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Vahid Ranaei

*Hormozgan University of Medical Sciences*

Alireza Sahab Jahanlu

*Hormozgan University of Medical Sciences*

Laleh Hassani

*Mother and Child Welfare Research Center*

Ghodratollah Roshanaei

*Hamadan University of Medical Sciences*

Kristin Haglund

*Marquette University, kristin.haglund@marquette.edu*

*See next page for additional authors*

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**Authors**

Vahid Ranaei, Alireza Sahab Jahanlu, Laleh Hassani, Ghodratollah Roshanaei, Kristin Haglund, Jagnoor Jagnoor, and Forouzan Rezapur Shahkolaei

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Vahid Ranaei

*Social Determinants in Health Promotion Research Center, Hormozgan Health Institute, Hormozgan University of Medical Sciences, Bandar Abbas, Iran, vahidranaei222@gmail.com*

Alireza Shahab Jahanlu

*Cardiovascular Research Center, Hormozgan University of Medical Sciences, Bandar Abbas, Iran, jahanlu@gmail.com*

Laleh Hassani

*Department of Health Promotion and Education, School of Health, Mother and Child Welfare Research Center, Hormozgan University of Medical Sciences, Bandar Abbas, Iran, lhassani1969@gmail.com*

Shohratollah Roshanaei

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*Department of Biostatistics, School of Public Health, Modeling of Noncommunicable Diseases Research Center, Hamadan University of Medical Sciences, Hamadan, Iran., gh.roshanaei@umsna.ac.ir*

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Kristin Haglund

*Marquette University, kristin.haglund@marquette.edu*

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## Beliefs about Safe Traffic Behaviors among Male High School Students in Hamadan, Iran: A Qualitative Study Based on the Theory of Planned Behavior

### Abstract

Road traffic injuries are public health challenges with heavy economic and social burdens. Road traffic injuries are common in developing countries and occur disproportionately with adolescents. This study aimed to elicit beliefs about traffic behaviors based on the theory of planned behavior among male high school students in Hamadan, Iran. We used a constructivist-interpretive qualitative design with directional content analysis. Interviews were conducted with 19 adolescent males in Hamadan, Iran. Analysis revealed that theory of planned behavior fit well to explain how perceptions, attitudes, and beliefs influenced traffic behaviors. Perceived subjective norms in the forms of parental encouragement, traffic rules and policies, and media advertising influenced the pursuit of safe traffic behaviors. Control belief factors that impeded safe behaviors included aggressive and/or drunk driving and bad road conditions, distance to bridge crossings, and improper seat belt position. Our results provided a deeper understanding of attitudes, experiences, and intentions that precede adolescents' traffic behaviors. Understanding precursors to behaviors is necessary for effective intervention. Further exploration of factors that lead youth to engage in unsafe behaviors despite education, knowledge, and presence of influential people that promote safe traffic behaviors is needed.

### Keywords

adolescent, traffic behaviors, qualitative content analysis, health promotion, theory of planned behavior

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### Authors

Vahid Ranaei, Alireza Shahab Jahanlu, Laleh Hassani, Ghodrattollah Roshanaei, Kristin Haglund, Jagnoor Jagnoor, and Forouzan Rezapur Shahkolaei

## Beliefs about Safe Traffic Behaviors among Male High School Students in Hamadan, Iran: A Qualitative Study Based on the Theory of Planned Behavior

Vahid Ranaei<sup>1</sup>, Alireza Shahab Jahanlou<sup>2,\*</sup>, Laleh Hassani<sup>3</sup>, Ghodratollah Roshanaei<sup>4</sup>, Kristin Haglund<sup>5</sup>, Jagnoor Jagnoor<sup>6</sup>, Forouzan Rezapur-Shahkolai<sup>7</sup>

<sup>1</sup>Social Determinants in Health Promotion Research Center, Hormozgan Health Institute, Hormozgan University of Medical Sciences, Bandar Abbas, Iran

<sup>2</sup>Cardiovascular Research Center, Hormozgan University of Medical Sciences, Bandar Abbas, Iran

<sup>3</sup>Department of Health Promotion and Education, School of Health, Mother and Child Welfare Research Center, Hormozgan University of Medical Sciences, Bandar Abbas, Iran

<sup>4</sup>Department of Biostatistics, School of Public Health, Modeling of Noncommunicable Diseases Research Center, Hamadan University of Medical Sciences, Hamadan, Iran.

<sup>5</sup>Marquette University, College of Nursing, Milwaukee, Wisconsin, USA

<sup>6</sup>The George Institute for Global Health, UNSW, Australia

<sup>7</sup>Department of Public Health, School of Public Health and Social Determinants of Health Research Center, Hamadan University of Medical Sciences, Hamadan, Iran

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Road traffic injuries are public health challenges with heavy economic and social burdens. Road traffic injuries are common in developing countries and occur disproportionately with adolescents. This study aimed to elicit beliefs about traffic behaviors based on the theory of planned behavior among male high school students in Hamadan, Iran. We used a constructivist-interpretive qualitative design with directional content analysis. Interviews were conducted with 19 adolescent males in Hamadan, Iran. Analysis revealed that theory of planned behavior fit well to explain how perceptions, attitudes, and beliefs influenced traffic behaviors. Perceived subjective norms in the forms of parental encouragement, traffic rules and policies, and media advertising influenced the pursuit of safe traffic behaviors. Control belief factors that impeded safe behaviors included aggressive and/or drunk driving and bad road conditions, distance to bridge crossings, and improper seat belt position. Our results provided a deeper understanding of attitudes, experiences, and intentions that precede adolescents' traffic behaviors. Understanding precursors to behaviors is necessary for effective intervention. Further exploration of factors that lead youth to engage in unsafe behaviors despite education, knowledge, and presence of influential people that promote safe traffic behaviors is needed.

