

Article

The Role of News Media in Reducing Traffic Accidents

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Abstract: Traffic accidents represent a major problem worldwide. Public and private entities launch communication campaigns in order to educate the population about this problem. The aim of this study is to analyze the evolution of the presence of road safety in the Spanish media and its influence on the reduction of road accidents. A content analysis of six major Spanish newspapers between 2000 and 2008 (an important period in the reduction of the accident rate in Spain) was carried out in which the presence of news related to traffic accidents and the intensity of them were quantified using a set of criteria designed for this study. Furthermore, the correlation between the accident rates and the presence and intensity of news in the same time frame was measured. There has been an evident increase in the news related to traffic accidents during the analyzed period, both in terms of the presence of such news in general and in terms of intensity. The correlation analysis also shows a strong relationship between the increase in news presence and intensity and a sharp fall in accident rates in Spain. Although correlation analysis is not enough to establish a causal relationship between the variables studied here, the findings suggest that informative campaigns had a positive effect on encouraging pro-social behavior, were successful in disseminating related information, and, therefore, contributed significantly to lowering accident rates, although that was not the only reason.

Keywords: road safety; traffic accidents; mass media; communication campaigns; newspapers



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1. Introduction

Road traffic accidents represent a global societal problem of great importance on various levels [1–3] with great repercussions at the economic and social level [4,5]. Addressing the multifaceted challenges posed by road crashes requires a comprehensive approach involving various stakeholders, including governments, legislators, road safety organizations, and the general public [6]. Effective strategies include measures of various kinds, such as improved infrastructure [7,8], effective penalties [9,10], technological innovations in vehicle safety such as active and passive safety systems [11,12], educational initiatives [13,14], and public awareness campaigns and media communications [15,16], with the latter preventive action being the focus of the present study.

1.1. Evolution of Preventive Actions and Road Accident Rates in Spain

In Spain, road accidents represent the third leading cause of external death, with 1896 deaths during 2018 [17]. The first accident rate data available date back to the 1960s, linked to the creation of the Dirección General de Tráfico (DGT), a public body associated with the Spanish Ministry of the Interior, which is primarily responsible for developing actions to improve the behavior and mobility of any vehicle on the roads, as well as for training and informing drivers about the measures applied in the country. It is also responsible for the safety and fluidity of road traffic and is in charge of providing administrative services to citizens [18,19].

In this sense, there was initially an increasing trend in road accidents and fatalities, mainly due to the scarcity of preventive actions applied and the exponential growth of drivers in the country [20]. However, since the 1980s, the trend in this country has been decreasing, with slight variations, as a result of the development of the first National Road Safety Plan (1979) [21]. In this period, some measures related to signaling and regulations were established, such as the STOP sign or the compulsory use of helmets on motorcycles, as well as other actions related to traffic sanctions, such as breathalyzer controls on the roads. At the end of this period, the regulations were updated with the approval of the Law on Traffic, Motor Vehicle Circulation, and Road Safety [22] and the criminal code reform. In addition, investment in awareness and training campaigns increased, with road safety education becoming a central focus of preventive actions in Spain in those years [23].

After some years with constant decreases in road fatality data, a rebound in the data was observed in the mid-1990s [20]. For this reason, in the following years, multiple reforms were introduced in the rules and regulations for drivers and vehicles, especially the Strategic Road Safety Plan 2005–2008 [24] and the Law regulating the Points Permit (2006) [25]. These latter actions marked a turning point, with a significant and constant reduction in the accident rate in the country. Thus, during the decade between 2000 and 2010, one of the most significant declines in these data can be observed. In 2000, 6098 deaths were recorded, while in 2010, this number was down to 2336 [17]. In other words, there were 3762 fewer victims, which represents a 61% reduction in that period of time.

The reasons behind such a sharp decline in road accident rates in a relatively short period have been discussed at length, and attributed from different points of view to a combination of multiple factors, including: the inclusion of road safety in the political agenda with the generation of a broad political consensus that allowed the enactment of different road laws, among which the establishment of the points-based license stands out [26–28]; the active role of the Road Safety Commission of the Congress of Deputies as a unifying and energizing element of that consensus; the implementation of new DGT management models, which led to the creation of the National Road Safety Observatory, strategic road safety plans and municipal road safety plans that represented greater economic investment in this sector [29]; a significant increase in traffic agents; the implementation of new technologies in traffic management, improvement of traffic infrastructures [30]; the empowerment of the Superior Council of Road Safety; the involvement of Judicial branch in the update of the criminal code and a variation of the typology of road crimes with the reform of the Criminal Code, the creation of the Road Safety Prosecutor's Office, among others [31].

Apart from the abovementioned factors, it was also an important period in terms of communication campaigns and advertisements that were developed in this area, as well as road safety education programs for the population as a whole [20]. There were both public initiatives from the DGT and private initiatives from various entities in the traffic sector.

