

The Effect of a School-Based Health Belief Model Intervention on Safety Measures Behaviors in School Accidents Among Elementary School Students

İlköğretim Öğrencilerinde Okul Temelli Sağlık İnanç Modeline Dayalı Girişimin Okul Kazalarında Güvenlik Önlemleri Davranışlarına Etkisi

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Abstract

Objective: This study aimed to investigate the effect of a Health Belief Model-based intervention on elementary school students' behaviors regarding safety measures in school accidents.

Method: This research was a quasi-experimental study (ClinicalTrials ID: NCT05576987) with a pretest-posttest control group design. According to the power analysis, the minimum required number of participants was 87 for both the experimental and control groups. Considering missing and erroneous data and participant absenteeism, the study was conducted with 100 students in each group. Students selected for the experimental group received education prepared based on the components of the Health Belief Model, delivered by the researcher once a week for 20 minutes over a period of four weeks. At the beginning and end of the study, a personal data identification form and a behavior scale regarding safety measures in school accidents were administered to both groups.

Results: The mean age of the students was 9.3 years. Among the participants, 47% were girls and 53% were boys. In both the pretest ($p < 0.001$) and posttest ($p < 0.001$) assessments, girls scored significantly higher than boys. No statistically significant difference was observed between the groups in behavior scores following the intervention ($p = 0.141$), nor was a significant within-group change detected from pretest to posttest ($p = 0.443$).

Conclusion: The Health Belief Model-based education on school accidents did not create an effect on students' behaviors regarding safety measures in school accidents. Further research with longer education durations and the inclusion of parents is needed.

Keywords: School, Accident, Student, Health Belief Model, Education.

Özet

Amaç: Bu çalışmada ilkokul öğrencilerinde Sağlık İnanç Modeli temelli girişimin öğrencilerin okul kazalarında güvenlik önlemlerine yönelik davranışlarına etkisinin araştırılması amaçlanmıştır.

Yöntem: Bu araştırma, öntest-sontest kontrol gruplu yarı deneysel bir çalışmadır (ClinicalTrials ID: NCT05576987). Güç analizine göre, deney ve kontrol gruplarının her biri için gerekli minimum katılımcı sayısı 87 olarak belirlendi. Çalışma katılımcı devamsızlığı, eksik ve hatalı veriler düşünülerek her iki grupta da 100 öğrenci ile yürütüldü. Sağlık İnanç Modeli bileşenleri temel alınarak hazırlanan eğitim, deney grubuna seçilen öğrencilere, araştırmacı tarafından haftada bir gün 20 dakika süreyle ve dört hafta verildi. Her iki gruba çalışma başlangıcında ve sonunda kişisel veri tanımlama formu ile okul kazalarında güvenlik önlemlerine yönelik davranış ölçeği uygulandı.

Bulgular: Öğrencilerin %47'si kız, %53'ü erkekti. Öğrencilerin yaş ortalaması 9,3'dü. Hem ön test ($p < 0.001$) hem de son testte ($p < 0.001$) kız öğrencilerin puanı erkek öğrencilerden yüksekti. Eğitim müdahalesinden sonra davranış puanlarının gruplara göre farklılık göstermediği ve ($p = 0,141$) eğitim sonrası davranış puanında eğitim öncesine göre anlamlı bir farkın olmadığı saptandı ($p = 0,443$).

Sonuç: Sağlık inanç modeli temelli okul kazalarına yönelik eğitimin öğrencilerin okul kazalarında güvenlik önlemlerine yönelik davranışlarında bir etki oluşturmadı. Eğitim süresinin daha uzun olduğu ve ebeveynlerin de çalışmaya dahil edildiği araştırmalara ihtiyaç vardır.

Anahtar kelimeler: Okul, Kaza, Öğrenci, Sağlık İnanç Modeli, Eğitim

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Some summary findings of this study were presented as an oral presentation at the 3rd International and 4th National Public Health Nursing Congress, held online between January 11–13, 2023.



