effect size as moderate (0.30) (G*Power version 3.1.9.2 statistical). Given that there might be losses during the study, an additional 10-15% of the number of participants indicated by the power analysis were included. In total, 127 students from the aforementioned elementary school who met the inclusion criteria were included in the study. When the students were randomly assigned to the (IG) and control group (CG), variables such as age, gender, and Injury Behavior risk score were taken into account. Injury

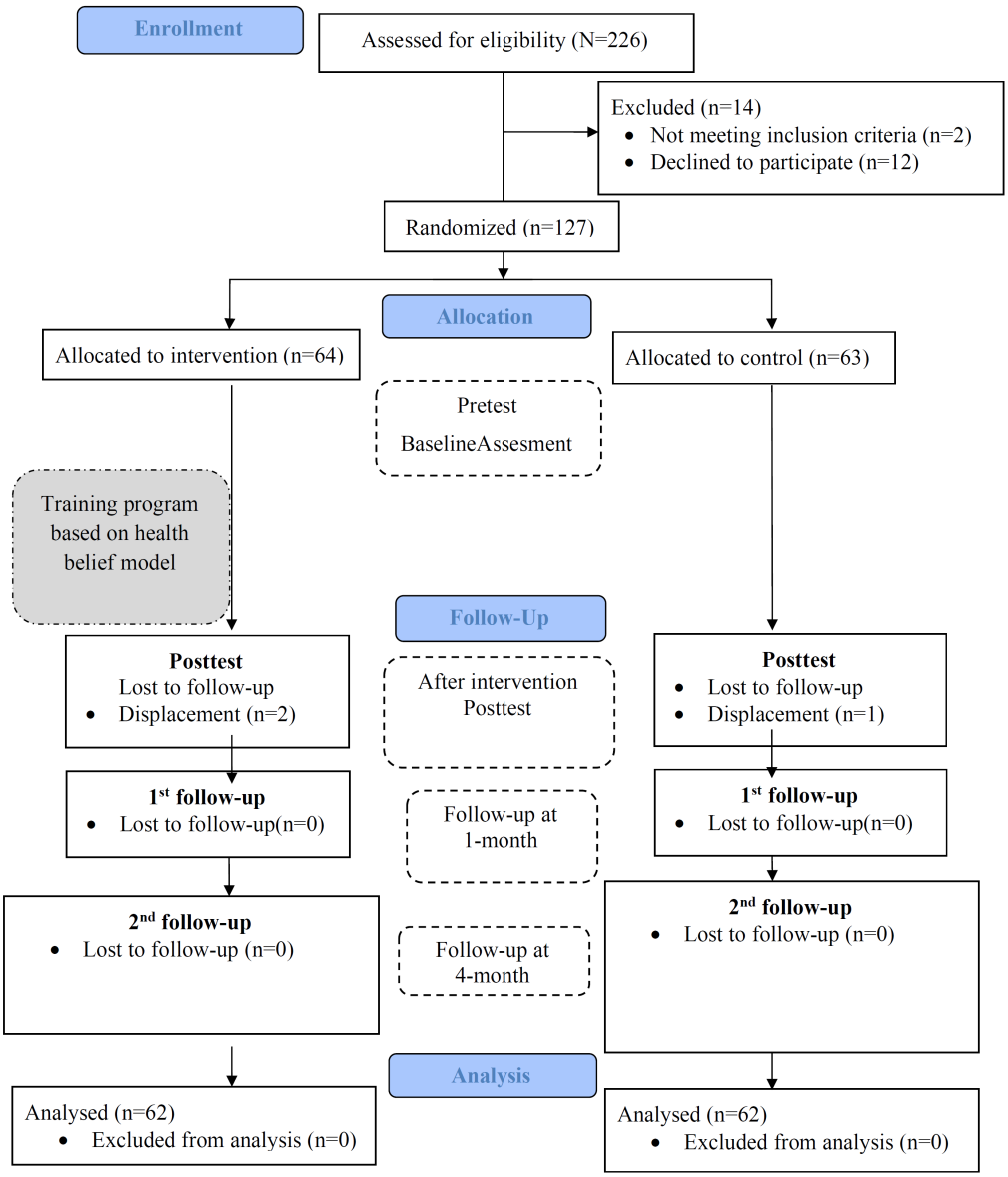

Figure 1. CONSORT diagram of the study

behavior risk checklist is filled in by parents and into account injury behavior risk of the child over the last 6 months. To prevent interaction between the students in the CG and IG, while the participants in the IG were trained, no students from the CG were allowed to join the training. As a result of the randomization process, 64 students were assigned to the IG and 63 students to the CG. Regarding the homogeneity of the participants, no statistically significant differences were found between the groups in terms of their injury behavior risk score, age, and gender. After the pre-test, two students from the IG and one from the CG left the study due to displacement. The final study group consisted of 124 students (62 IG and 62 CG).

Measures

