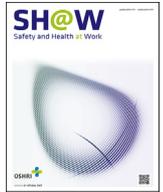




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Original Article

The Factors Affecting Unsafe Behaviors of Iranian Workers: A Qualitative Study Based on Grounded Theory

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ABSTRACT

Background: Some researchers state that they are not yet able to provide a deep understanding of the underlying causes of unsafe behaviors (UBs). Therefore, the present study was conducted to investigate the attitudes and experiences of Iranian workers of UBs.

Methods: This present study was conducted in 35 industries using a semistructured interview based on grounded theory. Forty participants were interviewed, including 13 industrial safety and health experts and 27 workers and supervisors. The analysis of the present study consisted of a three-step coding process including open, axial, and selective coding.

Results: The results showed that the factors affecting UBs could be classified into three categories: organizational, individual, and socioeconomic factors. Organizational factors were divided into 6 parts: procedure and environmental conditions, communications, monitoring, organizational safety culture, resource allocation, and human resources. Socioeconomic factors had three subcategories: community safety culture, type of organizational ownership, and economic problems. Finally, the individual factors were classified into two categories of personality traits and individual competence.

Conclusion: The results showed that organizational factors were the most categorized, and it is estimated that this factor has a more important role in the UBs. Of course, to better understand the close relationship between these factors and find the weight and importance of each factor, it needs to measure it with multicriteria decision systems.

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1. Introduction

The occurrence of accidents in the workplace is one of the negative consequences of the expansion and growth of industries in different societies [1]; it is estimated that injuries caused by accidents by 2020 will have been the second leading cause of disability in developing countries and the third leading cause of death and disability in the world [2]. In this regard, studies have shown that unsafe behaviors (UBs) are the main cause of accidents [3,4]. In various studies, the prevalence of UBs in the occurrence of accidents has been reported between 80 and 95% [5,6], showing the importance of study and deep understanding of this issue.

The results of previous studies show that the prevalence of UBs among workers is high and identifying the factors affecting it is very important. Many studies have conducted to identify the effective factors on UBs and various factors have been reported in this regard; personal characteristics, psychological aspects, safety climate, risk perception, stress [3,7–9], lack of awareness about safety, work stress, coworkers' attitude, and other psychological, organizational and economic factors [10]. Some studies have also identified and studied some causes of UBs such as personality, safety climate, psychological climate, and work attitudes by conducting meta-analysis studies [11–13]. Yu et al. [14], using Fishbone Diagram to analyze the factors that affect the UBs of coal miners, divided these factors into five aspects, individual factors, physical

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environment, safety leadership, safety management, and group factors. Other studies used statistical analysis [15] or provided limited explanations and elaborations [16] to study UBs.

However, some researchers state that they are not yet able to provide a deep understanding of the underlying causes and motivations that contribute to UBs [10]. In addition, workers' behavior and perceptions can also be influenced by contextual conditions such as culture, education, and society which exist differently in different countries and societies [12]. In addition, understanding the factors affecting the occurrence of UBs in different societies could be effective in preventive and control measures. Therefore, it is need to study the factors affecting UBs based on the cultural structure and social conditions of Iran.

In Iran, according to the studies conducted, the prevalence of UBs among workers have been reported between 43.23% and 54.76 [17,18]. Based on the systematic review and meta-analysis study conducted by the authors on prevalence of UBs in Iranian workers, the present study showed a prevalence of 40.37% [19]. In only one study conducted for understanding the UBs in Iran, 6 categories of social, organizational, contracting, safety management and supervision, work conditions, and personal characteristics were reported as the affecting factors on UBs [20]. In addition, a review of past studies shows that most of the studies that have been done on UBs are quantitative and have addressed only one factor such as workers' perceptions; therefore, the factors that facilitate and encourage UBs and the main reasons for these behaviors among Iranian workers are not yet well understood. The present study was aimed to investigate the effective factors and root causes of UBs among Iranian workers by a comprehensive qualitative study based on grounded theory.

2. Materials and methods

This is a qualitative approach based on grounded theory with semistructured face-to-face interviews. Individual interviews were recorded and later written for data analysis.