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1. Introduction

An accident is defined as an event resulting in injury or an unexpected occurrence that requires emergency medical attention, encompassing incidents such as trauma, fractures, poisoning, and burns (Gambarte et al., 2014). Accidents represent a significant public health problem due to their association with deaths and temporary or permanent disabilities. Injuries are among the leading causes of death and lifelong disability in individuals aged 5–14 years (WHO, 2022). Children in this age group spend a substantial portion of their day at school, where they are also highly physically active. This increased physical activity heightens the risk of accidents and injuries. It is reported that approximately 15% of childhood accidents occur in the school environment (Gambarte et al., 2014). In an epidemiological study examining school accidents between 2012 and 2016 in Turkey, 7,042 school injury records were analyzed. The study revealed that the majority of school injuries were caused by falls (60.1%) and occurred during break times (38.6%), with 13.3% attributed to environmental factors and 86.7% to behavioral causes (Şengel et al., 2020). Thus, modifying behaviors that lead to injuries and promoting behaviors related to preventive safety measures could significantly reduce the risk of school-related injuries. Three levels of impact have been identified in injury prevention, each requiring different intervention strategies: (1) the intrapersonal level, targeting self-efficacy, knowledge, skills, and beliefs; (2) the interpersonal level, targeting social and peer influences and norms; (3) the community level, focusing on environmental modifications and policy changes. Among these, the Health Belief Model (HBM) is one of the most widely applied theories addressing behavior change at the individual (intrapersonal and interpersonal) levels (Orton et al., 2016).

The Health Belief Model, initially developed by Rosenstock in 1966 and later expanded by Becker et al., focuses on individuals' attitudes and beliefs (Gözüm and Çapık, 2014). The model posits that health behaviors are primarily influenced by an individual's personal beliefs or perceptions regarding a health condition. Accordingly, when a child perceives injury as a serious threat and recognizes its consequences, they are more likely to adopt positive behavioral changes to prevent injuries.

Previous studies have demonstrated that HBM-based school health education can improve students' health beliefs regarding injury (Cao et al., 2014). Similarly, another study found that educational interventions based on the HBM improved students' practices in preventing school injuries (Farhadi et al., 2014). Overall, evidence suggests that HBM-based interventions can enhance health beliefs and practices related to injury prevention. However, there is limited evidence regarding the effectiveness of HBM-based interventions in improving behaviors specifically related to safety measures among primary school students. The purpose of this study is to investigate the effect of HBM-based education on elementary school students' behaviors regarding safety measures in school accidents. Additionally, it is expected that the findings will provide scientific evidence to support school health nurses in utilizing the HBM to promote behavioral changes for injury prevention in school settings.

Hypothesis

School accident prevention education, prepared in line with the components of the Health Belief Model, affects students' safety precautionary behaviors

2. Materials and Methods

2.1. Study design

This study is a quasi-experimental research with a pretest-posttest control group design (ClinicalTrials.gov ID: NCT05576987). The CONSORT checklist was used to report this study.

2.2. Population and Sample

The research was conducted at Selçuklu Elementary School, a state school with a total student population of 1100. The population of the study consisted of 640 students enrolled in the 3rd and 4th grades of a primary school during the 2022–2023 academic year. There were a total of 15 classes across the 3rd and 4th grades in this school. To determine the sample size, a power analysis was conducted based on the mean scores and standard deviations related to safety measures behaviors from a previous study (Dilek, 2018). The power analysis was performed with a significance level of 0.05 for Type I error, an effect size of 0.50, and a power of 0.95. According to the results of the power analysis, the minimum required number of participants was determined as 87 for the experimental group and 87 for the control group. Considering missing or erroneous data and student absenteeism, the study was conducted with 100 students in each group. For the experimental group, three classes were selected by drawing lots, and for the control group, another three classes were also selected by drawing lots. To ensure that students did not miss their regular lessons during the training, the study groups were formed on a class-by-class basis. All students in these classes were invited to participate in the study. Accordingly, the students' parents were informed, and their written consent was obtained. The study commenced with a total of 100 students who provided consent. During various weeks of the educational sessions, 10 students from the experimental group who missed sessions due to absenteeism were excluded from the study. Data from 90 students who attended all four weeks of the educational sessions were included in the final analysis. In the control group, 8 students who were absent during the second scale administration after the initial assessment were excluded. Consequently, the study was completed with 92 students in the control group.

Inclusion Criteria

- Being enrolled in the 3rd or 4th grade
- Volunteering to participate in the study
- Obtaining parental consent
- Ability to speak and understand Turkish

Exclusion Criteria

- Having visual or hearing impairments
- Lacking full proficiency in Turkish
- Unwillingness to participate in the study
- Lack of parental consent

2.3. Data Collection Tools

Data were collected using a the Personal Data Identification Form and The Scale of Behavior of Students towards Safety Measures in School Accidents.