Sociodemographic characteristics questionnaire (SCQ): The sociodemographic characteristics questionnaire included 12 items questioning the students' grade in school, age, gender and family type, including their parents' education levels and employment status, the number of siblings, whether they had a chronic illness, and whether they had an accident within the past 6 months (1,10,13).

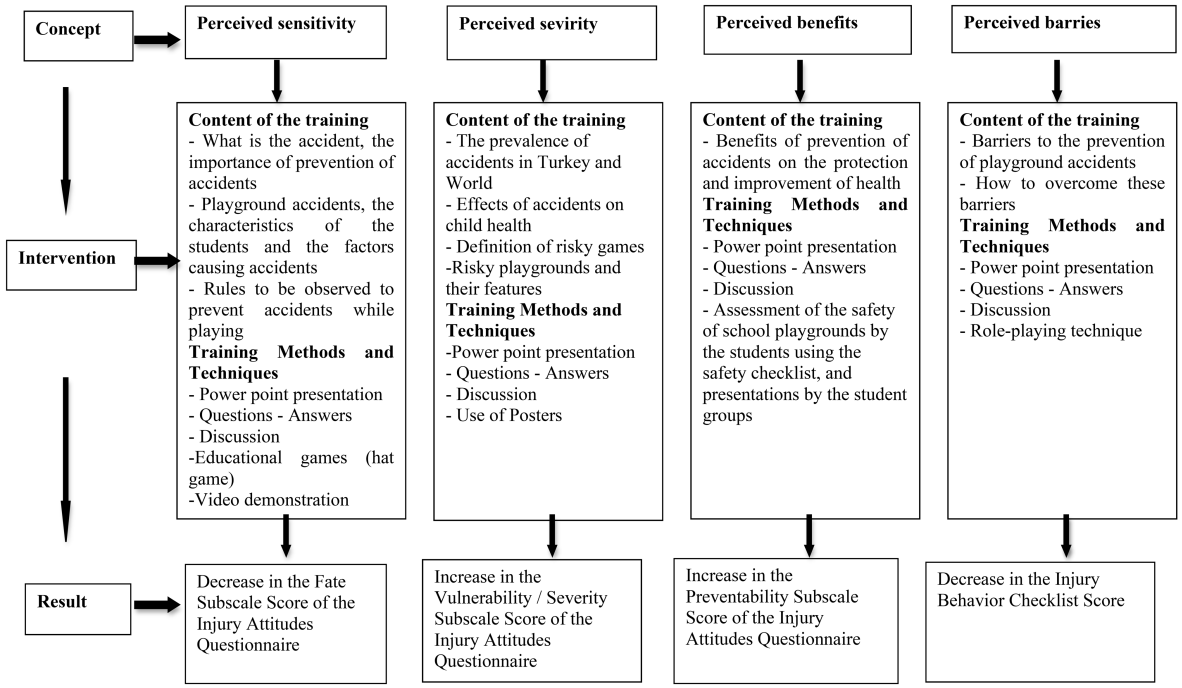

Figure 2. Structuring of the Study According to the subscales of the Health Belief Model

Injury behavior checklist (IBC): The IBC was developed by Speltz et al. (1990) and is suitable for children 7-10 years old (14). Similarly, performance on the IBC, which measures a child's tendency to take physical risks, is highly associated with their performance on the playground (15,16); therefore, the IBC was used in the study. The internal consistency coefficient of the checklist was α = 0.87. The Turkish version of the checklist was developed by Uysal et al. (2008) (α = 0.87) (17). The 24-item checklist was filled in by the parent taking into account their child's risky behavior over the past 6 months. The tendency to display the risky behaviors listed on the checklist was assessed using a five-point Likert-type scale. For the IBC, a score ≥ 48 indicates that the student is at high risk to display an injury, a score < 48 indicates low risk.