2.1. Interview setup

To create a comprehensive framework, we designed some questions based on previous studies [21,22] that could provide a better understanding of the reasons for the UBs. A pilot study was conducted on 8 participants to ensure that the questions were understandable to workers. Questions such as "What do you think UBs is? What is your attitude toward UBs? What do you think is the cause of UBs?" were asked. Of course, after the initial interviews, to ensure that the interviews are in-depth, we also asked follow-up questions such as "When you say ... what do you mean? Or others have mentioned ..., what is your opinion?".

2.2. Study procedure

The surveyed industries were selected in different cities of Iran. Before each interview, a brief introduction to the study was provided to all participants. The participants were informed before the start of the interview that they had the right to leave the interview at any time, and that the information collected would remain strictly confidential and anonymous. In addition, the participants were informed that the interviewers were independent academic researchers with no contact with their employers, and their answers were collected for analysis without identification and would be used solely for academic purposes. The interviews were all conducted in

Persian and in a comfortable and quiet room. The duration of the interviews ranged from 15 minutes to one hour and 10 minutes.

2.3. Participants

Based on a study carried out by Mason who reviewed 560 qualitative studies and proposed a mean sample size of 31 [23], 40 participants in the present study seems acceptable. Of these, 13 were industrial safety and health expert and 27 line workers and production supervisor. Most of the participants were men (90%). The mean (standard deviation) age and work experience of the participants were 37.47 years (6.23) and 14.18 (5.40) years with a minimum of 5 years of work experience. The surveyed industries included 25 large industries (more than 250 workers, such as pipe production, steel company, petrochemical and refinery, cement, mining and construction) and 15 medium and small industries (less than 250 workers such as paper company, stone powder, car repair workshop and welding workshop), at least 4 workers from each industry.

The following five criteria were used to select participants [24].

- A) Importance: Do the participants have sufficient knowledge and experience in their job and safety?
- B) Identified by others: Are workers identified as experts (workers with more than 5 years of experience in a job, as well as undergraduates and masters of occupational health with more than 5 years of experience) in the desired job and safety?
- C) Diversity: Are selected workers employed in different occupations?
- D) Safety experts in the Ministry of Cooperatives, Labor and Social Welfare with more than 10 years of work experience.
- E) Industries: Industries with at least one part-time or full-time safety expert and small workshops with multiple occupational accidents.

2.4. Data analysis

The recorded audio data were transcribed and analyzed using reading the full text of the interviews. The analysis of the present study involves a three-step coding process that includes open, axial, and selective coding [25]. The first stage of open coding refers to the initial and line-by-line analysis of data [26], in which qualitative data are coded into units of meaning (themes) that are quite similar to the words used by participants (as example of data "Some of us had a small technical force at that time and they were very busy and had to work night shifts" can be coded as "shortage of workers") [27]. Similar and analytical concepts were grouped. Concepts that were highly interrelated were combined on a more theoretical and abstract level (e.g. work pressure), by which the themes or categories were identified. The second stage of axial coding is the process of determining the relationship between the categories obtained from open coding [28]. In other words, axial coding can be recategorized based on its nature [29]. Finally, selective coding was used to extract the conceptual model.

In addition, to improve data analysis, two approaches, partial and holistic, were used. In this way, in the partial approach, the text of the interviews was read line by line, and if one or more semantic paragraphs came to mind, that part was selected as the unit of analysis. The semantic unit was then condensed to form one or more short sentences. This analysis procedure was performed throughout the text of the interviews. In the holistic approach, the text of the interview was considered as a semantic unit and after reading the whole text and its

Table 1
Classification of the factors affecting unsafe behaviors using interview coding

Category	Row	Subcategory	Theme
Organizational factors	1	Work system and conditions	Working pressure Environmental conditions Type of payment No person-job fit Punishment and encouragement system
	2	Communications	Interpersonal Interdepartmental
	3	Monitoring	External Internal
	4	Organization safety culture	Role model for workers Priority of productivity over safety Management attitude about safety The tendency of the organization toward unsafe behaviors
	5	Allocate resources	Perfunctory Weakness of technology Inadequate personal protective equipment
	6	Human resources	Inadequate budget allocation for safety Insufficient worker Training Job satisfaction and security
Individual factors	1	Personality traits	Arrogance and ostentation Pertinacity Risk perception Consideration of Future Safety Consequence
	2	Individual competence	Negligence Work experience Education
Socio-economic factors	1	Community safety culture	Safety literacy Place of residence
	2	Type of ownership of the organization (governmental and private)	
	3	Economic problems	

coding several times, subthemes were extracted. Then, these subthemes were semantically categorized into the main themes [30].