2.3.1. The Personal Data Identification Form

This form, prepared by the researchers based on a review of the literature, included questions aimed at identifying personal characteristics such as age, gender, parental education level, and history of experiencing a school accident.

2.3.2. The Scale of Behavior of Students towards Safety Measures in School Accidents

This scale, developed by Gür and Yıldız (2009), consists of 4 factors. Factor 1 is Unsafe Behaviors, Factor 2 is Safe Behaviors, Factor 3 is Safe Behaviors Towards Outside, and Factor 4 is Behaviors in the School Bus. The questions are scored in the opposite direction. The scale consists of 40 items and is a 5-point Likert type scale. For each item, it is required to tick one of the options “Always”,

“Often”, “Sometimes”, “Rarely”, “Never”. For each question, “Always” receives 5 points, “Often” receives 4 points, “Sometimes” 3 points, “Rarely” 2 points, and “Never” receives 1 point. 2nd, 3rd, 4th, 5th, 7th, 10th, 12th, 20th, 21st, 22nd, 26th, 32nd, 34th, 36th, 37th, 38th, 39th. Questions are scored in the opposite direction. Before the statistical analyses, the reverse-scored items were appropriately transformed. Then, all analyses were conducted. The lowest score that can be obtained from the scale is 40, and the highest is 200. The highest score obtained from the scale shows that the student takes the security measures for school accidents at the highest level. In this study, the Cronbach's alpha reliability coefficient of the scale was calculated as $\alpha = 0.87$ in the pretest and $\alpha = 0.90$ in the posttest.

2.4. Data Collection and Intervention

The study was conducted between October 3, 2022, and October 28, 2022. The classes in which the study would be conducted were selected by a random lottery method among 15 classes. The classes selected in the first group constituted the experimental group, while those in the second group constituted the control group. Afterwards, informed written consent was obtained from the students and their parents in the selected classes (Figure 1).

2.5. Experimental Group

Pretest data were collected from students in the selected experimental classes who had provided informed consent, using the The Personal Data Identification Form and the Safety Measures Behavior Scale for School Accidents. Data collection was conducted face-to-face during class hours permitted by the school administration. Following the pretest, students received HBM-based education on school accident prevention, delivered for 20 minutes per week over a period of four weeks. The educational sessions were scheduled in coordination with classroom teachers and conducted within the classroom environment. At the end of the fourth week, following the completion of the educational intervention, the Personal Data Identification Form and the Safety Measures Behavior Scale for School Accidents were re-administered to the students. The training content was prepared in line with the components of the Health Belief Model (HBM). It was delivered in a PowerPoint presentation format, with an emphasis on incorporating more visuals. The presentation was conducted using the smart boards available in the classrooms. The training topics based on the components are provided in Table 1.

Table 1. Training topics based on the components of the HBM

| Components of the Model | Training Topics |
|--------------------------|---|
| Perceived Susceptibility | What is an accident? |
| | School Accidents: Definition and Scope |
| | Where do school accidents occur? |
| Perceived Severity | What are the risk factors for school accidents? |
| | Consequences of school accidents |
| Perceived Benefits | Health problems resulting from accidents |
| | What should be done to prevent school accidents? |
| | Behaviors that help prevent school accidents |
| Perceived Barriers | Positive outcomes of preventing school accidents |
| | Barriers to preventing school accidents |
| Motivation | Ways to reduce or eliminate these barriers |
| | How to take action to prevent school accidents |
| Self-Efficacy | Benefits of preventing school accidents |
| | How to change behaviors that cause school accidents |

2.6. Control Group

In the control group, the Personal Data Identification Form and the Safety Measures Behavior Scale for School Accidents were administered in the same manner. Data collection was carried out face-to-face during class hours permitted by the school administration, similar to the experimental group. No intervention was applied to the control group during the study period. At the end of four weeks, the



same data collection tools were re-administered concurrently with the experimental group. After the completion of the educational intervention and posttest data collection in the experimental group, a 40-minute educational session on school accident prevention was provided separately to each of the three control classes to ensure that students were not deprived of the training.