*Keywords:* adolescent, traffic behaviors, qualitative content analysis, health promotion, theory of planned behavior

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### Introduction

Road traffic injuries (RTIs) are one of the most important public health challenges with heavy economic and social burden to any country and they are the most important causes of death in developing countries (Omidi et al., 2016). According to the 2018 World Health Organization (WHO) statistics on road accidents, the annual number of road fatalities is 1.35

million people, in which one person is killed on the roads every 24 seconds (World Health Organization, 2018). Men are three times more likely to die in road accidents than women (Toroyan & Peden, 2007). In Iran, the annual incidence of RTIs is 34 cases per 100 thousand persons, with an estimated rate of 20.5 deaths per 100,000 population (World Health Organization, 2018).

In middle- and low-income countries, young people (15 to 30 years old) have the highest proportion of deaths due to RTIs (World Health Organization, 2018). According to the WHO global status report on road safety, every year, 460,000 young people under the age of 30 (1,262 people per day) die in road accidents, more than 75% of whom are young men (Toroyan & Peden, 2007). RTIs account for approximately 35-40% of deaths among adolescents (10-19 years age group) and young adults (19-24 years age group) in Western countries (Riaz et al., 2019). In Iran, a recent review showed that of 22,865 RTI victims, about 3578 were children and adolescents under 19 years old (Behzadnia & Shahmohammadi, 2016).

Hamadan is a metropolis in the western, mountainous region of Iran and is the center of the province of Hamadan. At the 2019 census, its population was 783,300 in 230,775 families. This city has a substantial burden of RTIs. In a review of data from emergency departments of the hospitals of Hamadan province during the years 2009-2014, 21.8% of patients presenting for care due to injuries were due to RTIs (Khazaei et al., 2016). Road traffic accidents, injuries, and deaths occur disproportionately in young men and are catastrophic tragedies that can be prevented.

Human factors and errors play important roles in RTIs (Dadipoor et al., 2020). Analytic epidemiologic studies have shown that 16–19-year-old adolescent drivers, especially males, are almost four times more likely to be injured in RTIs than drivers over the age of 20 years (Li et al., 2018; Llerena et al., 2015). Seat belt use is lower among adolescents and young adults than adults in other age groups (Yellman et al., 2020). In addition, adolescents and young adults tend to engage in other risky behaviors such as texting while driving, drunk driving, and speeding (Li et al., 2018; Llerena et al., 2015). Their overall lack of driving experience also makes adolescents and young adults more vulnerable to road traffic collisions, and thus to RTIs. RTIs also have financial implications. In 2018, approximately 12 billion USD was spent as a result of medical costs and loss of employment due to RTIs in adolescents in the U.S. (Yellman et al., 2020). Hence, prevention of RTIs is a public health priority and strategies to reduce human errors and to improve safe traffic behavior prerequisites such as perceptions, attitudes, and beliefs are needed.

Prior to intervention, data from young men are necessary to understand how their attitudes, beliefs, feelings, and overall experiences contribute to traffic behaviors. This study aimed to describe perceptions, attitudes and beliefs that influenced traffic behaviors among male high school students in Hamadan, Iran, based on the theory of planned behavior (TPB). Like in Hamadan, the phenomenon of adolescents having high rates of injury and death due to traffic accidents occurs world-wide. The results of our study may be used to develop interventions for promoting safe traffic behaviors such as increasing knowledge and understanding of traffic rules, improving skills, and strengthening attitudes towards safe behaviors (Riaz et al., 2019). Our results may be translatable to other areas of the world as well. If not directly applicable, our results can still provide a starting place for others to explore safe traffic behaviors among different groups of people, cultures, and populations.