All the mentioned factors contributed to such desirable results. However, the influence of the media on the reduction of road accidents in Spain still remains a question since it has not been properly researched. All communication is, in itself, intentional and, to a greater or lesser degree, has elements of influence and intentionality, and therefore, it has some weight in changing people's attitudes or behaviors [32]. After all, pro-social behavior, also in the traffic sector, is the result of a maturation and learning process that is moldable and modifiable by the subject's primary environment [33,34], as well as cultural and social elements, including the role of the media [35,36]. In this line, all the aforementioned preventive measures and actions were complemented with news in the media and awareness campaigns that used various communication strategies to impact the audience [37]. Thus, the present research focuses on analyzing the potential impact of the written press during the period of time that saw the greatest decrease in road fatalities in Spain.

1.2. Effectiveness of Communication Campaigns for the Promotion of Healthy Behaviors

The media are an important channel for conveying information to the audience [38]. Traditionally, they have been widely used to promote the sale of goods and services [39].

However, for some time now, communication strategies have also been used to convey to the population healthy attitudes and behaviors that will increase the well-being of citizens [40,41]. Communication campaigns that aim to educate and raise awareness among the population to promote positive social change are framed within so-called social advertising [42]. These campaigns can be carried out on very heterogeneous issues such as disease prevention, environmental sustainability, attitudes of respect for diversity, and, of course, road accident prevention, among many others [43–45].

However, despite the number of spots of this type that are designed and broadcast around the world, as well as the economic and human resources that are used, and unlike what happens in product advertising, there is little evidence of their real effectiveness [46]. However, at a theoretical level, there is a consensus on its potentially relevant value in influencing citizens, given that techniques that have proven effective for behavioral change are usually used in evaluations carried out in a product advertising context [47].

In this line, social advertising consists of an informative and, on many occasions, persuasive component, providing data likely to be remembered by the audience. The strategies for transmitting information can be different and may opt for (1) rational techniques that try to convince the viewer with data of impact and interest [48]; (2) emotional techniques that provoke the audience's sensitivity and empathy [49]; (3) high-impact techniques with aggressive images that attract the viewer's attention [50]; and (4) humorous techniques that capture the user and facilitate the transmission of information, although they may not be appropriate for some specific problems [51]. In addition to the communication strategy and the tone of the message, there are other formal variables that can influence the degree of recall and impact of a campaign or social news. For example, the location and layout of the spot, its broadcasting frequency, the broadcasting media, or even audience characteristics related to sociodemographic and/or attitudinal variables towards the issue addressed, among others, may be influencing [52,53].

In any case, it is important to point out that the attitudinal or behavioral change of viewers is not mediated solely by social advertising but that various external factors interact, which are difficult to extract from the final result [54]. For this reason, many authors prefer to use the term "contribute" to indicate the potential impact of social campaigns, avoiding absolute terms in the statements made. This difficulty in the evaluation process is one of the factors that may be affecting the scarcity of analysis of the effectiveness of social advertising [47]. However, this is not the only one since the economic cost and the lack of systematic evaluation protocols also lead to limited evidence on the effectiveness of awareness campaigns [55]. This poses a problem for the development of future spots or news, as there is limited knowledge of the most appropriate strategies to convey these messages, which hinders progress in this area.

Focusing specifically on road safety campaigns, the trend of other social issues continues, with very little research analyzing their contribution to reducing road accidents [47]. There is, therefore, a potential influence of the news and the media on the attitudes and behaviors in the traffic of the users, which has been scarcely explored both from scientific research and from the organizations and institutions responsible for road safety in different countries.

1.3. Objectives of the Study

The aim of this manuscript is to evaluate the contribution of the messages in the media through the analysis of news items, their tone, use of graphic materials, and intensity, in order to observe how these news items are treated and how they evolve during the period of analysis. Subsequently, we tried to investigate the relationship between these messages and their influence on road accident rates (analyzing official data referring to fatal accidents and/or fatalities) in Spain in the period analyzed between 2000 and 2008.

To guide our research, the following hypotheses were made in this regard to be tested:

- The number of news items on road safety has increased during the period 2000–2008 in the main national daily media, as has their length, the use of media such as photographs or graphics, and their intensity and subject matter.

- There is a negative relationship between the tone of the messages and the rate of fatal accidents.

2. Materials and Methods

2.1. Sample

To obtain the news for analysis and in order to gather as much information as possible, original search systems, documentary databases, news summaries, online newspaper libraries, and manual searches by media were used. Each of the news items has been stored in digital systems and analyzed in paper format.