Injury attitudes questionnaire (IAQ): The original scale was developed by Morrongiello and Kane (2012) to measure the injuries beliefs of children aged 7-12 years old and consists of four subscales and 19 items (1). The extent the students agree with each statement is assessed using a six-point Likert-type scale. Validity and reliability studies of the Turkish version of the scale were conducted by Koca and Uysal Toraman (2019) (18). Because the Turkish version of the IAQ has a three-dimensional construct, reliability analyses were performed for three subscales (α = 0.75 for fate, α = 0.90 for vulnerability/severity, α = 0.66 for preventability). Items 3, 5, 11, 12, 13, 14, and 18 are reverse scored. The Turkish version of the scale consists of 15 items and three subscales. The subscales of the Questionnaire assess the following: children's beliefs that injuries are related to fate (5 items), their beliefs about the potential severity of playground injuries and their beliefs that a person's vulnerability to injuries are related to the behavior of the person (6 items), their beliefs that injuries can be prevented by the behavior of the person (4 items). While all the measurement tools were administered to the participants before the training program, after the training program, IAQ were administered. IBC were evaluated December and June.

Data Collection

Data were collected using the above-mentioned structured questionnaires from December 2016 to June 2017. The purpose and method of the study were explained to the research participants, and they were informed that no risk was involved in participating in the research and that their data would not be used for any purpose other than the present study. IBC was filled in by the parent taking into account their child's risky behavior over the past 6

TABLE 1. Comparison of the Mean Scores Obtained from the "Fate" Subscale of the IAQ by the Students in the Intervention and Control Groups by Group and Time (n=124)

Time / Group	Pre-test Mean SD	Post-test Mean SD	Follow-up 1 Mean SD	Follow-up 2 Mean SD	Significance Test F, p Value	
Perception of Fate Intervention (n=62)	16.95 7.09	7.74 2.63	6.48 1.85	7.39 3.88	F= 97.295 p= 0.000	Group* F= 92.995 p= 0.000
Control (n=62)	15.98 7.21	16.68 7.48	18.26 6.71	18.27 5.90	F= 4.039 p= 0.008	Time* F= 28.221 p= 0.000
	t= 0.514 p= 0.608	t= 8.875 p= 0.000	t= 13.306 p= 0.000	t= 12.145 p= 0.000		Group* Time F= 59.840 p= 0.000

SD= Standard Deviation; F= Repeated measures ANOVA; *t*= t test; Significant at $p < 0.05$; *= Statistical Comparison

months. SCQ and IAQ was filled in the class by the student. The time required to complete the questionnaires was 15–20 min, and the questionnaires were collected immediately after completion. The results were evaluated pre-test, post-test, and at the 1-month and 4-month follow-ups.

Intervention

Training Program Based on the Health Belief Model

The HBM, one of the health promotion models, indicates that the health of individuals is influenced by their characteristics, perceptions, and stimulators. The focus of the model is to help people understand and change their own beliefs (19). Beliefs and behaviors in the HMB are divided into four sub-dimensions including perceived susceptibility, perceived seriousness, perceived benefit, and perceived barrier. Health education programs based on the HBM have been shown to effectively promote a range of behavioral changes (20,21). The HBM suggests that changes in behavior result from changes in the putative sociocognitive determinants of behavior; thus, interventions should target these changes (10). Evaluating the interventions is an important element of injury prevention, and statistical modeling plays a major part in large-scale evaluations (22). The training program content was developed by the researcher based on the HBM by taking the developmental characteristics of children 8-10 years old into consideration (1,8,10). Figure 2 shows the structure of the study according to the subscales of the HBM.