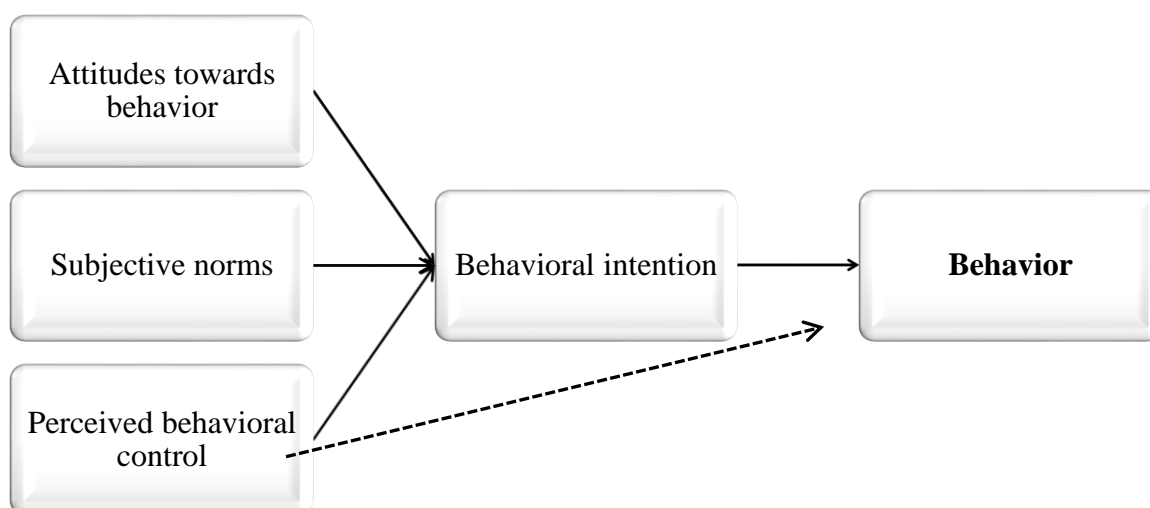
## Literature Review

### Theoretical Framework

The TPB has been used with a wide range of evidence to predict different types of behaviors like safe traffic behaviors (Ajzen, 1991; see Figure 1). Fishbein and Ajzen (1977) developed the TPB by extending the theory of reasoned action (Fishbein & Ajzen, 1977, 2011; Guo et al., 2007). The TPB was the theoretical framework for this study. Questions on the interview guide were based on TPB constructs including attitudes, subjective norms, perceived behavioral control, and behavioral intention. The TPB constructs were used as coding labels during analysis and became themes to describe our results.

**Figure 1**

*Framework of the Theory of Planned Behavior [TPB] (Ajzen, 1991)*



According to TPB, individuals' attitudes toward behaviors and their outcomes, their subjective norms derived from important patterns in their life, and perceived behavioral control or self-efficacy (Bandura, 1977) determine their behavior indirectly through behavioral intention (Ajzen, 1991; Sheeran & Orbell, 1999). In fact, in TPB it is assumed that most human behaviors are done not out of capricious and impulsivity but out of reasoning and planning (Tornikoski & Maalaoui, 2019). In general, the TPB can be used alone as the theoretical basis of a health training program, or it can be combined with other theories, patterns, and approaches to learning (Ajzen, 1991; Joorbonyan et al., 2022).

### Traffic Behaviors and the Theory of Planned Behavior

Previous researchers have reported that the constructs of the TPB predict safe and unsafe traffic behaviors and can be used to support interventions to change traffic behaviors (Azami-Aghdash, 2020). Three previous qualitative studies used the TPB to investigate the factors affecting safe traffic behaviors. Farshchi Tabrizi (2016) found that high perceived behavioral control and subjective norm are effective ways to improve safe traffic behaviors. Haghighi et al. (2018) investigated barriers and challenges of safe traffic behaviors. They found that barriers and challenges affecting safe traffic behaviors can be broadly classified into three

categories of attitude, subjective norms, and perceived behavioral control. Forward (2006) reported that participants who considered themselves superior to others had higher perceived behavioral control and they had more safe traffic behaviors. Low perceived behavioral control was used as a justification for high-risk behaviors while driving.

### ***Perceived Subjective Norms and Traffic Behaviors***

Regarding the impact of student traffic safety behavior and subjective norms, evidence shows that seat belt laws are effective in reducing RTIs in 15–20-year-old drivers (Romano et al., 2015). Adolescents whose parents monitor their behaviors are less likely to engage in dangerous traffic behaviors, such as not fastening a seat belt, using a cell phone, and drunk driving compared to their peers with lower parental monitoring (Ginsburg et al., 2009). These findings support that subjective norm provided by the authorities are increasing safe traffic behaviors. Also, other studies have reported a significant relationship between safe crossing behavior and subjective norms (Ashrafihafez et al., 2013). Lajunen and Räsänen (2001) considered the impact of peers' and parents' awareness about the benefits of wearing helmets as the most effective way to increase wearing helmets when cycling among students. In fact, at the level of comprehensive actions of schools and society, programs that rely on family participation can be used to teach safe traffic behaviors to adolescents by providing various opportunities for practice, awareness, and the importance of not demonstrating dangerous traffic behaviors (Richard et al., 2018).

### ***Attitudes and Traffic Behaviors***

Youth with positive attitudes towards traffic behaviors have significantly increased safe traffic behaviors including safe-road crossing behaviors (Hemmati & Gharlipour, 2017) and wearing bike helmets (Lajunen & Räsänen, 2001, 2004). Attitudes have also been found to significantly predict pedestrian unsafe behaviors (Zhou et al., 2016) and intention to not wear a bike helmet (Quine et al., 1998). Individuals who are highly prone to high-risk road behaviors are also likely to have a negative attitude toward traffic safety (Nabi et al., 2007).

### ***Beliefs and Traffic Behaviors***

According to the TPB, when individuals believe that they can perform a particular behavior, it will increase their intention to perform that behavior. In one study, the behavioral intention was predicted by subjective norms and perceived behavioral control (Quine et al., 1998). A positive and significant relationship was found between road-crossing safe behaviors and perceived behavioral control of students ( $r = 0.24$ ; Hemmati & Gharlipour, 2017). In another study, a significant relationship was observed between road-crossing safe behaviors, behavioral intention, perceived behavioral control, compliance motivation, evaluation of behavioral outcomes, and normative beliefs (Ashrafihafez et al., 2013).