The great profusion of messages in the media on various road safety issues makes it necessary to precisely delimit the moments in which road safety messages have a direct impact on accident rates. Thus, the analysis periods were chosen at the times when the greatest number of vehicles converge on the roads and when the highest accident rates occur, as the official statistics show. In this sense, we took as a reference the dates coinciding with the special traffic operations that the Directorate General of Traffic implements, which are indicated under the name of OPERES. Therefore, the news items analyzed coincide with the specific period that the DGT considers special, thus making it possible to compare the data on accidents and deaths at 24 h on the road at the end of each operation (using the data provided by the DGT).

We chose to select representative time periods in Spain, such as the years between 2000 and 2008, as they were the most intense in the fight against road accidents. Especially in those moments, the media played a role in the dissemination of informative messages and the promotion of the implementation of key measures and initiatives to reduce road accidents.

The selected media were the written press newspapers that are most widely read in Spain, both during the period analyzed and at present. Thus, they are the following: El País (785,000 daily readers of the print edition in 2022), La Vanguardia (472,000 readers), ABC (444,000 readers), El Mundo (436,000 readers), El Periódico de Cataluña (386,000 readers), and La Razón (350,000 readers) were complemented with a brief approach to the free and local press.

The news was selected under a search criterion that focuses on the appearance of the terms accident, traffic, road safety, and operation with corresponding sub-terms. For the analysis, the following topics are considered: traffic jams and delays; recommendations; messages with special operations; messages about accidents; preventive messages; and legislative measures or sanctions.

The aim was to select for analysis those topics that had a direct impact on traffic and road safety and to check their number and intensity. On the other hand, news stories that include preventive topics such as the analysis of the factors and causes that lead to accidents, as well as studies or experts who assess the data and provide solutions, helping to raise awareness of the problem of road accidents, were also considered.

2.2. Design, Procedure, and Data Processing

For the first analysis, the method of Lawrence Bardin [56] and his content analysis were applied. Therefore, a systematic, objective, and quantitative method was adopted through descriptive research techniques, where a numerical set of data, frequencies, and percentages of the selected news items were obtained. Thus, through these analyses, it was possible to infer knowledge related to the conditions of production/reception (inferred variables) of the messages launched. When talking about the message, we should not only think about words and sounds, but the images themselves can also be a valid object of study, especially when it comes to studying the mechanisms of the construction of realities. Therefore, in the content analysis, we relied on reading (textual and visual) as an instrument for collecting information.

In relation to the objective of relating the news in the media and the levels of accidents in Spain, techniques that measure the interdependence of the variables, such as Pearson's

correlation, have been applied. After the application of different filters to detect erroneous or incomplete data, a database was set up in SPSS (Statistical Package for Social Sciences) version 26.0; the same program was used to process the data.

2.3. Analysis Criteria

2.3.1. The Space of the News Item

For the quantification of the length of the news item and the headlines by columns, within the scale applied to each news item, space is considered one of the most important values, so a unit value is applied to each column. In this sense, the measurement in cm^2 could imply differences between media of different sizes. Within the classification of news headlines, the assessment is made by the number of columns of the title.

2.3.2. Selection of News Items on the Information Pages

Each information page can include one or more news items, which may or may not be related. For the selection of the news items, the journalistic structures with the headline and body of the news content were considered, as well as other figures such as interviews, chronicles, reports, and opinion articles. In any of these cases, when two headlines were detected on the same analysis page with different texts and even with different column sizes, they were studied as two independent news items and evaluated separately.

2.3.3. Assessment of the News Item

Previously established scales have been assigned, which are intended as a criterion for quantifying the news items that have a more direct impact on the messages related to road safety (Table 1).

Table 1. Variable-scale assessment of the news.

| Scale | Points |
|--|----------------|
| Presence of the selected topics in the text | 1/2 Points |
| Presence of the selected topics in headlines or the title (except traffic jams and operations) | 5 Points |
| Presence in headlines or in the subject headlines of traffic jams and operations topics. | 1 Point |
| Measurement of text size | 1 Point/column |
| Measurement of headlines (in columns) | 1 Point/column |

2.3.4. Weighted Frequency (Headlines)

The appearance of several elements in the headlines of the news item has a weighting frequency (Table 2).

Table 2. Variable-scale headlines.

| Scale | Points |
|--|----------|
| Headlines about traffic jams and delays | 1 Point |
| Headlines with recommendations (for travel) | 2 Points |
| Headlines on operations | 1 Point |
| Headlines on accidents and preventive models | 2 Points |
| Headlines on legislative measures or sanctions | 2 Points |

2.3.5. Photographs and Graphics

The presence of intensity is also reflected in the graphics and photographs, or even in the vignettes. Visual elements are also a form of message in themselves and will be assigned a value according to the established scale (Table 3).