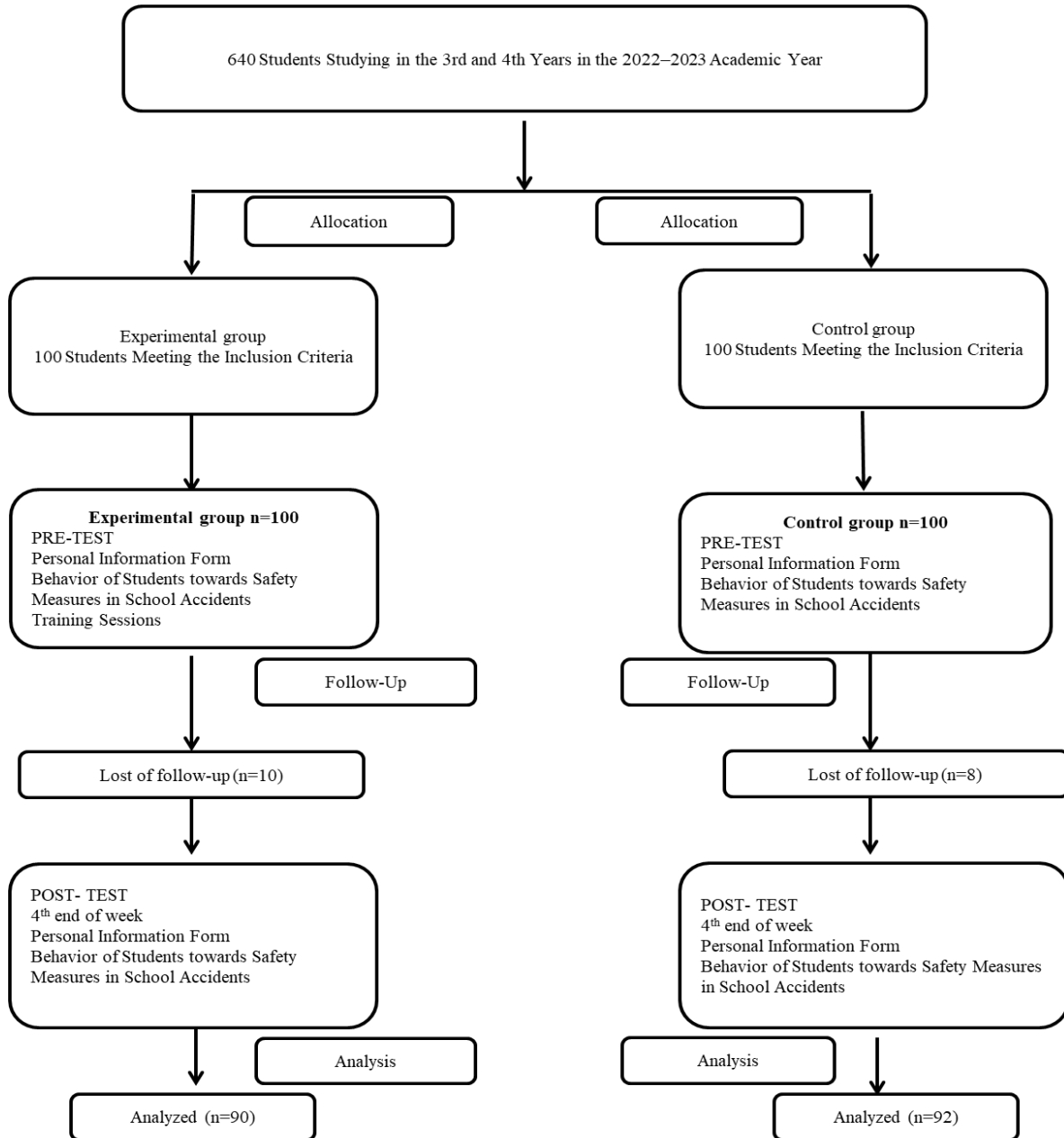


Figure 1. Study flowchart

2.7. Outcomes

The primary outcome of this study was the students’ behaviors regarding safety precautions in school accidents.

2.8. Ethical Considerations

Ethical approval was obtained from the Clinical Research Ethics Committee of Afyonkarahisar University of Health Sciences (Decision Date: June 3, 2022; Decision Number: 2022/340).