Application of the training program

The training program was presented to the students in the IG in four sessions, each of which lasted 40 minutes. To prevent interaction between the students of the CG and IG, all training program-related activities (presentation, poster work, video demonstration, implementation of playground safety checklist, etc.) were carried out in places where there were no CG students (library, seminar room). At the end of the training, the participants in the IG were given an informational booklet titled "Let's Play Safe" and instructed to read the booklet during the follow-up period. After the data of the IG were collected, CG students were administered the same educational program and given the same educational booklet.

Data Analysis

Statistical analysis of the data was performed using the SPSS statistical package program (version 21, NY, USA), at a 95% confidence interval level and a significance level of $p < 0.05$. For the descriptive statistical methods, frequency, percentage, mean values, and standard deviation were used to represent the data. The chi-square test was employed to compare the demographic variables to ensure homogeneity between the IG and CG. In

TABLE 2. Comparison of the mean scores obtained from the "vulnerability / severity" subscale of the IAQ by the students in the intervention and control groups by group and time (n=124)

Time / Group	Pre-test Mean SD	Post-test Mean SD	Follow-up 1 Mean SD	Follow-up 2 Mean SD	Significance Test F, p Value	
Perception of vulnerability / severity Intervention (n=62)	26.40 6.75	32.55 4.14	34.08 2.08	33.32 4.56	F= 36.998 p= 0.000	Group* F= 107.986 p= 0.000
Control (n=62)	27.58 5.82	25.55 6.02	24.03 6.14	23.10 6.02	F= 9.882 p= 0.000	Time* F= 5.264 p= 0.001
						Group* Time F= 39.571 p= 0.000
	t= 1.038 p= 0.301	t= 7.546 p=0. 000	t= 12.203 p= 0.000	t= 10.659 p= 0.000		

SD= Standard Deviation; F= Repeated measures ANOVA; *t*= t test; Significant at $p < 0.05$; *= Statistical Comparison

addition, the chi-square test was used to compare the state of having a playground accident at school over the past 6 months, and the Yates-corrected chi-square test was utilized to compare the state of getting injuries in the playground over the past 6 months.

While the multivariate analysis of variance for repeated measures was used for the inferential comparisons, the Bonferroni correction test for the significance of the difference between two means was used for further analysis. The predictive value of the changes in the scale and its subscales was evaluated using linear regression analysis. Statistical significance was set at $p < 0.05$.

Ethical considerations

Study approval was obtained from the Ege University Ethical Committee (Ege University Ethical Committee Date: 19-12-2016 and No: 1002016- 10/14). The study included children who were between the ages of 8 and 10, who were not to leave school for more than a year, who gave their verbal consent and whose parents provided their written consent. Of the students, those who had severe hearing or vision problems, learning disabilities, and were likely to leave school within a year were not included in the study.

RESULTS

The mean age of the students in the IG was 9.41 (SD = 0.69) years and, in the CG, the mean age was 9.48 (SD = 0.62) years. In the IG, 51.6% of the students reported having an accident in the school playground within the past 6 months and this rate was 48.4% among the students in the CG ($\chi^2 = 0.032$, p = 0.857). The mean number of accidents was 3.43 (SD = 4.1) in the IG and 3.13 (SD = 2.36) in the CG. At the end of the second follow-up; of the students, 4.8% in the IG and 19.4% in the CG were injured in school playground accidents within the past 6 months (χ^2 Yates = 4.854, p = 0.028). The mean number of injuries was 1.33 (SD = 0.58) in the IG and 2.92 (SD = 2.68) in the CG.

The comparison of the mean scores obtained from the fate subscale of the IAQ by group and time is shown in Table 1. The analyses revealed statistically significant differences between the mean scores in terms of time (F = 28.221, p = 0.000), group * time (F = 59.840, p = 0.000), and group (F = 92.995, p =0.000) ($p < 0.001$). In an additional analysis conducted to determine whether there was a difference within the intragroup mean scores, a significant difference was found both in the IG (F = 97.295, p = 0.000) and the CG (F = 4.039, p = 0.008).

