

**Ahead of the Flames: Understanding What Drives Residents' Wildfire Mitigation
Intentions**

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Abstract

In light of the increasing impact of wildfires on society, the lack of preparedness among residents needs to be addressed. An emerging body of research is concerned with residents' motivations to reduce their vulnerability to wildfires. The present study examined what socio-psychological factors positively affect the intention to perform mitigation behaviours among Dutch residents. Insights from the Theory of Planned Behaviour, the Protection Motivation Theory and literature on feelings of responsibility were integrated. Participants ($n = 83$) living in wildfire-prone areas in Twente completed an online survey. Subjective norms and personal responsibility predicted mitigation intentions. However, against expectations, risk perception, attitude and self-efficacy were not found to contribute to the explanation of intentions to mitigate. Theories in addition to those mentioned above are needed to better understand mitigation behaviours. Authorities concerned with wildfire management are advised to focus on subjective norms and residents' feelings of responsibility in community meetings and public communications.

Keywords: wildfire mitigation behaviours, socio-psychological determinants, residents.

1. Introduction

“Canada wildfire season is now the worst on record” (Yousif, 2023); “California wildfire threatens 1,300 homes south-east of Los Angeles” (Anguiano, 2023), “A losing battle to save the lungs of Athens as wildfires grip Greece” (Giokos & Hawkinsthese, 2023) these are a few of many examples of recent newspaper headlines. The headlines underscore what experts have been saying for years: the threat of wildfires to people and the environment is increasing due to climate change and land-use change (United Nations Environment Programme [UNEP], 2022). Considering these developments, experts have urged governments to rethink their wildfire management plans.

Traditional strategies no longer suffice for two main reasons. To start with, such approaches mostly focus on ignition prevention and fire detection (UNEP, 2022). Large-scale efforts towards minimising the negative impact of wildfires on society (i.e., mitigation) are currently lacking in many countries. Furthermore, traditional strategies reflect a belief that the risks can be eliminated (UNEP, 2022). This optimism contributed to residents’ experience of safety, yet also caused them to become detached from the phenomenon of wildfires and turned them into passive actors (Górriz-Mifsud et al., 2019). Residents are often not prepared and over-rely on governments to protect them.

Contemporary strategies, thus, need to account for all phases of a disaster, namely mitigation, preparedness, response and recovery, and actively involve residents (UNEP, 2022). North America, where the rise in catastrophic wildfires was already evident a decade ago, took the lead in developing these approaches. Collaborative programs, such as Firewise and FireSmart, encourage residents living in wildfire-prone areas to take mitigation measures on their properties (National Wildfire Coordinating Group, 2019). Now that the fire seasons in Europe are becoming more intense (San-Miguel-Ayaz et al., 2023), governments here have started to recognise the need to engage affected residents in a similar manner.

The widespread sense of urgency has resulted in a growing academic interest in what drives residents to mitigate wildfires (Haghani et al., 2022). Wildfire literature is mostly framed by the Theory of Planned Behaviour (for an integrative literature review, see Dupéy & Smith, 2018), which links attitudes, subjective norms and perceived behavioural control to behaviours. Emerging research is exploring the influence of additional socio-psychological factors, including feelings of responsibility, to gain a comprehensive understanding of residents’ mitigation behaviours. The present study integrates determinants outlined in the Theory of Planned Behaviour and Protection Motivation Theory, and personal responsibility into a model to explain mitigation intentions among Dutch residents.

Furthermore, in social psychology, two types of subjective norms are identified. Injunctive and descriptive subjective norms are regarded as separate sources of motivation (Manning, 2009; McEachan et al., 2016). Until now this distinction has been overlooked in mitigation research. Additionally, the role of personal responsibility as a mediator between subjective norms and intentions has received little to no attention in the context of wildfires. A mediation analysis is performed here to help clarify the relationship between subjective norms and residents' intentions to mitigate.

Moreover, similarities across literature from Australia, Canada and the United States of America are striking (McCaffrey, 2015). Several socio-psychological factors seem to affect residents' behaviours in all three countries. Still, McCaffrey (2015) argues that assuming wildfire dynamics among residents are equivalent everywhere without empirical evidence is incorrect. Contrasting results may arise due to differences in national institutional structures and policies. The current research provides insights into whether determinants of mitigation behaviours found in North America and Oceania apply to the Netherlands, where wildfires are one of today's most prevalent natural hazards (Analistennetwerk Nationale Veiligheid, 2022; Nederlands Instituut Publieke Veiligheid [NIPV], 2023).