### **Research Team Member Roles**

This study was supported by an interdisciplinary, international research team consisting of doctoral student/principal investigators, supervisors, and study research consultants. Vahid Ranaei, as the principal investigator, was a doctoral health education and health promotion student in Iran. He chose the topic of safe traffic behaviors for his doctoral dissertation because he lost his best friend as a teenager due to an RTI. Team members contributed expertise in health education and health promotion, medical healthcare, and qualitative research



methodology. Further, international collaboration enhanced this project by combining emic and etic perspectives in the processes of data analysis and writing the research report. Alireza Shahab Jahanlou and Laleh Hassani as the two supervisors (health education and health promotion experts), and Forouzan Rezapour Shahkolaei as the research consultant (RTIs expert) designed the current study. Ghodratollah Roshanaei as a biostatistics consultant performed the analytic calculations. Vahid Ranaei as a doctoral student collected and analyzed the data and wrote the findings and first draft of the paper. Kristin Haglund as qualitative research consultant and Jagnoor Jagnoor as injury epidemiology consultant revised and improved the manuscript thoroughly. All authors discussed the results and approved the final manuscript.

## Methods

We used a constructivist-interpretive qualitative design (Forward, 2006; Ranaei et al., 2021) to answer the research question what factors are effective to promote safe traffic behaviors in male adolescents? In qualitative studies, phenomena are investigated in their natural form without pre-determined hypotheses and not reducing reality to the minor and finite elements that characterize quantitative studies. We chose a qualitative design to deeply investigate the quality of the phenomenon studied including meanings, concepts, definitions, symbols, metaphors, explanations, and characteristics.

## Recruitment and Sample

The inclusion criteria were male students studying in high school, living in Hamadan, and who signed an informed consent. Only males were included in this study to focus on this high-risk group.

In Iran, high schools include grades 7 to 12. The first course is 7th to 9th grade and the 10th to 12th grade is called the second course. Hamadan is the capital city of Hamadan province and has four educational districts. We used a multi-stage sampling method in this study. In the first stage, we randomly selected two educational districts of one and four in the city of Hamadan using cluster sampling. In the second stage, the most populous boys' high school with maximum diversity in terms of socio-economic status was selected in each of the two school districts. In the third stage, the primary investigator visited the selected schools to recruit students to participate in qualitative interviews. We explained the purpose of the study to them. We explained in a briefing with the participants that the present study was designed to investigate the effect of educational intervention on safe traffic behavior of male high school students in Hamadan. We also mentioned that the number of RTIs are high and impose a lot of physical and mental damage on families and a lot of financial costs on the community. We further explained that students can play an important role in preventing the occurrence of injuries caused by traffic accidents, and we intended to study the performance of students about traffic safety and traffic accident prevention. While we explained to the students that their collaboration could help to achieve the goals of the study, we emphasized that their entry into the study would be voluntary, and the data received would be completely confidential. Interviews were done with students who agreed to participate in the study. Recruitment continued until we reached data saturation and the interviews did not provide new information.

Information on the demographic characteristics was collected to provide a description of the participants. Nineteen adolescents participated in the study. Most participants were in grade eight ( $n = 7$ , 37%), in public schools ( $n = 9$ , 47%) and commuted to school on foot ( $n = 8$ , 42%). The education of the student's fathers was often associate and bachelor's degrees, ( $n = 5$ , 26.3%). Students' mother education was often a diploma ( $n = 4$ , 21.01%; see Table 1).

**Table 1**  
*Description of Student's Demographic Characteristics*

Variable	Levels	N	%
Course	1 <sup>st</sup>	11	57.8
	2 <sup>nd</sup>	8	42%
Type of school	Public	9	47.3
	Private	8	42.1
Transportation mode	On foot	8	42.1
	Bike	5	26.3
	Public transportation	3	15.7
	Combination of three methods	3	15.7
Father's education	Diploma or less	4	21
	Undergraduate degree	10	52.6
	Graduate degree	5	26.3
Mother's education	Diploma or less	6	31.6
	Undergraduate degree	9	47.4
	Graduate degree	4	21

### Protection of Human Subjects

Informed consent was obtained immediately before the interview. The researcher introduced himself and explained the purpose of the study. Participants were allowed to ask questions, read the participant information sheet, and read and sign the consent form. In this

study, because most students were under the age of 18, informed consent was obtained from their parents. The present study was also approved by the Ethics Committee of Hormozgan University of Medical Sciences (Ethics Committee exclusive ID: IR.HUMS.REC.1398.484). Participants were assured that participation in the study would be voluntary and that they could refuse to answer or leave the meeting whenever they did not want to continue. The interviewer explained to the participants that their names and opinions would be strictly confidential, and the results would be published generally. The interviews were held at the convenience of the participants in terms of time and place. For example, the interviewer went to a private room in the school after school time, so the participant could express his opinions more calmly about the research. The participants were completely free to express their opinions and beliefs. The questions did not contradict the beliefs and traditions of the society. The interviewer did not comment on the participants and tried to persuade them to express their beliefs about safe traffic behaviors.

### Data Collection

Semi-structured interviews were carried out face-to-face with the participants. Data collection occurred from July to October 2020. The duration of the interviews ranged from 20 to 60 minutes. Interviews were conducted in the Farsi language and were audio-recorded.

Vahid Ranaei conducted all the interviews along with benefiting from the training and guidance of supervisors in his dissertation. The supervisors separately held five training sessions in addition to university courses to make Vahid Ranaei as Ph.D. student more familiar with qualitative studies. Also, to monitor the interview process, the first three sessions were videotaped with the consent of the participants. The recorded videos were reviewed several times by the professors and the positive and negative points in the interviewer's work were noted. For example, the type of questions, how the questions were expressed, body language, tone of voice, facial expressions, gestures, and posture of the interviewer were evaluated. Vahid Ranaei used a semi-structured interview guide to elicit participants' opinions about the factors affecting the performance of safe traffic behaviors. The focus was solely on the responses provided in the interview without any intervention by the researcher. Questions in the interview guide were developed to correspond to constructs of the TPB. Table 2 shows the guiding questions used for the interviews. The questions were developed by incorporating tenets of TPB, reviewing the literature on traffic accidents and traffic behaviors, and consulting with researchers in the field of traffic accidents. The questions 1-3 were designed based on the TPB construct of attitudes towards behaviors, question 5 was based on the construct of subjective norm, questions 4 and 6 were based on the behavioral intention construct, and questions 7 and 8 were based on perceived behavioral control construct. Before using the interview guide with participants, the research team studied the questions and cleared up any ambiguities.