TABLE 3. Comparison of the mean scores obtained from the preventability subscale of the IAQ by the students in the intervention and contro groups by group and time (n=124)

Time / Group	Pre-test Mean SD	Post-test Mean SD	Follow-up 1 Mean SD	Follow-up 2 Mean SD	Significance Test F, p Value	
Perception of preventability Intervention (n=62)	17.34 4.65	21.77 2.29	22.24 1.72	22.34 2.95	F= 48.288 p= 0.000	Group* F= 21.925 p= 0.000
Control (n=62)	18.94 4.66	18.34 4.27	19.76 4.55	17.37 5.43	F= 4.136 p= .007	Time* F= 15.637 p= .000
	t= 1.898 p= 0.60	t= 5.578 p= 0.000	t= 4.019 p= 0.000	t= 6.329 p= 0.000		Group * Time F= 21.635 p= .000

SD= Standard Deviation; F= Repeated measures ANOVA; *t*= t test; Significant at $p < 0.05$; *= Statistical Comparison

The comparison of the mean scores obtained from the vulnerability/severity subscale of the IAQ by group and time is shown in Table 2. The analyses revealed statistically significant differences between the mean scores in terms of time (F = 5.264, p = 0.001), group * time (F= 39.571, p = 0.000), and group (F= 10.986, p = 0.000). In the additional analysis conducted to determine whether there was a difference within the intragroup mean scores, a significant difference was found both in the IG (F = 36.998, p = 0.000) and the CG (F = 9.882, p = 0.000) (p <0.05).

The comparison of the mean scores obtained from the preventability subscale of the IAQ by group and time is presented in Table 3. The analyses revealed statistically significant differences between the mean scores in terms of time (F = 15.637, p = 0.000), group * time (F = 21.635, p = 0.000), and group (F = 21.925, p = 0.000) (p < 0.05). In the additional analysis conducted to determine whether there was a difference between the intragroup mean scores, a significant difference was found both in the IG (F = 48.288, p = 0.000) and in the CG (F = 4.136, p = 0.007).

The Comparison of mean scores of injury behavior risk according to group and time is shown in Table 4. The analyses revealed statistically significant differences in the mean scores in terms of time (F = 12.990, p = 0.000), group * time (F = 36.394, p = 0.000), and group (F = 4.689, p = 0.032) (p < 0.05). In the additional analysis conducted to determine whether there was a difference in the intragroup mean scores, a significant difference was found both in the IG (F = 45.772, p = 0.000) and the CG (F = 4.901, p = 0.003).

The effect of the training program on the scores obtained from the fate (d = .65), vulnerability/severity (d = .56), preventability subscales (d = .42), and injury behavior risk (d = .54) was found to be moderate. From the assessment of all of the subscales and injury risk, the strength of the study was determined to be high. Table 5 shows the predictive level of the training program in determining the changes in the scores the students obtained from the fate, vulnerability, and preventability subscales of the IAQ and injury behavior risk. The training program accounted for 44.1% of the difference in the fate subscale (R^2 = 0.441), 33.7% of the difference in the vulnerability/severity subscale (R^2 = 0.337), 28.1% of the difference in the preventability subscale (R^2 = 0.281), and 41.7% of the difference in the injury behavior risk score (R^2 = 0.417). The training program reduced the fate subscale score by 0.664-fold, increased the susceptibility/severity subscale score by 0.581-fold, increased the preventability subscale

TABLE 4. The Comparison of mean scores of injury behavior risk according to group and time (n=124)

Time / Group	Pre-test Mean SD	6 month after the pretest Mean SD	Significance Test F, p Value	
				Group*
Intervention (n=62)	13.90 10.20	4.03 3.57	F= 45.772 p= 0.000	F= 4.689 p= 0.032
				Time*
				F= 12.990 p= 0.000
Control (n=62)	11.42 10.07	14.15 10.87	F= 4.901 p= 0.003	
				Group*Time
				F= 36.394 p= 0.000
	t= 1.365 p= 0.175	t= 6.962 p= 0.000		

SD= Standard Deviation; F= Repeated measures ANOVA; *t*= t test; Significant at $p < 0.05$; *= Statistical Comparison

score by 0.530-fold, and reduced the injury behavior risk score by 0.645-fold (p = 0.000).

DISCUSSION

To our knowledge, this is study the first randomized control study in Turkey HBM based playground accidents prevention. The aim of the study is to investigate the effect of a training program developed based on the health belief model (HBM) on elementary school students' behaviors towards the prevention of playground accidents.