2.9. Statistical Analysis

Data were analyzed using IBM SPSS Version 25. The normality of the data distribution was evaluated using the Kolmogorov-Smirnov test and Skewness-Kurtosis coefficients. Since the Skewness and Kurtosis values were within the range of -2 to +2, the assumption of normality was accepted. Descriptive statistics for the scale were presented as mean and standard deviation values. Independent samples t-test was used to compare the students' scale scores according to individual characteristics and to compare pretest and posttest scores between the experimental and control groups. Paired samples t-test was used to analyze the within-group differences between pretest and posttest scores. The significance level was set at $p < 0.05$.

3. Results

The mean age of the students was 9.3 years. Of the students, 47% ($n = 85$) were girls and 53% ($n = 97$) were boys; 25.3% ($n = 46$) were in the third grade and 74.7% ($n = 136$) were in the fourth grade. It was found that 42.3% of the students traveled to school by their parents' car, 28% walked, 23.1% used a school bus, and a smaller proportion commuted by bicycle or public transportation. Additionally, 65.4% of the students had experienced a school accident before, and among those who had an accident, 27.1% received treatment at a hospital. It was determined that most accidents occurred during recess periods (40.3%) and in the schoolyard (42.2%). Regarding the causes of accidents, 43.5% resulted from falling and 25.9% from colliding with a friend. When asked about the reasons for their injuries, 44.1% of the students attributed the cause to their own carelessness, 39.3% to the carelessness of a friend, and 16.6% to environmental factors such as slippery surfaces or holes in the schoolyard (Table 2).

Table 2. Some individual characteristics of the students

| | Experimental group | | Control group | | Total | |
|---|--------------------|------|---------------|------|-------|------|
| | n | % | n | % | n | % |
| Gender | | | | | | |
| Girl | 41 | 45.6 | 44 | 47.8 | 85 | 46.7 |
| Boy | 49 | 54.4 | 48 | 52.2 | 97 | 53.3 |
| Grade level | | | | | | |
| Third grade | 18 | 20.0 | 28 | 30.4 | 46 | 25.3 |
| Fourth grade | 72 | 80.0 | 64 | 69.6 | 136 | 74.7 |
| How do you commute to school? | | | | | | |
| On foot (walking) | 26 | 28.9 | 25 | 27.2 | 51 | 28.0 |
| By bicycle | 1 | 1.1 | 2 | 2.2 | 3 | 1.6 |
| By minibus/bus | 6 | 6.7 | 1 | 1.1 | 7 | 3.8 |
| By school shuttle | 20 | 22.2 | 22 | 23.9 | 42 | 23.1 |
| By parents' car | 37 | 41.1 | 40 | 43.5 | 77 | 42.3 |
| Have you ever had a school accident before? | | | | | | |
| Yes | 60 | 66.7 | 59 | 64.1 | 119 | 65.4 |
| No | 30 | 33.3 | 33 | 35.9 | 63 | 34.6 |
| Did you receive medical treatment at a hospital after the accident? | | | | | | |
| Yes | 19 | 31.7 | 13 | 22.4 | 32 | 27.1 |
| No | 41 | 68.3 | 45 | 77.6 | 86 | 72.9 |
| When did the accident happen? | | | | | | |
| During recess | 39 | 44.3 | 42 | 37.2 | 81 | 40.3 |
| At the start of school | 5 | 5.7 | 5 | 4.4 | 10 | 5.0 |
| At the end of school | 7 | 8.0 | 13 | 11.5 | 20 | 10.0 |
| During class | 10 | 11.4 | 10 | 8.8 | 20 | 10.0 |
| During lunch break | 24 | 27.3 | 32 | 28.3 | 56 | 27.9 |
| During a group activity | 3 | 3.4 | 11 | 9.7 | 14 | 7.0 |
| Where did the accident happen? | | | | | | |
| Schoolyard/playground | 32 | 38.1 | 46 | 45.5 | 78 | 42.2 |
| Classroom | 10 | 11.9 | 12 | 11.9 | 22 | 11.9 |
| Restroom | 3 | 3.6 | 3 | 3.0 | 6 | 3.2 |
| Stairs | 17 | 20.2 | 16 | 15.8 | 33 | 17.8 |
| Cafeteria/canteen | 1 | 1.2 | 5 | 5.0 | 6 | 3.2 |
| School corridor | 19 | 22.6 | 18 | 17.8 | 37 | 20.0 |
| School shuttle | 2 | 2.4 | 1 | 1.0 | 3 | 1.6 |
| How did you get injured? | | | | | | |
| Falling | 40 | 51.9 | 44 | 37.9 | 84 | 43.5 |
| Being pierced by an object | 4 | 5.2 | 5 | 4.3 | 9 | 4.7 |
| Colliding with a friend | 16 | 20.8 | 34 | 29.3 | 50 | 25.9 |
| Being hit by a falling object | 1 | 1.3 | 5 | 4.3 | 6 | 3.1 |
| Getting cut | 3 | 3.9 | 10 | 8.6 | 13 | 6.7 |
| Spraining | 8 | 10.4 | 15 | 12.9 | 23 | 11.9 |
| Getting squeezed/trapped | 5 | 6.5 | 3 | 2.6 | 8 | 4.1 |
| What do you think was the cause of the accident? | | | | | | |
| My own carelessness | 30 | 54.5 | 34 | 43.6 | 64 | 44.1 |
| My friend's carelessness | 26 | 47.3 | 31 | 39.7 | 57 | 39.3 |
| Environmental factors at school (Slippery floor, high stairs, potholes in the playground, etc.) | 11 | 20.0 | 13 | 16.7 | 24 | 16.6 |