**Table 2**

*The Interview Schedule of Student's Beliefs Based on the TPB about Safe Traffic Behaviors*

- 
- 1 What do you think about safe traffic behaviors?
  - 2 What are the consequences of performing safe traffic behaviors?
  - 3 What is your view on the consequences of safe traffic behaviors?
  - 4 Explain your inner desire to engage in safe traffic behaviors.
-

- 
- 5 What is the role of your friends or family members in enforcing your safe traffic behaviors?
  - 6 Explain your personal intention about safe traffic behaviors.
  - 7 Describe your ability to perform safe traffic behaviors.
  - 8 What conditions must be provided for you to be able to perform safe traffic behaviors?
- 

## Analysis

In qualitative research, the data analysis occurs with data collection and is iterative. Interviews with students who agreed to participate in the study continued until we reached data saturation. In qualitative studies, data saturation is achieved when similar opinions are repeatedly heard in ongoing interviews and new data does yield redundant information (Gentles et al., 2015). In this study, Vahid Ranaei interviewed one participant at a time and audio-taped the conversations. On the same day that interviews were performed, he transcribed, read, and coded the interviews. After interviewing 19 students within 11 days, Vahid Ranaei found that he did not receive any new information from participants about safe traffic behaviors. Therefore, he concluded that data saturation has been reached.

There are several analytical frameworks to interpret qualitative data. In the current study, the qualitative content analysis was used to determine the presence of certain concepts or themes within some qualitative data and analyze the presence and relationships of such themes or concepts (Graneheim et al., 2017; Graneheim & Lundman, 2004).

To understand the content of interviews, transcribed texts were carefully reviewed several times and were broken into smaller meaningful units. After immediate transcription of recorded audios (data source) and transferring the content to the initial research sheet, the codes were extracted out of these meaningful units. Coding is the process of naming or labeling meaningful units. The words, phrases, meaning units, sentences, and paragraphs related to the factors affecting safe traffic behaviors based on the TPB were condensed from the original transcript and pasted into a new document. Although in the condensation process, we shortened the text, however the core meaning was still preserved. The analysis followed the basic coding sequence of open and axial coding (Moghaddam, 2006). In open coding as the first step of coding, the content of the initial research sheet and meaningful units were re-studied and titled according to the purpose of the research, a title that expressed and introduced the content of that text. Then the data were turned into small and discrete pieces which were coded by a descriptive label. We ensured that units with similar meanings were labeled with the same codes. As an example of open coding, in one of the interviews a participant said "One of the conditions that must be prepared to wear a helmet is that you have to be able to pay for it. Now the economic situation of young people is difficult. If you want to buy a helmet, you have to pay 20,000,000 IRR (about 76.92 USD), which is too much for a teenager." We considered this statement as a meaningful unit and extracted the code of "High price of safety equipment" from this meaningful unit.

In axial coding, the connections between codes were drawn and the codes made by open coding were organized. After analyzing the codes, the extracted categories were exactly according to the TPB constructs. This shows that TPB can be widely used as a suitable conceptual framework in both quantitative and qualitative studies. In axial coding after completing the initial coding, where necessary, some of the codes were combined as the categories and some of the codes also became condensed as the sub-categories. Categories and subcategories were formed by grouping together the codes that are related to each other through similar content or context. The extracted codes, subcategories, and categories are listed in Table

3. Based on the TPB, three categories and six sub-categories were obtained from the analysis of the interviews (see Table 3).

For example, evaluation of behavioral outcomes and behavioral beliefs as two subcategories were grouped under the category of attitudes towards behavior. This stage can be interpreted as secondary or axial coding. It should be noted that at this stage, the relationships of substitution and companionship of safe traffic behaviors with adjacent words and sentences were investigated to further assist in inference and comprehension. At the end of the secondary coding, the sheets related to the same coding were put together and after re-studying them, the student's point of view was presented and written under the title of the sheets. Vahid Ranaei studied the point of view and presented the conclusion by studying it several times and using other sheets and topics (Moghaddam, 2006).