Table 3. Variable-scale photographs and graphics.

| Scale | Points |
|-------------------------------------|----------|
| Charts on preventive measures | 2 Points |
| Accident/fatality graphs | 2 Points |
| General statistical graphs | 1 Point |
| Traffic photographs | 1 Point |
| Photographs of accidents/prevention | 2 Points |

2.3.6. Intensity of the News and Topics

One of the most important elements of this work is to study how the news can influence the perception of a problem: traffic accidents. This perception, as we will try to demonstrate, can be reflected in the incidence of accidents since the form, content, and tone can bring the issue of accidents closer to the user through a more human, real, or even dramatic profile. For this analysis, the degree of intensity of the terms used in the headlines, preceding paragraphs, and headings is evaluated, considering their aggressiveness or the author's subjectivity, so that they show the problem of traffic accidents through the wording itself (Table 4). This variable makes it possible to objectively identify the degree of impact and tone of the news message.

Table 4. Variable-scale news intensity.

| Scale * | Points |
|--|----------|
| Crash, collision, accident, incident, accident (and meanings), balance, danger (and meanings), impact, loss of control, risk, precaution, prevention, awareness, sensitization, training, human error, prudence, imprudence, insecurity (road), safety (road), education (road), victim, deceased, death, operation, speed, radar, alcohol (and meanings), drugs, crime, jail, penalties, penal, license (or permit) points, sanction, fine, denunciation, infraction, and factors and elements such as cell phone, helmet, reflective vests, safety distance, sleep, fatigue, child restraint system, distraction, and seat belt. | 1 Point |
| Tragedy (and meanings), children, babies, dead (and meanings), lose life, take a life, perish, black, murderers, violence, lethal, dead bodies, suicides, kamikaze, reckless, and drama. | 2 Points |

* Having established this second criterion, it is necessary to establish a clear difference between the presence of these terms in the headlines, pre-title, or lead-in with respect to the rest of the text, applying a value of 5 units in the first of the cases.

3. Results

3.1. Description of the News

In general, there was an increasing trend in the number of news items related to traffic and road safety in Spain between 2000 and 2008 (Figure 1).

Table 5 shows the continuous positive evolution in the presence of news related to traffic and road safety in the main Spanish newspapers in the years analyzed.

Furthermore, Table 6 shows that there is not only an increase in the number of news items but also in the space they occupy in the media and their intensity. This is a continuous positive evolution, with the exception of 2007, when there was a significant increase in this type of news, which was even higher than the one in the following year.

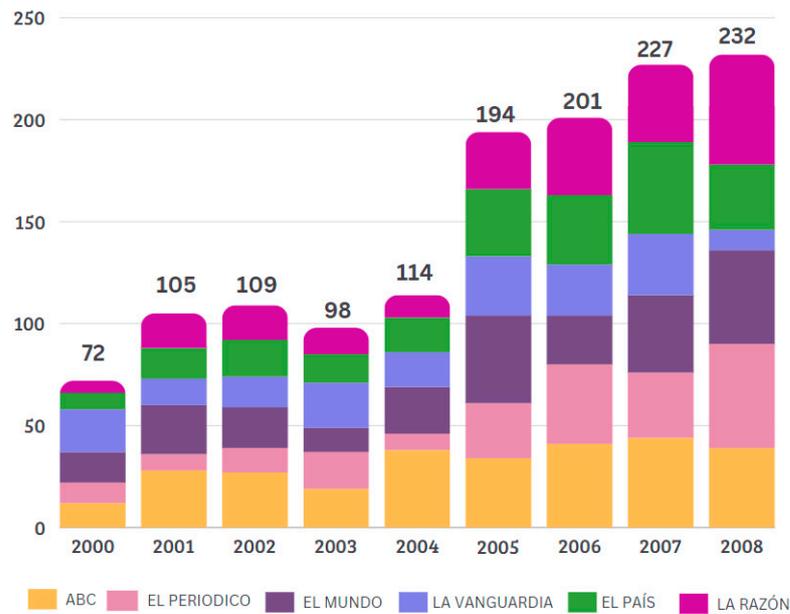


Figure 1. The evolution of news in Spain, 2000–2008, by media.