When the students' behavior scores regarding safety measures in school accidents were compared according to certain individual characteristics, it was found that in both the pretest ($t = 5.772, p < 0.001$) and the posttest ($t = 6.443, p < 0.001$), the scores of female students were higher than those of male students. However, when analyzed by groups, there was no significant difference between female and male students within the control group ($p > 0.05$). Additionally, there was no significant difference in scale scores based on whether the students had previously experienced a school accident or had received hospital treatment ($p > 0.05$) (Table 3).

Table 3. Comparison of scale scores according to some individual characteristics of the students

| Behavior of students towards safety measures in school accidents | | | | | | | | | |
|---|--------------------|--------------------|--------------------|---------------|--------------|---------------|-------|--------------------|--------------------|
| | Experimental group | | | Control Group | | | Total | | |
| | | Pretest | Posttest | | Pretest | Posttest | | Pretest | Posttest |
| | n | Mean±SD | Mean±SD | n | Mean±SD | Mean±SD | n | Mean±SD | Mean±SD |
| Gender | | | | | | | | | |
| Girl | 41 | 137.63±13.97 | 141.20±13.64 | 43 | 133.14±16.93 | 133.42±18.15 | 85 | 140.07± 12.44 | 143.06±12.53 |
| Boy | 49 | 126.65±18.68 | 125.65±19.99 | 49 | 135.61±14.61 | 139.55±15.64 | 97 | 126.94± 17.45 | 127.43±19.08 |
| t/p | | 3.106/0.003 | 4.221/0.000 | | -0.752/0.454 | -1.741/0.085 | | 5.772/0.000 | 6.443/0.000 |
| History of a previous school accident | | | | | | | | | |
| Yes | 60 | 130.90±18.15 | 132.52±19.44 | 61 | 132.97±17.35 | 136.43±18.37 | 119 | 132.37 ±16.80 | 134.38±17.54 |
| No | 30 | 133.17±16.30 | 133.17±18.30 | 31 | 137.39±11.50 | 137.19±14.34 | 63 | 134.40 ±16.34 | 135.40±19.20 |
| t/p | | - 0.577/0.565 | - 0.152/0.879 | | -1.281/0.203 | - 0.203/0.840 | | -0.782/0.435 | -0.361/0.719 |
| Receiving medical treatment at a hospital after the accident | | | | | | | | | |
| Yes | 19 | 128.84±20.32 | 132.53±22.26 | 19 | 131.26±18.21 | 130.79±20.90 | 32 | 128.81± 18.45 | 132.69±19.98 |
| No | 41 | 131.85±17.24 | 132.51±18.29 | 42 | 133.74±17.11 | 138.98±16.76 | 85 | 133.59 ± 16.25 | 134.78±16.60 |
| t/p | | - 0.595/0.554 | 0.003/0.998 | | -0.513/0.610 | -1.634/0.108 | | -1.365/0.175 | -0.575/0.566 |

t: Independent samples t-test, p: probability value

When comparing the pretest ($t = -1.137$, $p = 0.257$) and posttest ($t = -1.479$, $p = 0.141$) scores between the experimental and control groups, no statistically significant difference was found (Table 4).