**Table 3**

*Categories and Sub-categories Extracted from Interviews with Students*

<b>Categories</b>	<b>Sub-categories</b>	<b>Codes extracted from interviews</b>
<b>Attitudes towards behavior</b>	Behavioral beliefs	Do not seriously damage if wearing a helmet, do not crash if using a pedestrian bridge, do not harm others if the speed limit is observed, be hospitalized due to high speed, die due to speeding, pay a fine due to an accident, make fun of friends for using helmet, imprisonment due to accident, jumping out of the car due to not wearing a seat belt, family grieving over brother's death in motorcycle accident, head overheating due to helmet use
	Evaluation of behavioral outcomes	The value of health, the value of life, the difficulty of paying compensation, fine and hospital costs, the difficulty of enduring pain and injury, the guilt of hurting others
<b>Subjective norms</b>	Normative beliefs	The effect of adult and family education, the non-observance of safe traffic behaviors by peers, the effect of school education, the effect of mass media education, the effect of traffic rules
	Motivation to comply	The superiority of the father's opinion over his classmates, the superiority of the parents' opinion over the friends', the importance of the teacher's opinion, the motivation to conform with the friend
<b>Perceived behavioral control</b>	Control beliefs	High-risk driving due to alcohol consumption; crash due to inattentiveness; high-speed driving due to showing self-confidence, not being afraid and courage, and maturity; not using the pedestrian bridge due to physical pain; lack of observing safe traffic behaviors due to mental distraction; not being able to afford a helmet; not using a pedestrian bridge due to its distance and inappropriate structure; bad road conditions; not wearing a seat belt due to its unsuitability, not using a helmet seat belt to its improper structure; road accidents due to traffic
	Perceived power	Being tempted to engage in unsafe traffic behaviors, obeying the rules even if the right conditions are not provided, observing personal duty, respecting the rules, having an inner motivation to perform safe traffic behaviors, overcoming temptations, the ability to overcome ridicule and humiliation of peers

## Deep Scan

One participant stated that the cost of a helmet is not important. During the first reading of the transcript, Vahid Ranaei gave the initial code, "Cheap helmet," to this meaningful unit. After reading the transcript for several times, he realized that from this participant's point of view, helmets were expensive but were worth the money to protect the head and neck while cycling, no matter how expensive the helmet was. So he revised the initial code of "Cheap helmet" to the code of "Paying money to stay healthy." The accuracy of qualitative research methods is judged by criteria that are appropriate to this approach. The validity, reliability, appropriateness, and confirmation have been proposed as criteria of scientific rigor in qualitative research (Denzin & Lincoln, 2008). Reliability refers to the adequate representation of the social construct that the researcher seeks to examine and to make the results believable. To achieve reliability, several strategies were used including long-term review and engagement with data, continuous observation, observation of data from different aspects, analysis of conflicting data, review of interpretations of raw data, and discussion with other experts and colleagues. Also, to validate the findings, the strategy of constant comparative method was used (Li et al. 2018; Moghaddam, 2006). We ensured accuracy, consistency, stability, significance, and verifiability of the research findings with frequent exchanges between coding steps, re-questioning, and re-comparing the data (Fram, 2013). The data analysis process was carried out on MAXQDA software (version 12).

## Results

In this section, we describe the results of interviews with students. We have provided at least one quote from the participants for each subcategory. We cooperated with the Department of Education and the Police Department and presented the results of the study to these organizations and schools.

### Attitudes Towards Behavior

Attitude towards behavior, defined as the personal evaluation of performing safe traffic behaviors, included two sub-categories of behavioral beliefs and evaluation of behavioral outcomes (Rimer & Glanz, 2005). From students' points of view, attitudes were of high importance in performing safe traffic behavior.

#### *Behavioral Beliefs*

Behavioral beliefs are defined as beliefs about the likely outcomes of the behavior (Ajzen, 2006). Students who believed that safe traffic behaviors led to desirable outcomes had positive attitudes. If they expected negative consequences because of safe traffic behaviors, they developed a negative attitude towards safe traffic behaviors. Believing safe traffic behaviors will lead to a desirable outcome engenders positive attitudes. Conversely, believing that negative consequences could result from safe traffic behaviors would engender a negative attitude.

All the participants mentioned that their beliefs and experiences increased their traffic safety behaviors. They generally considered that accidents led to negative consequences such as injury or death to themselves and others. For example, participant 1 stated, "I have had the experience of an accident, injuries to the body; you injure both yourself and the person with whom you have an accident. You are hurting both yourself and the other person." Another participant stated, "Many elementary school friends were seriously injured in the same

accident, even one of my friends died in an accident." They linked the lack of safe traffic behaviors to negative consequences such as death following ejection from a car because of not fastening the seat belt and death due to head injury following a motorcycle accident without helmet use.

Some believed that following safe traffic behaviors could have positive consequences and not using a mobile phone can cause a proper and timely reaction while driving. For example, Participant 5 stated:

Once I was going somewhere with my father. My father was using a cell phone while driving. A few minutes after he finished talking, he was entering a subway when suddenly a bicycle overturned, but my father was able to pull away and not hit it.

The students in this study believed that an accident could cause injury or even death to themselves and others. In addition, they held behavioral beliefs that not engaging in safe traffic behaviors, such as not wearing a seat belt or not wearing a helmet, could result in bodily injury, skull injury, or even death. For example, Participant 17 stated, "Once when I was going to school by taxi, we had a serious accident, but because I was wearing a seat belt, I did not hit anywhere, and I was not physically injured."

### ***Evaluation of Behavioral Outcomes***

Evaluation of behavioral outcomes refers to the value one attaches to each outcome (Handoyo, 2018). Almost all participants stressed the importance of the positive and negative consequences of observing or not observing safe traffic behaviors. Positive consequences of observing safe traffic behaviors included preservation of life and prevention of injury. For example, Participant 1 stated, "I use the pedestrian bridge even if it has no elevators or escalators because I know that it is dangerous for me and our health it is valuable." Thus, students' evaluation of the positive consequences of observing safe traffic behaviors can be associated with creating a positive attitude in them. A few who did not believe in the consequences of observing and not observing traffic behaviors stated that observing traffic behaviors is a waste of time and tedious.