Table 5. Number of news items by media.

| | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---------------|------|------|------|------|------|------|------|------|------|
| ABC | 12 | 28 | 27 | 19 | 38 | 34 | 41 | 44 | 39 |
| El Periódico | 10 | 8 | 12 | 18 | 8 | 27 | 39 | 32 | 51 |
| El Mundo | 15 | 24 | 20 | 12 | 23 | 43 | 24 | 38 | 46 |
| La Vanguardia | 21 | 13 | 15 | 22 | 17 | 29 | 25 | 30 | 10 |
| El País | 8 | 15 | 18 | 14 | 17 | 33 | 34 | 45 | 32 |
| El Razón | 6 | 17 | 17 | 13 | 11 | 28 | 38 | 38 | 54 |
| Total | 72 | 105 | 109 | 98 | 114 | 194 | 201 | 227 | 232 |

Table 6. Breakdown of points according to the scales.

| | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|--------------|------|------|------|------|------|------|------|-------|------|
| Headline | 172 | 248 | 247 | 222 | 297 | 464 | 485 | 638 | 609 |
| Text | 171 | 265 | 264 | 241 | 357 | 522 | 520 | 741 | 695 |
| Subject | 1646 | 2096 | 2881 | 2974 | 3314 | 3014 | 6674 | 8633 | 6552 |
| Photos | 27 | 79 | 78 | 51 | 62 | 134 | 120 | 175 | 189 |
| Graphics | 5 | 22 | 26 | 26 | 51 | 85 | 66 | 107 | 61 |
| Intensity | 825 | 1645 | 1638 | 1695 | 1825 | 3429 | 3986 | 5130 | 3760 |
| Total points | 2021 | 3520 | 3496 | 3514 | 4081 | 7219 | 7865 | 10294 | 8101 |

3.2. Relationship between News and Road Accidents in Spain

Figure 2 shows the evolution of traffic accident fatalities in Spain, allowing a comparison to be made with the news broadcast by the media and their degree of intensity. It can be seen that there is a decrease in the number of fatalities, while there is an increase in the presence of news related to traffic and road safety in the media.

In addition, the differences in the number of deaths according to age group were analyzed to detect possible influences related to the characteristics of the users (Figure 3). The reduction in the number of deaths is consistent in the age groups analyzed, with no significant differences depending on this variable.

Beyond the comparison that can be made in Figure 2, we also wanted to know the exact degree of relationship between the variables. It should be noted that Pearson's correlation does not establish causality, but it does allow us to know if there is a significant

relationship between the analyzed variables. On this basis, the total points variable and the fatal accident rate variable were related, with the Pearson correlation value being $r^2 = -0.875$ and $p = 0.002$. Therefore, there is a strong negative relationship between the presence of news in the media and the fatality rate. For this purpose, a complete analysis of the statistical balances provided by the DGT was obtained, taking into account the variables total points and deaths in traffic accidents for the Pearson correlation. It is important to note that a reduction in accidents does not necessarily reduce the number of deaths. However, in this case, the pattern is perpetuated by a negative correlation ($r^2 = -0.867$; $p = 0.002$).

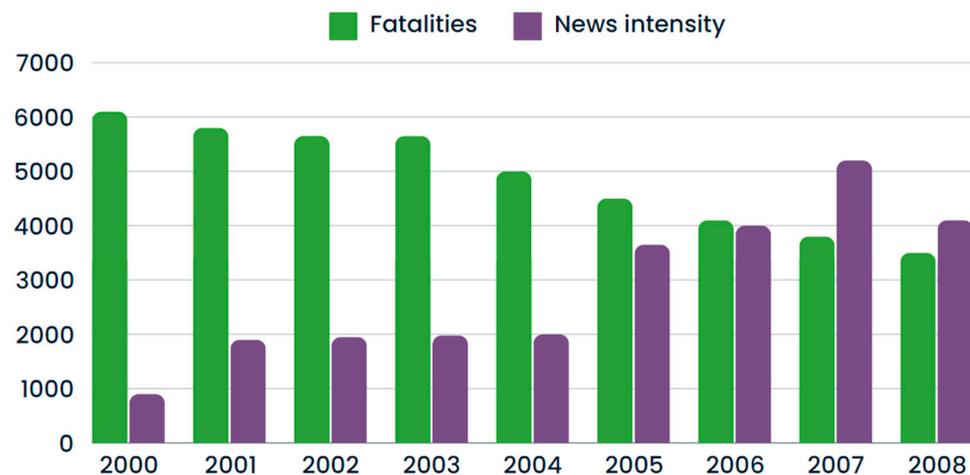


Figure 2. Relationship between news intensity (points obtained) and traffic fatalities in Spain. Note: Traffic fatalities data obtained by the DGT.