3. Results

3.1. Results of coding

All interviews were analyzed and the concepts were extracted. The results are in fact similar statements and opinions of the participants, which are expressed in an integrated manner. The coding results are showed in Table 1. Each category will be described in detail.

3.1.1. Organizational factors

Organizational factors based on the experiences of the participants are formed in any organization with the opinions and thoughts of the employer and the supervisor.

3.1.1.1. Procedure and working conditions. The system and working conditions were defined as the job trends and procedures and environmental conditions of the industry. In this regard, one of the participants stated that “in work pressure, we are asked to work as much as two or three people, which may lead to UBs ... Yes, one of the reasons for this is work pressure.”. The theme of the type of payment is how to check the performance of the worker, which is offered in some manufacturing jobs in proportion to the number of pieces made in a day, and other jobs are calculated as a daily wage of the worker’s performance. Hence, some participants stated that the production process made working faster and ignored the safety. For example, “when the payment is based on the number of productions, the work force likes to finish his/her work as soon as possible and rest, so maybe a seat belt or safety shoes will slow him down”. The participants stated that if a person was not fit for his/her job in terms of mental and physical ability; this mismatch will lead to UBs. For example, “Sometimes we have to hire someone who is not suitable for the job.”. Punishment and encouragement

systems are also one of the controlling approaches to UBs. In this regard, “If the supervisor sees that a person is using the device, he encourages him and someone else sees that his colleague has been rewarded for safety equipment; it may affect him because of the reward. Encouragement at work increased the use of safety equipment.”.

3.1.1.2. Communication. Communication between people in an industry and that between the safety sector and other sectors were one of the issues that participants cited as a factor in enhancing safety and controlling UBs. One participant noted: “I generally make friend with the guys and they themselves understand that if I say something, it is because of them. Sometimes, they say that now someone who has a bachelor’s degree is sitting at a desk and now he wants to tell them something; it is difficult for them, but now I have behaved in such a way that he is friendly and thinks that I am one of them and it is like this. I think they are less pressured and accepted more easily” Regarding the interdepartmental relationship for monitoring UBs, one participant stated that “what we have defined for a supervisor to have a duty in this area; we did not have such a thing ... UBs may occur, but since there was no accident, I do not understand at all and no one tells me at all.”.

3.1.1.3. Monitoring. Monitoring UBs was presented as a factor controlling UBs and divided into two subcategories: external institutions (certification organizations of management systems or regulatory organizations) and internal monitoring (safety supervisor or line supervisor). A participant stated, “if we divide the overall safe behavior, 99% of UBs depend on monitoring. That is, UBs occurs when we, as observers, do not pay attention to it.” Another participant also stated: “we do not have a specific system for recording UBs; maybe, I did not think about it at all.” In Iran, the Labor Office is responsible for registering and investigating occupational accidents. To do this, all industries are required to report their accident statistics to the department during specific periods, and if a fatal accident occurs, the agency will identify the causes.

Large industries are also seeking management systems certification and achieving this type of certification requires a well-established security system. Therefore, the participants were asked whether organizations and institutions outside the organization also monitor UBs. One participant stated, “there is no legal system like the accident and no one asked me to record UBs. I have to record the accident and send the report, but not for UBs”.

3.1.1.4. Organization safety culture. The participants stated that some factors affecting UBs existed due to the organization’s safety culture. Role model for workers refers to a situation in which people with industry experience become a role model for young and inexperienced workers. “Another very bad thing is the existence of a series of experienced personnel inside the workshop with UBs and setting an example for a series of new workers who make UBs a culture. It gradually becomes a pattern.” The employer’s attitude causes a prioritization between productivity and safety, and if productivity takes precedence over safety, UBs increases in the organization. “Employers are not aware and they only consider safety as a cost; they regard spending extra for safety as an additional cost. They only think about production, not safety, and these unfortunately have led to the abandonment of safety, resulting in a lot of damage.”. Another issue is the tendency of the organization toward UBs. One of the participants stated that “one of them is the policies within the organization, how to turn an UB of a person into a safety behavior, the wrong policies of the system”. Perfunctory was defined as ignoring safety at all levels. “In general, as soon as we want to get the ISO, as the previous month, everything will be great and safe, and after getting the certification it’s the same old story; there is no safety.”