Fatalist approach, the child is more risky when playing and child thinks that she cannot prevent the accident in any way (e.g., "No matter what I do, if I am going to have an accident it will happen") (1). Studies have reported that identifying accidents with fate increases children's tendency to display risky behaviors (1,15). The present study found that after the training program based on the HBM, while the students in the IG's perceptions that playground accidents are related to fate decreased, those of the students in the CG who were not given training increased. Similarly, study in which training programs aimed at preventing playground accidents were applied reported that children's perceptions that accidents were related to fate changed positively (1). In our study, it is thought that the education program to prevent accidents in playgrounds positively affects the perceptions of fate of the students in the IG.

It has been reported that showing students the negative effects of the accidents on health in training programs through presentations, role-playing techniques, video demonstrations, etc. in order to increase their perception of vulnerability and severity is important (1,10). In the present study, after the training program, there were improvements in the IG students' perceptions of susceptibility/severity indicating that students could protect themselves from accidents by playing safe games. In parallel with the results of the present study, in Kane's (2012) study, the mean scores obtained by the IG students on the vulnerability and severity subscale increased significantly after the training, but changes in the CG students' scores were not significant (23). In their interventional study, Morrongiello and Matheis (2007) reported positive behavioral changes in the IG students regarding the prevention of accidents (24). In our study, the HBM-based training program was designed taking the characteristics of children's developmental periods into consideration and the methods used in the program led to the expected changes in the IG students' perception of vulnerability and severity regarding playground accidents.

Studies have shown that elementary school students can avoid the majority of accidental injuries using a precautionary strategy (e.g., safety training, video demonstrations, posters) (25,26). In this study, after the training and follow-ups, the IG students' beliefs that risky behaviors they displayed while playing could cause them serious harm increased their

TABLE 5. The predictive level of the training program in determining the changes in the scores the students obtained from the fate, vulnerability and preventability subscales of the IAQ and injury behavior risk

Variable	Fate	Vulnerability / Severity	Preventability	Injury Behavior Risk Score
	β	β	β	β
Intervention*	- .664	.581	.530	- .645
R	.664	.581	.530	.645
R^2	.441	.337	.281	.417
F	96.323	60.062	47.693	87.109
p	.000	.000	.000	.000
DW (1.5-2.5)**	2.036	1.847	1.897	1.912

Note * When the training program was coded, the intervention group was coded as "1" and the control group was coded as "0".

** Regression analysis assumes no correlation between independent and dependent variables as well as no correlation between error terms. SPSS has developed a simple criterion for correlation problems. The Durbin Watson statistic determines whether there is a correlation between statistical error terms and records values between 0 and 4. If the statistical value is around 2, it is interpreted as no correlation. Values close to 0 indicate high-positive correlation, whereas values close to 4 indicate high-negative correlation

perceptions that accidents could be prevented. After the training program, in the IG, injury-related risk behaviors decreased to the desired level and this decrease persisted in the follow-up assessments after the posttest. In a similar study, consistent with the results of in our study, the mean score the IG participants obtained on the preventability subscale increased significantly after the training; however, the mean score did not change for the CG (23). Several studies indicate that educational interventions are extremely important if students' attitudes toward accidents are to be improved, their risk prevention skills are to be strengthened, and their knowledge of the prevention of unintended injuries are to be increased (8,27). The HBM-based training program led to the expected changes in the students' risk-taking behaviors on the playground.

The effect size, as used in educational science studies, is considered as the collection of coefficients used to measure the degree of the effect of a method, combination of methods, or program (28). At the end of the present study, the power and effect size in the students' injury attitudes was found to be moderate for the fate, vulnerability/severity, and preventability subscales and the injury behavior risk score. A statistical power of 0.80 is considered to be adequate (29,30). The power of the present study was found to be high in all of the subscales of the IAQ and the injury risk assessment.

Based on these results, the HBM based training program conducted to prevent playground accidents and the methods used in the training reduced the IG students' perceived fate and injury behavior risk scores and increased their perceived vulnerability/severity and preventability scores as expected. In a study conducted by Kane (2012), in the IG participants, the perception of fate decreased whereas the perception of vulnerability/severity and preventability increased after the intervention (23). These results demonstrate that the HBM based training program and the methods used in the training were effective in preventing playground accidents.