Table 4. Comparison of scale scores between the experimental and control groups

| Variable | Time | Experimental group | Control group | t/p | Cohen's d |
|--|----------|--------------------|------------------|--------------|-----------|
| | | $\bar{X} \pm SD$ | $\bar{X} \pm SD$ | | |
| Behavior of students towards safety measures in school accidents | Pretest | 131,66 ±17,50 | 134,46±15,70 | -1.137/0257 | 0.17 |
| | Posttest | 132,73±18,97 | 136,68±17,05 | -1.479/0.141 | 0.22 |

t: Independent samples t-test, p: probability value

In the within-group comparison conducted to evaluate the effectiveness of the HBM-based education, no significant difference was observed between the pretest and posttest scores in the experimental group ($t = -0.771$, $p = 0.443$). However, in the control group, the posttest scores were found to be significantly higher than the pretest scores ($t = -1.993$, $p = 0.049$) (Table 5).

Table 5. Comparison of the pre-test and post-test scale scores within the experimental and control groups

| Variable | Time | Experimental group | Control group |
|--|------------|---------------------|---------------------|
| | | $\bar{X} \pm SD$ | $\bar{X} \pm SD$ |
| Behavior of students towards safety measures in school accidents | Pretest | 131,66 ±17,50 | 134,46±15,70 |
| | Posttest | 132,73±18,97 | 136,68±17,05 |
| | t/p | -0.771/0.443 | -1.993/0.049 |
| Cohen's d | | 0.059 | 0.14 |

t: Paired-Sample T-Test, p: probability value

4. Discussion

This study aimed to investigate the effect of HBM-based education on elementary school students' behaviors regarding safety measures in school accidents. The results of the study revealed that the HBM-based education, delivered once a week over a four-week period, did not have a significant impact on students' behaviors related to safety measures in school accidents.

The results of this study showed that female students exhibited better behaviors regarding safety measures in school accidents. A study conducted among adolescents identified male gender as the most significant predictor of injury (Kılınç & Gür, 2020). Another study demonstrated that sixth-grade male students were more likely to cross the street during a red light compared to female students (Holm et al., 2018). Although the study populations were different, these findings are similar to our study in terms of highlighting gender differences. It can be suggested that risk behaviors differ between genders; boys may engage in riskier play activities, whereas girls may act more cautiously. This difference in gender characteristics may explain the observed variation in behaviors related to safety measures in school accidents. However, a study investigating the relationship between personality traits and accident-related injuries in children found no association between gender and accidents (Vollrath et al., 2003). Although the accident type in that study was not limited to school accidents, when considering the relationship between accident proneness and preventive behaviors, the findings appear to differ from ours. However, the sample in that study consisted of children who were

admitted to the hospital due to accidents. This difference may be attributed to the behavioral pattern similarities among children who have experienced accidents.

In this study, no significant difference was found between students who had previously experienced an accident and those who had not, nor between students who had received hospital treatment due to an accident and those who had not, in terms of behaviors related to safety measures for school accidents. This result suggests that students' experiences with accidents and receiving hospital treatment did not lead to a change in their safety behaviors, indicating that they may not have sufficiently learned from their past experiences. The age range of the study population was 9 to 10 years. The transition from concrete to abstract thinking typically occurs between the ages of 11 and 13 (Ülger, 2023). Accordingly, at younger ages, since children's abilities for abstract thinking and establishing cause-and-effect relationships are not yet fully developed, they may not adequately assess the future risks associated with their past accidents. This situation may explain why accident experiences did not lead to a behavioral change.

The results of this study indicated that school accidents occurred most frequently during recess periods and in the schoolyard, and that the leading causes of these accidents were falls and collisions with peers. This finding highlights the importance of improving students' behaviors related to safety measures. Moreover, it emphasizes the necessity of supervising children in accordance with school rules, particularly during recess and in the schoolyard. In this context, ensuring an adequate number of duty teachers becomes critically important. Duty teachers can contribute to reducing the risk of accidents by monitoring risky behaviors that could lead to accidents, providing necessary warnings to students, and promoting the development of safe behaviors among children. Several studies have also found that school accidents occur most frequently in the schoolyard (Dilek & Öncel, 2018; Eraslan & Aycan, 2008; Gevrek Akar & Kökcü Doğan, 2021). Additionally, other studies have demonstrated that falls are the most common cause of school accidents (Akçay & Yıldırımlar, 2018; Gevrek Akar & Kökcü Doğan, 2021).