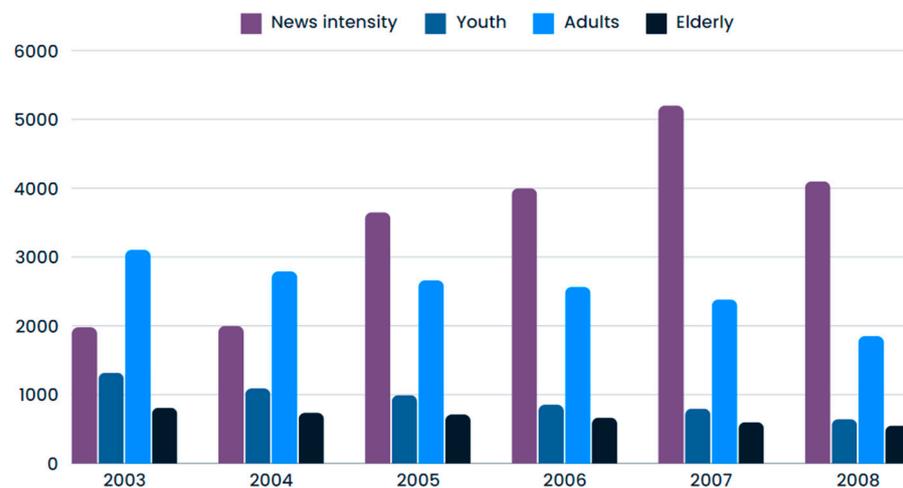


Figure 3. Relationship between news intensity (points obtained) and traffic fatalities. Note: Traffic fatalities data obtained by the DGT.

As for the tone of the messages and the number of fatal accidents, there is also a negative correlation ($r^2 = -0.854$; $p = 0.003$). For the analysis of this correlation, we have considered the intensity of the news, in which the value obtained from the size of the headline or the text is no longer taken into account but only the quantification of the elements that, due to their content or significance, offer a greater connotation, according to the scales proposed in the Section 1. Thus, it can be seen that the increase in the intensity of the messages is related to a reduction in the number of fatal accidents in the analyzed period.

If we take into account the relationship between total punctuation, news intensity, and fatalities, 3D Figure 4 shows a fairly clear line of relationship between them.

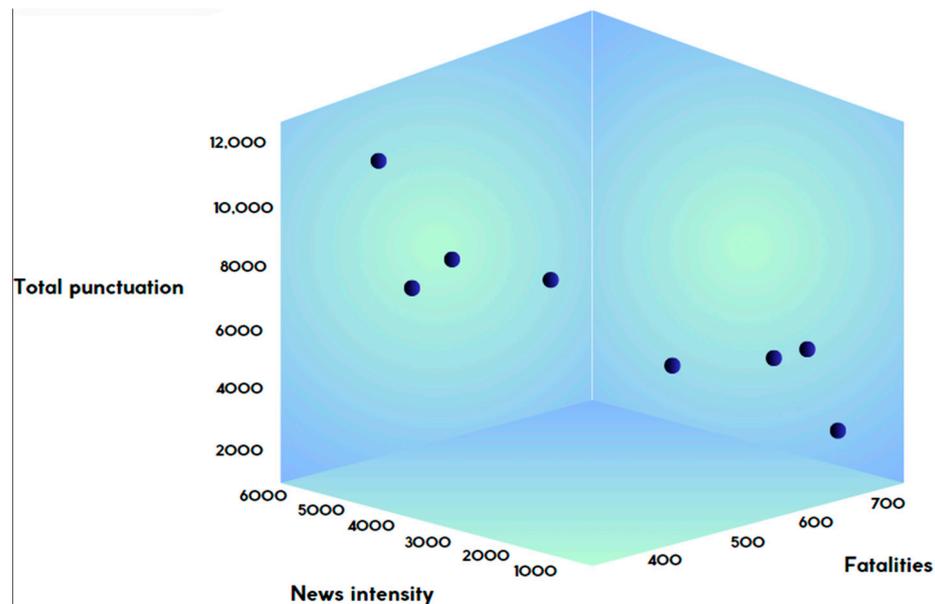


Figure 4. A 3D representation of total points, intensity, and accidents.

4. Discussion

The aim of this article is to quantitatively analyze the presence of traffic and road safety in the Spanish press during the years when there was the greatest reduction in road accidents in Spain (from 2000 to 2008). Communication campaigns and news issued by the press do not only seek to inform but also produce a positive change in the population [57]. Pro-social behavior is the result of a maturation and learning process that begins at early ages and evolves as cognitive, emotional, and social development progresses [58–60]. In this sense, pro-social behavior is modifiable. It must be learned throughout one's life, highlighting the important role that parents, teachers, and media can exert in this regard from the early stages of our human development [61].

In this sense, social marketing is a tool that uses marketing techniques to influence human behavior to achieve social good [62]. They are commonly used in the transmission of healthy behaviors and mental health [63], ecology and recycling [64], empowering aid to countries at risk of poverty [65], or the promotion of appropriate behaviors while driving [66], among many others. Therefore, a detailed analysis of the news related to traffic and road safety in the time period evaluated in this paper is of particular interest to understand how the population was influenced to achieve a reduction in road crashes that have followed this downward trend until today.