3.1.1.5. Allocate resources. Participants stated that the existence of safe equipment could be effective in reducing UBs and talked about the inadequacy of equipment and the lack of adequate funding for safety. For example, “Here, what prevents us from making further progress is the factory technology. That is, you can deploy many safety items in an ideal state when the technology is up-to-date and now the weakness of technology is blocking our way and the equipment is extremely old, related to 30 years ago.”

3.1.1.6. Human resources. This factor is categorized into three sections: insufficient worker, training and job satisfaction, and security. For example, “I do not have a driver’s license as a lifter, but I became a crane driver. The work did not stop and I was a driver because we had a shortage of drivers, and if I do not make up for the shortage, I will have to get things done.” Or “Lack of worker. We must do our duty in that shift now, whether with one person or with 100 people, ourselves or others.” Or “Health safety training in this company (with a part-time safety officer) is not much. I used to work for another company and there was a complete training. They had a department for safety. Maybe once a year, there was no training and it was just a lecture.”.

3.1.2. Socioeconomic factors

Based on the interviews, socioeconomic problems are the underlying factors that will affect the attitude and safety culture of the people working in the organization, including the worker, supervisor, and employer.

3.1.2.1. Economic problems. Economic problems were one of the socioeconomic factors that most participants emphasized. One of the participant stated that “If I say I need something, I have to pay for it to make it safer. They make it light and heavy, it is prioritized in the financial cycle, and then you see that this priority comes from the first one that they said comes second, third, and even

lower. The reason is the financial cycle and economic conditions; for example, you need raw materials and suppose you also need a protection for your device. First, they provide the raw materials, so that the production line works ... they prioritize their production and then come to safety.”

3.1.2.2. The type of ownership of organization (governmental and private). It refers to the way organizations are classified in Iran, i.e. two categories: governmental and private. “We had two types of managers in this company; one was a private manager and the other a governmental one. Governmental managers may be more open-handed because they care about these things. The governmental manager says there is a government budget to spend ... In my opinion, the cost was not borne by the owner, but by the managers who were private and owner. Well, if they wanted to do anything, they had to pay from their own pockets. Maybe, that’s why a lot of things didn’t happen.”.

3.1.2.3. Community safety culture. This factor refers to the attitude about safety in the community, which was classified into two sub-categories of safety literacy and place of residence. One of the participants stated that “the most important reason for UBs in my opinion is a person’s family and social culture; some people enjoy doing something when it is unsafe”. According to the participants about safety literacy “We must start safety from schools I remember we went to school and they visited the same company, but at that time no one talked to us about safety. In the university, we passed 143 courses, but not even two courses were about safety.”

3.1.3. Individual factors

This category shows individual characteristics that cause UBs.

3.1.3.1. Personality traits. This category refers to the internal features of individuals and they can be defined as specific patterns of thinking, excitement, and behavior. One participant stated that “Some characters do UBs because they think they know very well and they are smart and skillful. Some people may say no, but because of their arrogance they do it unsafely.” Or “Sometimes there is a series of pertinacity; for example, someone has a problem with his supervisor; I tell him to do something like this and he says I will not do it.” As for the risk perception, it was stated that “there are some who follow the principles arbitrarily, or there are those whose nature is risk-taking, or who want to attract attention, and you have to worry about how to deal with them.” Participants referred to consideration of future safety consequence (CFSC) as people who consider the potential consequences of their current behavior in the future. “But basically, where there is a danger, one is threatened; for example, where there is chlorine or ammonia gas, we must be careful and use a mask. I mean we should use safety equipment for our own health. One hundred percent safety goes exactly to itself” Regarding negligence, participants say that “The main reason and the first reason for UBs is negligence, underestimating the issues. For example, they did not think that what they were going to do was less likely to be dangerous.”.

3.1.3.2. Individual competence. From the participants’ point of view, individual competence refers to the abilities, skills and knowledge gained from the work environment. Of course, in the case of education and experience, it is said that these two factors are both controller and facilitator of UBs. Participants stated that “early in the production, which was not training, there was an accident and many people experienced it and after that they work safely and the others tried to observe safety issues.” Or “Yes, if someone has more work experience, he will not wear a helmet anymore and says I have known here that an accident has not happened to me for

several years ... but someone who is just coming to work observes better and is better trained." Or "The level of literacy and education is important. I strongly believe that it affects safety and UBs. We are looking for people with higher education to have lower UBs and literacy to be effective."