### **Subjective Norms**

Subjective norm is the importance of approval or disapproval of the behavior by key people, leading one to behave in a way to gain the approval (Rimer & Glanz, 2005). Subjective norm included two sub-categories of normative beliefs and motivation to comply. The students' individual beliefs about safe traffic behaviors as well as observing the behavior of family members, friends, traffic police, social media, and training of school and driving school were effective on performing traffic behaviors by them.

### ***Normative Beliefs***

Normative beliefs are defined as beliefs about the normative expectations of others (Ajzen, 2006). Five participants considered school officials important in promoting safe traffic behaviors. School officials encouraged them to wear seatbelts and to stop and not run red lights. Participant 18 stated, "We had a teacher who taught us not to pass the red light and wear your helmet while bicycling."

Nine participants emphasized the importance of expecting parents and adults to engage in safe traffic behaviors. For example, Participant 13 stated, "When older or educated people encourage us to follow traffic rules, it affects our behavior as students." Participant 4 stated, "My mom and dad always insist that I do not rush while cycling."

Almost all participants mentioned the expectations and behaviors of other friends and classmates in this regard. Of course, a small percentage also stated that when they are in a hurry or very tired, sometimes they do not adhere to traffic behaviors. For example, Participant 1 stated, "Some friends do not take it seriously. They do not take it seriously like family. They also say do not do some things, such as not wearing a helmet or fastening seat belt."

Eleven participants referred to TV commercials or virtual media clips about traffic behaviors. The information on television and in the mass-media had a decreasing impact on death caused by injuries. As Participant 15 stated, "On Instagram, I see clips of cyclists and motorcyclists crossing sand dunes or cycling in mountainous areas by wearing helmets or wearing special clothes with cross bikes."

Eight participants stressed the importance of traffic laws such as following traffic laws and believed that road traffic injuries will happen much less automatically. For example, Participant 4 stated, "There are cameras on all roads now, and if you do not do so, you will be fined." As can be seen, the norms and expectations of authorities have important role in following the safe traffic behaviors in the participants of this study.

### ***Motivation to Comply***

Motivation to comply is defined as motivation to do what each referent thinks (Glanz et al., 2008). In this view, all participants emphasized adherence to the authorities.

For example, Participant 1 stated, "Some of my friends joke and laugh at me when I do the road traffic behaviors, but I want to follow my father's instructions for the prevention of road traffic injuries."

Participants may choose an unsafe traffic behavior perhaps to appear more masculine or at least to fit in. For example, Participant 10 stated, "My mother says not to go to the football club by bike because it is dangerous, but my other friends come by bike, and I go by bike." In this regard, it is observed that the expectations and beliefs of individuals and important groups for the individual multiplied by the motivation of individuals to follow them from subjective norms (Tornikoski & Maalaoui, 2019).

### **Perceived Behavioral Control**

Perceived behavioral control describes an individual's perception of the simplicity or adversity of executing the behavior and has two sub-categories namely control beliefs and perceived power (Ajzen, 1991). In the other words, perceived behavioral control refers to a person's perception of how easy or difficult the behavior is and has two constructs: belief in the existing facilitators to perform the safe behavior (control beliefs) and confidence in their ability to complete the behavior (perceived power). This sense in students that they control the behaviors and that they have the ability and efficiency to perform safe traffic behaviors was also effective in increasing their safe traffic behaviors.

### ***Control Beliefs***

Control beliefs are defined as beliefs about the presence of factors that may impede or facilitate performing the behavior (Ajzen, 2006). Factors that might impede safe traffic behaviors included driving drunk and drug abuse. Students believed that most of the RTIs are



due to speeding or alcohol consumption. Participant 6 stated, "When doing many wrongdoings, they are not conscious, drinking or abusing, in short, their consciousness was not in their own hands." Further, 12 participants felt that young people drove too fast because they believed that speed showed their confidence, skill as a driver, and bravery. Students declared that there are aggressive behaviors and so-called juggling between their peers to show off their skills to friends. For example, Participant 8 stated. "Sometimes they want to show that they have grown up and they are not afraid of anything. I think that I am so good at driving and I don't need a helmet."

Eighteen participants described the means of transportation and unfavorable environmental conditions such as frost, poor road conditions, unstandardized seat belts, low-quality helmets, and proximity of schools to highways as obstacles to observing safe traffic behaviors and contributors to RTIs. For example, Participant 10 stated:

The seat belt, car conditions, the technical conditions of the car, the pedestrian bridge should be close to the place, the security of the pedestrian bridge, having an elevator, lift and escalator is very important, as well as having the budget to provide a means to increase safety.

Nine participants considered the cost of providing safety equipment. For example, Participant 3 stated, "The economic status of the youth is difficult, for example, if you want to get a hat, it will cost more than 20,000,000 RII."

Fourteen participants cited traffic and road congestion as factors in the RTIs. For example, Participant 15 stated, "Unfortunately, due to the increase in car production and population, even in our country, we are witnessing deadly and heartbreaking road traffic injuries, especially when it's a holiday."

Most ( $n = 16$ ) participants cited factors that made it easier for them to engage in safe traffic behaviors. For example, Participant 17 stated, "There is a pedestrian bridge next to our house and I use it to cross the street when I leave the house." Or Participant 19 stated, "I used to have a low-quality helmet that was tight and annoying. That's why I didn't use it. But my father bought me another helmet that is comfortable, and I always use it." As can be seen, participants listed various barriers and facilitators for performing safe traffic behaviors. These factors together shape their perceptions of their control over these behaviors.