A limitation of the present study was that it was not possible to prevent interactions between the groups because the students in the IG and CG attended the same school and because there were close friendship and kinship relationships between some of the students. In future research in order to prevent students from interacting with each other, students in the IG and CG should be selected from different schools. Research regarding playground accidents can be performed in schools located in places with different socio-cultural characteristics. Performing the training program on the prevention of playground accidents throughout the academic year, integrating it into the curriculum, and including the teachers in the program can positively contribute to the prevention of playgrounds accidents experienced by students.

CONCLUSION

As a result of this research, H1, H2, H3, and H4 hypotheses were accepted. The training program reduced the mean scores obtained on the fate subscale of the IAQ by the IG students, increased their mean scores for the vulnerability/severity and preventability subscales, and reduced their injury risk scores. At the end of the study, the effect level of the training program on the fate, vulnerability/severity, and preventability subscale scores of the IAQ and on the injury risk assessment was determined to be moderate. The power of the present study was found to be high in all of the subscales of the IAQ and the injury risk assessment. The training program accounted for 44.1% of the difference in the fate subscale, 33.7% of the difference in the vulnerability/severity subscale, 28.1% of the difference in the preventability subscale, and 41.7% of the difference in the injury risk score. The training program reduced the fate subscale score by .664-fold, increased the susceptibility/severity subscale score by .581-fold, increased the preventability subscale score by .530-fold, and reduced the injury risk score by .645-fold.

The present study revealed that the training program based on the basic concepts of the Health Belief Model was considered as a scientific guide helping students gain behavioral changes by evaluating their injury attitudes.

Implications for Practice

School nurses should design and implement training programs in order to positively change the level of association that students establish between playground accidents and bad luck or fate and to strengthen connections between the preventability of accidents and behavior. Additionally, in order to increase student perception of susceptibility and severity toward preventing students' risky behaviors, during training programs, school nurses should visibly emphasize the factors responsible for accidents and the negative effects of playground accidents on health (presentation, poster, role-playing, and video screening). In schools, risky student behaviors resulting in playground accidents should be recorded and educational programs on preventing accidents should be included in the curriculum. Activities (designing posters, role-playing technique, etc.) should be organized to increase active student participation by motivating students during the training programs carried out by school nurses, and the school management, teachers, and school personnel should be given some responsibilities in the conduction of these activities. These health education programs regarding playground accidents in schools should be sustainable.

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REFERENCES

1. Morrongiello BA, Kane A. An evaluation of the cool 2 be safe program: an evidence-based community-disseminated program to positively impact children's beliefs about injury risk on playgrounds. Prevention Science. 2015;16(1):61–69.
2. Olsen K, Kennedy E. Safety of School Playgrounds: Field Analysis From a Randomized Sample. The Journal of School Nursing. 2019;1-7.
3. Adelson SL, Chounthirath T, Hodges NL, Collins CL, Smith GA. Pediatric Playground-Related Injuries Treated in Hospital Emergency Departments in the United States. Clinical Pediatrics. 2018; 57(5):584-592.
4. Huynh HT, Demeter NE, Burke RV, Upperman JS. The Role of Adult Perceptions and Supervision Behavior in Preventing Child Injury. J Community Health. 2018;42:649-655.
5. Turkish Statistical Institute. 2015. Available at:. http://www.tuik.gov.tr/. Accessed September 2, 2019.
6. Suminski R, Presley T, Wasserman JA, McClain E, Johnson M. Playground Safety is Associated With Playground, Park, and Neighborhood Characteristics. J Phys Act Health. 2015;12(3):402-8.
7. Kılınç E, Gür K. The Effect of Health Belief Model Based Initiatives in Preventing School Injuries. HSP. 2018;5(3):467-475.