3.2. Grounded theory conceptual model

In the next step, axial coding was used to identify the relationships between the variables. To explore the relationships between the codes, the interviews were reviewed several times in a partial and holistic manner, and only the factors that were conceptually related to each other based on the expression of the participants were extracted. This process is, therefore, a conceptual framework with four components: causal conditions, external influencing factors, intervention conditions, and its consequences (Fig. 1). The main phenomenon considered in this study is "UBs". Causal conditions are the main causes of UBs. Arrogance and ostentation cause a person to ignore safety, and show off, so UBs increase. CFSC and risk perception occur in individuals due to awareness of the consequences of danger and safety. This allows the person to accept the safety warnings applied in the organization and control his behaviors which lead to safe behavior. The end result of the UBs will be occupational accidents.

The socioeconomic factors are the external features that affect both individual and organizational factors. Economic problems cause the management to prioritize productivity, which leads to the neglect of safety under normal situation. If an organization is in financial trouble, it will not consider safety and purchase safe equipment; in such situations, if the worker wants to behave safely, he cannot do so because of unsafe conditions. Community safety culture causes people to consider UBs as normal and be institutionalized as a culture in them.

Interfering factors of UBs are classified into two categories: facilitators and barriers. Facilitating factors such as perfunctory lead to the institutionalization of UBs in the organization. In addition, no person-job fit leads to the individual's inability to do work in a safe way. Weak technology also prevents the worker from being provided with appropriate and safe equipment and helps the worker to perform UBs by creating excuses.

Barrier factors prevent UBs if they are properly established in the organization. For example, if there is appropriate training, the worker can appropriately manage his behavior by knowing the main cause of safe behavior and the reason for safety in the organization. On the other hand, the existence of job satisfaction and security causes the worker not to intentionally behave unsafely.

4. Discussion

The aim of this study was to identify the main causes of UBs among Iranian workers using grounded theory. The results show that the three categories of organizational, socioeconomic, and individual factors are the main causes of UBs. According to a review study by Khosravi et al., in 2014, communication, resource management, environmental conditions, management attitude, and social factors have been expressed [20]. The present study confirmed that the causes of UBs are multidimensional and generally related to society, organization, and individual characteristics. The organizational factors depend on the employer and supervisor's safety attitude and priority to reduce UBs by allocating appropriate equipment, budget, procedure, and working conditions. In this regard, studies have shown that these are some organizational factors that have affected the disaster in the high-tech industry [31]. One of the important organizational factors extracted in the present study was the priority of productivity over safety in terms of organizational management. Numerous studies