4.1. Evolution in the Presence and Typology of Traffic News in the Print Media

The most striking thing that can be observed in our data is that there is a pronounced increase in the number of news items, as well as in their intensity and tone of message. In other words, there is an increase in the use of terms with a greater component of aggressiveness or violence. These factors are fundamental to achieving an impact on the population and, thus, a greater recall and even a change in their behavior [66]. Conveying a clear and informative message is important, but including an emotional component is directly related to the effectiveness of reducing traffic accidents [67]. Research has shown that awareness campaigns that incorporate emotional elements, such as fear or empathy, have a significantly greater impact on the target audience [68]. When people are emotionally moved by a message, they tend to remember it longer and are more inclined to take preventive measures [68].

However, an excess of aggressiveness in the message might produce the opposite results from those expected. It has been demonstrated that an inverted U-shaped relationship exists between the emotional intensity of a message and attitude change, specifically

referring to negative emotional messages or appeals to fear [69]. That is to say, news with low levels of intensity, as well as those whose levels are too high, have been shown to be less effective [70–72]. Thus, very low levels of emotionality or impact may cause the campaign not to capture the viewer's attention sufficiently, while high levels of aggressiveness may cause the rejection of part of the audience, thus losing the message conveyed [73]. Moreover, if messages and images with a certain level of violence are broadcast for long periods of time, their effect on the recipients is also reduced as they become habituated to such content, and, therefore, their perceived level of intensity will be reduced [74]. Thus, news and campaigns must be calibrated and varied in the communication strategy to achieve the best effect.

In this regard, it is important to point out that previous studies carried out by our research group have identified five major time periods of Spanish communication campaigns broadcast on television, and their results are consistent with the data obtained in this research for the period 2000–2008 [73]. To contextualize the information, it is necessary to know the general characteristics of the five time periods. Thus, the first spots, framed in the period called "The Beginnings", have high educational and formative content but no emotional impact. They are campaigns that teach the user how to behave on the road, but in a positive tone, without exposing the consequences of the accident; this is a strategy that is not very effective both from a theoretical point of view and in relation to the data, given the increasing number of accidents during the 1960s and 1970s [20]. Later, in "Soft Line", the consequences of traffic accidents began to be broadcast, but without using violent or aggressive methods [73]. On the other hand, in the 1990s, with the new Traffic and Road Safety Law, the "Hard Line" was developed, in which what happens after a road accident is presented in a crude and bloody way, including the visualization of dead and injured people in a very realistic way [73]. Although a decrease in the number of deaths is identified at the beginning of this stage, it quickly stabilizes due to the habituation and rejection that these images provoke in the audience, as previously mentioned and as the scientific literature supports [75].

However, and entering specifically into the period that concerns us in the present study, the stage developed in the 2000s, called the "Multivariate Period", includes the presence of very heterogeneous campaigns in terms of message tone and the communicative strategy employed [73]. Not only are techniques of one typology used, but also informative, emotional, aggressive, and high-impact strategies, as well as other new resources such as humorous, metaphorical, and others. This change of approach has been shown to be effective, at least as a complement to the rest of the measures developed in these years [76]. In fact, in terms of strategy, in the "period of recent years", the heterogeneity and diversity of communicative approaches to convey messages in traffic and road safety spots and news, gauging the degree of use of all of them over time, are maintained.

In this sense, congruencies are identified in the formal aspects of the campaigns developed by the DGT in the period analyzed and in the presence and typology of news in the most relevant written press media in the country. This concordance occurs in relation to the number of news items, which increases over the years, as does the number of traffic advertisements. Moreover, the tone of the message, in which the use of emotional and informative strategies is observed in the news, is similar to that shown in road safety advertising [77].

4.2. Contribution and Potential Impact of Traffic News on the Reduction of Road Accident Rates

Our analyses indicate that there is a negative correlation between the number of news items and their intensity in relation to traffic accidents and deaths resulting from them. However, it should be made clear that Pearson's correlation does not establish causality [78]. In addition, the fact that no substantial differences in the influence of print news by age group are identified is an interesting finding that contradicts expectations based on previous literature [79]. Traditionally, it has been assumed that young people reading fewer print media would be less influenced by print news compared to other age groups [80,81]. One

possible reason is related to the fact that, although young people access less news through print newspapers, they have access to the same news through other media. In the years analyzed, news spreads rapidly and is available on a variety of platforms, including digital versions of newspapers, news websites, and social networks [82]. Therefore, even if young people do not actively consume print newspapers, they are likely to be exposed to the same news through other channels [83].