8. Zhang LL, Wang SM, Dalal K. Injury related risk behaviour: A health belief model-based study of primary school students in a safe community in shanghai. Plos One. 2013;8:1.
9. Gözüm S, Çapık CA. Guide to the development of health behaviors: the Health Belief Model. Dokuz Eylül University Nursing Faculty Journal. 2014;7:230-237.
10. Cao ZJ, Chen Y, Wang SM. Health belief model based evaluation of school health education programme for injury prevention among high school students in the community context. BMC Public Health. 2014;14:26.
11. Farhadi Z, Roshanaei G, Bashirian S, Rezapur-Shahkolai F. The effect of an educational program on school ınjury prevention in junior high school students of famenin based on the health belief model. J Educ Community Health. 2014;1(3):1-11.
12. Gottwald M, Goodman-Brown J. Health Belief Model. A Guide To Practical Health Promotion. 1nd ed. England, McGraw-Hill Educatio;2012, p. 73-78.
13. Gür K, Yıldız A. Students in the school accident validity and reliability of knowledge and behavior scale for security measures. Maltepe University Journal of Nursing Science and Art. 2009;2(1):10-21.
14. Speltz ML, Gonzales N, Sulzbacher S, Quan L. Assessment of injury risk in young children: a preliminary study of injury behavior checklist. Journal of Pediatric Psychology. 1990;15:373-383.
15. Morrongiello BA, Kane A, McArthur BA, Bell M. Physical risk taking in elementary- school children: Measurement and emotion regulation issues. Personality and Individual Differences. 2012;52:492–496.
16. Potts R, Martinez IG, Dedmon A, Schwarz L, Dilillo D, Swisher L. Brief report: cross-validation of the Injury Behavior Checklist in a school-age sample. J Pediatr Psychol. 1999;22(4):533-540.
17. Uysal A, Ergül Ş, Ardahan M. Injury risk in pre-school children. Ege University Nursing School Journal. 2008;24:105-114.
18. Koca B, Uysal Toraman A. The Validity and Reliability Analyses of the Turkish form of Injury Attitudes Questionnaire for School Children. Dokuz Eylül University nursing faculty of electronic journals. 2019;12(1):57-76.
19. Carpenter CJ. A meta-analysis of the effectiveness of health belief model variables in predicting behavior. Health Communication. 2010;25(8):661–669
20. Garnett GP, Cousens S, Hallett TB, Steketee R. Walker N. Mathematical models in the evaluation of health programmes. Lancet. 2011;378(9790):515–525.
21. Webb TL, Sniehotta FF, Michie S. Using theories of behaviour change to inform interventions for addictive behaviours. Addiction. 2010;105(11):1879–1892.
22. Ergün S, Kalkım A, Dolgun E. Child-to-child training for prevention of school ınjuries in odemis, Turkey. The Journal of School Nursing. 2012;29:337-342.
23. Kane A. Evaluation of Cool 2 Be Safe: A Community-Based Intervention Program to Promote Positive Attitudes Towards Less Risky Play on Playgrounds in School-Age Children.2012. A Thesis presented to The University of Guelph, Canada.
24. Morrongiello BA, Matheis S. Addressing The Issue of Falls off Playground Equipment: An Empirically-Based Intervention to Reduce Fall-Risk Behaviors on Playgrounds. Journal of Pediatric Psychology. 2007;32:819–830.
25. Lovejoy S, Weiss JM, Epps HR, Zionts LE, Gaffney J. Preventable childhood injuries. J. Pediatric. Orthopaedics. 2012;32:736–742.
26. Simpson JC, Nicholls J. Preventing unintentional childhood injury at home: Injury circumstances and interventions. International Journal of Injury Control and Safety Promotion. 2012;19:141–151.
27. Mutto, M., Lawoko, Stephen., Ovuga, Emilio., & Svanstrom, L. Childhood and adolescent injuries in elementary schools in north-western uganda: extent, risk and associated factors. International Journal Of Injury Control And Safety Promotion. 2012;19(4), 357-367.
28. Hoyt WT. Del Re AC. Effect size calculation in meta-analyses of psychotherapy outcome research. Psychother Res. 2018;28(3):379-388.
29. Capık C. Examining statistical powers in articles published in a nursing journal. Journal of Anatolia Nursing and Health Sciences. 2013;16(3):170-17.
30. Prajapati B, Dunne M, Armstrong R. Sample size estimation and statistical power analyses. Optometry Today. 2010;16(07):10-18.