### ***Perceived Power***

Perceived power is defined as the personal assessment of the simplification or obstruction of the behavior (Ajzen, 1991). Perceived level power of the factors contributes to a person's perceived behavioral control over factors that may facilitate or impede the performance of a behavior (Tornikoski & Maalaoui, 2019). In this regard, Participant 11 stated, "I sometimes got tempted, which causes me to ride a motorcycle, and I cannot control myself." A person's perception of the power of behavioral facilitators or inhibitors affects a person's sense of self-efficacy and consequently, a person's behavioral intent. The person understands the power of each of the facilitating or hindering factors, and the person, after understanding, determines if they can control the factor and if so, they try to control its effect.

## **Discussion**

The study results showed that from the students' points of view, three categories along with six sub-categories including attitudes towards behavior (behavioral beliefs and evaluation of behavioral outcomes), subjective norms (normative beliefs and motivation to comply), and

perceived behavioral control (control beliefs and perceived power) are influential on the behaviors of adolescents. Knowledge and awareness of road safety are independent protective factors for RTIs. Conversely, adolescents who have a high level of high-risk traffic behaviors or little knowledge of road safety rules, experience more RTIs (Dong et al., 2011).

Haghighi et al. (2018) investigated barriers and challenges of safe traffic behaviors in Julfa, Iran. In that study, data were collected through observation and using videos and photos, the findings were like ours, showing that barriers and challenges affecting safe traffic behaviors can be broadly classified into three categories. Hence, providing training programs, culture, and dissemination of safe traffic behaviors among pedestrians and drivers, as well as reconstruction and improvement of the necessary infrastructure such as the construction of mechanized pedestrian bridges, may improve traffic behaviors and prevent RTIs.

Forward (2006) in her qualitative study to develop the TPB, presented different scenarios (not allowed speed in an urban area, not allowed speeding, and speeding on the main road) to 50 drivers and analyzed their responses. She found that drivers considered speeding on the main road more acceptable than on the side road. Also, those participants who considered themselves superior to others had higher perceived behavioral control. In addition, this study showed that low perceived behavioral control is used as a justification for high-risk behaviors while driving. This finding is like the responses of some students in the present study who considered drunk driving to be a cause of road traffic injuries. Drivers also stated that the presence of the police or feelings of remorse could lead to the prevention of risky behaviors while driving. Consistent with the present study, environmental infrastructure, and individual characteristics, along with other constructs of the TPB such as perceived behavioral control and subjective norms were found to be associated with reported safe traffic behaviors.

It should be noted that the results of the present study were limited to semi-structured interviews with 19 male high school students in Hamadan, which indicates that these results should be compared to other groups carefully where girls may consider different components as factors influencing safe traffic behaviors. In addition, the interviewer was an adult, and this may lead to adolescents agreeing with him due to the power imbalance in the study.

Regarding the gap in qualitative research in this field that provides a deeper understanding of attitudes, and intentions of different groups regarding safe and unsafe traffic behaviors, it is suggested that researchers should understand people's experiences in this field. As observed, subjective norms in the form of parental encouragement, traffic rules and policies, and media advertising were among the factors influencing the pursuit of safe traffic behaviors in adolescents. Therefore, these findings can emphasize the need for parents to pay attention to their important role in this field, the adoption of relevant policies regarding traffic and the promotion of mass media. Further research and exploration of factors that lead youth to engage in unsafe behaviors despite education, knowledge, and presence of influential people that promote safe traffic behaviors are also needed. Indeed, the relevant organizations and institutions can consider the conceptual framework of the TPB, which has strong empirical support to improve traffic safety behaviors.

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### Author Note

Vahid Ranaei (<http://orcid.org/0000-0001-7975-4806>) is a Ph.D. student at Hormozgan University of Medical Sciences. His research areas include traffic safety, theory of planned behavior and adolescents.

Dr. Alireza Shahab Jahanlou (<http://orcid.org/0000-0003-4850-9968>) is an Associate Professor of Health Education in the Department of Health Promotion and Education & Cardiovascular Research Center. He has expertise in quality of life, health literacy, health promotion and health education.

Dr. Laleh Hassani (<http://orcid.org/0000-0001-8446-0992>) is an Associate Professor of Health Education in the Department of Health Promotion and Education Hormozgan University of Medical Sciences. Her research areas include traffic injuries, road safety, intention, and health belief model.

Dr. Ghodratollah Roshanaei (<http://orcid.org/0000-0002-3547-9125>) is an Associate professor at Hamadan University of Medical Sciences. He has contributed to projects in a wide variety of health promotion and health education as biometric professional.

Dr. Kristin Haglund (<http://orcid.org/0000-0002-2786-5499>) is a Professor at College of Nursing, Marquette University. She is a community engaged researcher with expertise in health promotion and qualitative research.

Dr. Jagnoor Jagnoor (<http://orcid.org/0000-0002-5276-9095>) is a post doc fellow in University of Sydney with more than 110 publications and is very interested in qualitative research.

Dr. Forouzan Rezapur-Shahkolai (<http://orcid.org/0000-0001-5049-1109>) is an Associate Professor at Hamadan University of Medical Sciences. Her research areas include road traffic injuries, injury preservation, traffic accidents and child safety promotion.

\*Correspondence concerning this article should be addressed to: Health Promotion and Education & Cardiovascular Research Center, Hormozgan, Iran, [jahanlu@gmail.com](mailto:jahanlu@gmail.com).

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