Therefore, it should be noted that there may be other variables, measures, or actions that can have an impact on the reduction of road accidents in addition to the news in the media. There are some measures that, together with the associated informative dimension, have had a differential impact on road accidents and mortality. The establishment of the points-based license [27], the creation of the National Road Safety Observatory, the implementation of new technologies in traffic management, the improvement of infrastructure [30], and the reform of the Penal Code [31] are just some of the milestones that were reached in Spain during the years analyzed, and those, without doubt, are fundamental in understanding the sharp reduction in accident rates. However, once again, it is worth highlighting the role of the transmission of information to citizens through the media, since all these measures were made visible through news and campaigns broadcast in the press, radio, television, and internet [84]. Therefore, the media greatly favored the dissemination of these changes and made more people aware of the new measures, comply with them, understand their importance, and, ultimately, modify their behavior in favor of road safety.

In this sense, in Spain, especially since 2004, the Directorate General of Traffic has implemented a new communication strategy that has proven to bear fruit [85,86]. This mainly consists of establishing surveillance and control campaigns accompanied by messages in the media, press releases explaining the causes of their implementation, information to the mass media through interventions by those responsible for traffic, informative actions with radio spots and inserts in the press, and communication of the results after the end of the campaigns.

Given the scarce scientific evidence on the degree of effectiveness of communication campaigns in this area, there is no unanimous conclusion in this regard. Some studies identify significant changes in attitudes and behaviors derived from the presence in the media of traffic spots and news [87,88]. On the other hand, the results of other studies either do not point to the existence of significant changes in behavior or demonstrate that they are very slight [89,90]. In any case, and following the line of argument previously presented, a finding expressed by much of the research is the capacity of the campaigns to increase the effectiveness of other preventive measures. Thus, preparing a high media presence for certain offenses or specific measures increases the effectiveness of these actions [47].

In relation to this complementary role, in order to potentially increase the effectiveness of news and campaigns, the time of transmission must be taken into account. There are certain times when there is more travel than usual [91]. These are usually holiday periods around summer, Christmas, and Easter when police control or traffic sanctions are generally increased [92]. During these periods and their preceding days, traffic news and announcements issued by the media must also be increased so that users are especially alert and aware, thus causing a potential increase in their effectiveness for behavioral change in favor of preventive and safe behaviors [17]. Additionally, when there are changes in legislation or regulations, it is especially relevant that citizens are aware of the new rules, so news in the media is fundamental in these periods [93].

Therefore, the context in which news and campaigns are broadcast is relevant to explain their potential effectiveness, always taking into account the other preventive measures developed simultaneously and the consequences of this joint or complementary application on the prevalence of risk behaviors [73]. In short, traffic accidents are multifaceted, and many different factors are involved in them, making them extremely difficult to manage and therefore reduce. However, the role of communication campaigns and informative actions is hard to neglect. This, however, goes hand in hand with other executive, management, and legislative actions, which together can impact accident rates in a significant way.

4.3. Limitations of the Study

It is important to take into account some limitations of the present research in order to correctly interpret the results. An analysis of the presence of news related to traffic accidents and their intensity has been carried out using a set of criteria designed for this study. Thus, although the methodology of Lawrence Bardin [56] was followed for content analysis, since reading (textual and visual) was used as the instrument for collecting information, errors could have occurred in the coding of the news items. In any case, this potential bias has been minimized since the authors of the study conducted the categorization independently following the established criteria and, subsequently, shared their findings and discussed possible discrepancies. Furthermore, no subjective criteria have been established, but the categorization and scoring are obtained by the presence of terms and/or images that are not susceptible to interpretation.

In relation to the comparison between the presence and intensity of news items in the written press and road accident figures, as specified throughout the manuscript, causalities cannot be established but only correlations due to the simultaneous presence of preventive actions of various kinds that prevent the impact of news items and campaigns from being analyzed in complete isolation [47]. However, this circumstance does not detract from the value of the research, which is one of the first approaches to evaluating the contribution of communication actions to road safety due to the lack of existing evidence dealing with this problem.

5. Conclusions

In this paper, we attempt to address the contribution of the written press to the reduction of the accident rate in Spain, focusing on and analyzing the period between 2000 and 2008, when one of the largest decreases in road accidents and fatalities in the country took place. This period was also marked by a series of coordinated actions with the specific purpose of improving road safety, including unprecedented media and information campaigns, the introduction of the penalty points system as a new type of sanction, an emphasis on road safety education, and other preventive measures. This is why we cannot affirm that the news and campaigns in the press are the sole cause of this reduction in the data. However, their contribution is noted as an effective complementary action that has potentially increased the degree of effectiveness of other established measures, and that should be considered a fundamental point to inform and raise awareness among users about safe behavior when driving on the road.

Future research and studies can address some of the points underlined by this paper. Our study focused on the role of media in Spain, but such a role can be studied and analyzed in other countries as well. Such a comparison could pave the way for understanding the net effect of the media in general, as well as helping to understand the factors that may help or hurt the messages put forward by the media. Additionally, more recent media campaigns can be studied using the tools proposed in this paper to analyze the role of other similar campaigns and their effectiveness in controlling accident rates.

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