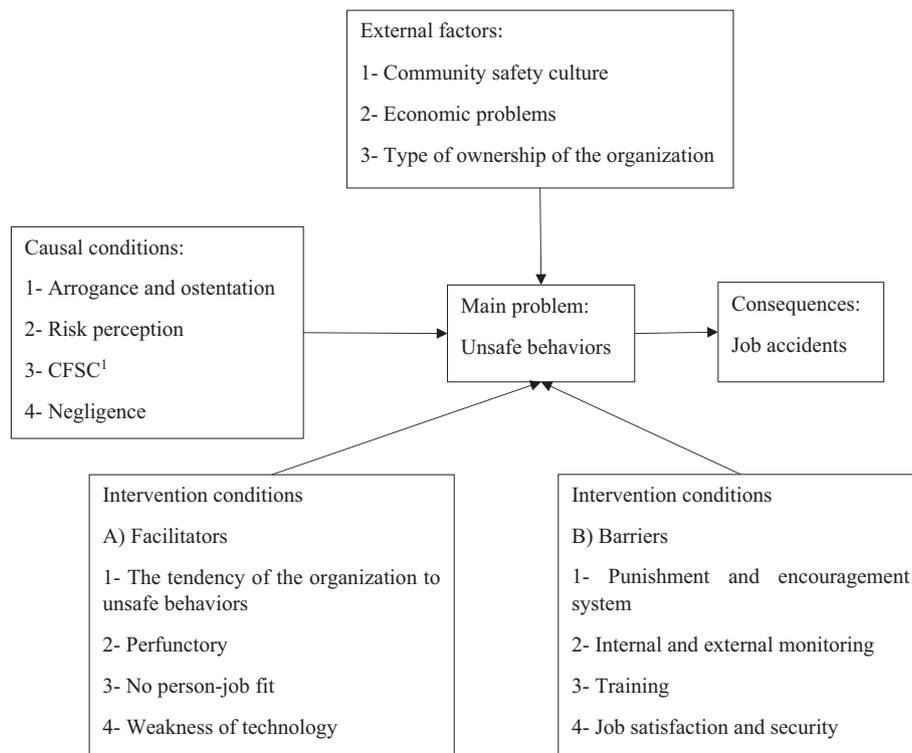


Fig. 1. The results of conceptual model with axial coding. 1: Consideration of Future Safety Consequence.

have shown that the priority of productivity over safety is one of the key dimensions [32,33]. The other factor that has been founded in the present study but has not been addressed in other studies was perfunctory. This concept means that all levels of industry ignore safety. This disregard means that people either do not care about safety regulations, or only pursue safety duties.

One of the most basic issues affecting UBs in this study were socioeconomic factors that affected both productivity and safety priorities of an organization and the attitudes of people within the organization (managers and workers). It can be said that the reason for some UBs and some management attitudes toward safety is the safety literacy of these people. According to the results, safety is not taught comprehensively in schools and universities. Therefore, it can be concluded that the number of workers literate in safety is not high. These findings are in the same line with those of previous studies. Guldenmund [34] states that a nation's cultural values are acquired in the family and school environment before employment and are reflected in the behavior of the individuals in the workplace. Economic problems are also an important factor, which is similar to the study of Khosravi et al. indicating that according to interviews with executives and project, because there is no stable economy when defining the contract, the project is not funded and the financial situation of the projects is shaky and fluctuating. Similarly, Mullen states that when resources (time and budget) are insufficient, there is a great deal of pressure on managers and workers to prioritize safety over performance, which creates the conditions for the adoption of safe procedures [35]. Most of the safety experts interviewed believed that the reason for not investing in safety was due to lack of understanding of direct and indirect costs of the accidents and economic values of safety.

Another important factor in the occurrence of UBs was individual factors. Individual factors refer to a number of issues, some of which are personality traits and others are individual competencies that a person has acquired over the years of his or her life. In the meantime, arrogance and ostentation was one of the characteristics that have been mentioned in both the present study and other research. Mullen et al. refer to arrogance as Macho Person Syndrome, in which a person strives to maintain a personal image in the workplace. People are afraid that they will be labeled unprofessional in their jobs, and that is why they behave unsafely. The arrogant person does not pay attention to the teachings and ignores them [35]. Choudhry and Fang [10] argue that workers do well in training but want to show at work that tough guys are "tough guys" and are not afraid of getting hurt. In addition, workers with more experience find safety boring. Another personality trait obtained in the present study was CFSC. This characteristic means that people do not engage in UBs because of their foresight and concern for their health and future. In this regard, Man et al. in their investigation on construction workers' attitudes toward UBs found that people were less likely to engage in UBs in the future or were opposed to UBs [36]. Feng et al. also found that construction workers who were older, married, or dependent on family members had a more positive perception of safety than those who were younger, single, or had fewer family members. The consequence is that workers tend to operate more safely as social responsibilities increase. In addition, UBs are considered stupid [37].

5. Conclusion

The results of the present study show that socioeconomic, organizational, and individual factors affect the UBs of Iranian workers. These factors are very much related to each other and affect each other. Organizational factors were the most categorized, and it is estimated that this factor has a more important role

in the UBs of workers. Of course, to better understand the close relationship between these factors and find the weight and importance of each factor, it is necessary to measure it with multicriteria decision systems.

There were some limitations in this study that should be taken into consideration when interpreting the results; Despite the benefits of qualitative study, quantitative studies could be conducted to determine the frequency, prevalence, and also importance weights of UBs factors. Furthermore, the current research did not study the socioeconomic factors in detail, further studies is needed to determine root causes for poor community safety culture and its effect on UBs. Finally, since the model proposed using the authors ideas, which formed an integral part of the grounded theory inductive process [38], other models could be proposed compatible with the data obtained.

Conflicts of interest

The authors declare no potential conflict of interest with respect to the research, authorship, and/or publication of this article.

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