HBM is one of the most widely applied models in injury prevention. This model suggests that individuals are more motivated to engage in healthy behaviors if they believe they are susceptible to a particular adverse health outcome. Furthermore, it suggests that the greater an individual's perception of the severity of a negative health outcome, the stronger their motivation to take preventive action. (Carpenter, 2010). The components of the model provide a conceptual foundation for educational interventions aimed at behavior change. In this study, education on school accident prevention was provided to students based on the components of the HBM. Following the educational intervention, students' behaviors regarding safety measures in school accidents were evaluated. However, no significant change was observed in the behavior scores of the students after the education. Additionally, no significant difference was found between the experimental and control groups in terms of behavior scores. Accordingly, it can be concluded that the HBM-based education did not have a significant effect on students' behaviors related to safety measures for school accidents. The lack of a significant impact of the training may be related to the duration of the intervention, as a four-week period may have been insufficient to achieve behavioral change. Indeed, a previous study demonstrated that the average time required for a behavior to become automatic is approximately 66 days (Lally et al., 2010). Nevertheless, some studies in the literature have reported the effectiveness of training programs delivered over a period of 2 to 6 weeks.

Cao et al. (2014) provided HBM-based injury prevention education to high school students and found that students' health beliefs regarding injury increased six weeks after the intervention. In another study, Rezapur-Shahkolai et al. (2017) delivered a four-session preventive behavior education program over two weeks to elementary school students concerning traffic injuries and found that the

intervention positively affected students' preventive behaviors related to traffic injuries. Similarly, Farhadi et al. (2014) conducted a six-week, five-session HBM-based educational program aimed at preventing school injuries among middle school students and reported that the educational intervention improved students' self-protection skills. In these studies, the educational interventions were found to be effective. The differences between these findings and the results of our study may be attributed to variations in participant characteristics, differences in the methods of educational delivery, and differences in the measurement tools used.

Although no intervention was applied to the control group, their post-test scores were higher than their pre-test scores; however, no significant difference was observed when compared with the experimental group. However, when assessed in terms of effect size, Cohen's *d* was quite small, reflecting a very slight difference. In other words, although statistically significant, its practical importance appears to be low. Nevertheless, there may be several possible explanations for this minor difference. One possibility is that the children in this group, being aware of their participation in a research study, may have felt observed and believed that certain changes were expected of them, which could have influenced their responses to the scale. This situation is referred to in the literature as the Hawthorne effect, which describes the tendency of individuals to modify their behavior when they are aware that they are being observed (Berkhout et al., 2022; McCambridge et al., 2014). Additionally, prior exposure to the same scale may have increased familiarity with the questions, thereby enhancing the accuracy of responses—a phenomenon known as the test–retest effect (Scharfen et al., 2018). In contrast, children who received the training may have approached the scale questions less seriously after the intervention, thinking, “I have already learned this topic.” Moreover, in the experimental group, the Hawthorne effect may have been masked by the impact of the intervention program. On the other hand, the test–retest effect in this group may have been relatively diminished, as the children likely attempted to answer the questions based on the knowledge gained from the intervention.

4.1. Limitations of the Study

This study has several limitations. To prevent students from falling behind in their coursework, random assignment to groups was not possible; instead, existing classes were assigned as groups. Another limitation is that the duration of the educational intervention was limited to four weeks, and parents were not included in the study.

5. Conclusion

The education program on school accident prevention, prepared based on the components of the HBM, did not have a significant effect on students' behaviors regarding safety measures in school accidents. Future interventions aimed at preventing school accidents should involve both teachers and parents. Additionally, experimental studies with longer intervention periods, larger sample sizes, and collaboration with schools should be planned to more clearly demonstrate the effectiveness of HBM education.

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Conflict of Interest

The authors do not declare any conflict of interest

Ethical Statement

I declare that I have complied with scientific and ethical principles in conducting and writing this study and that I have duly cited all the sources used.

Approval has been obtained from the Clinical Research Ethics Committee of Afyonkarahisar University of Health Sciences. Decision Date: 03.06.2022, Decision Number: 2022/340

Use of Artificial Intelligence: No artificial intelligence-based tools or applications were used in the preparation of this study. All content of the study was produced by the authors in accordance with scientific research methods and academic ethical principles.

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