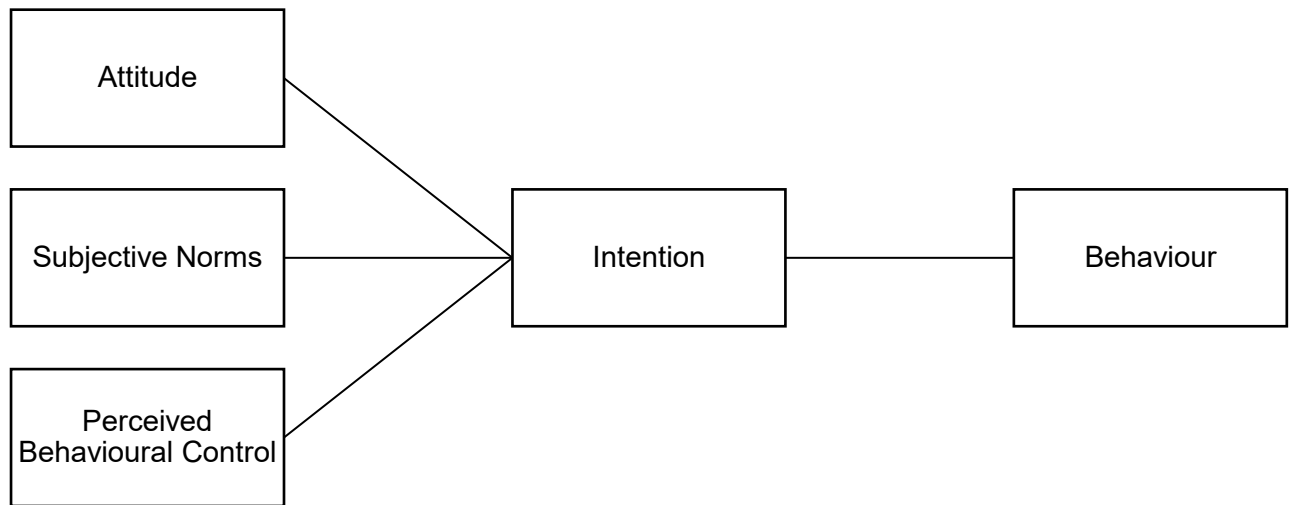
The following research question is addressed: *What socio-psychological factors positively affect the intention to perform wildfire mitigation behaviours among residents living in wildfire-prone areas in the Netherlands?*

1.1 Theoretical Framework

Two psychological theories are used here to guide the analysis of residents' mitigation intentions, namely the Theory of Planned Behaviour (TPB; Ajzen, 1991) and the Protection Motivation Theory (PMT; Rogers, 1975). The TPB is a general theory that has been successfully applied to a variety of contexts, including wildfires (e.g., Bates et al., 2009; Nox & Miles, 2017). It proposes that attitude, subjective norms and perceived behavioural control shape intentions to engage in a given behaviour (see Figure 1). The greater the intention, the more likely the behaviour will be performed.

Figure 1

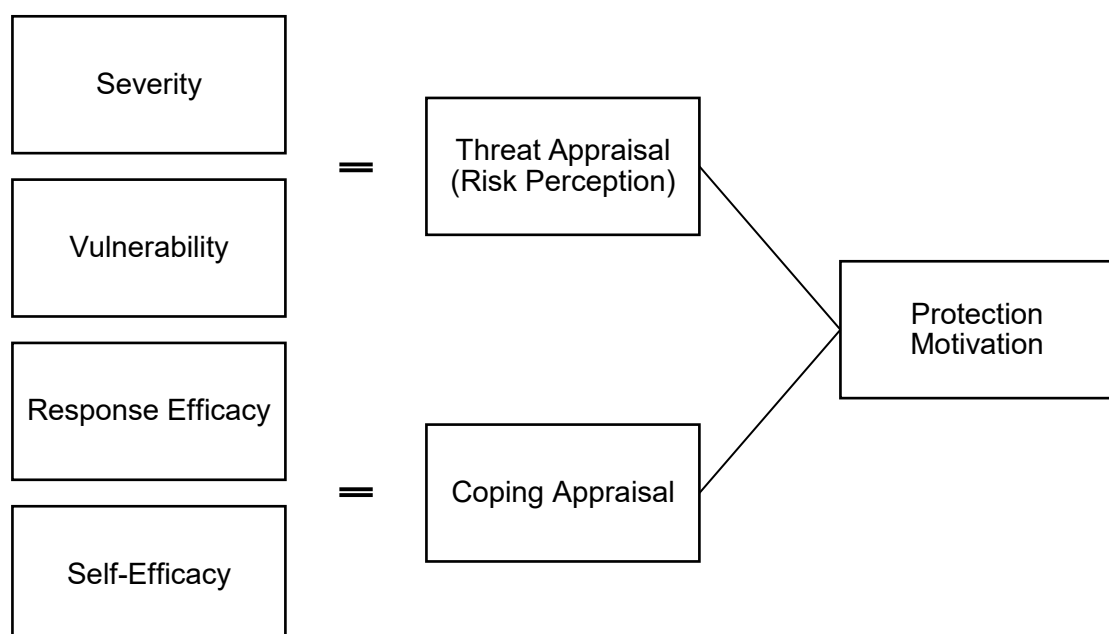
A Schematic Representation of the Theory of Planned Behaviour



Dupéy and Smith (2018) suggested that the PMT may be a promising addition to the TPB, since the former theory specifically focuses on risk reduction behaviours. The PMT posits that threat and coping appraisal processes affect intentions to take protective action (see Figure 2). Threat appraisal, often referred to as risk perception in wildfire literature, includes an evaluation of the severity of and vulnerability to the threat. Coping appraisal includes an evaluation of response efficacy and self-efficacy.

Figure 2

A Schematic Representation of the Protection Motivation Theory



Additionally, the present research identified personal responsibility as a variable of interest. In a recent scoping review, Cowan and Kennedy (2023) highlighted the need to further explore the effect of this socio-psychological factor on the uptake of wildfire mitigation measures.

1.1.1 Wildfire Mitigation Behaviours

Wildfire mitigation is an umbrella term for actions that are taken before a wildfire ignites to reduce the negative impact of this natural hazard. A wide range of parties may be involved in wildfire mitigation. For clarification, the behaviours discussed in this research are performed by residents and aimed at preventing damage to one's property.

1.1.2 Wildfire Risk Perception

Within the PMT, severity refers to the seriousness of a threat, while vulnerability involves the likelihood of being exposed to a threat (Rogers, 1975). One study reported that increased feelings of severity and vulnerability led to greater intentions to perform mitigation actions (Martin et al., 2007). Similarly, McNeill et al. (2013) found that both factors were positively related to several types of wildfire preparedness.

Furthermore, severity and vulnerability are often combined into a single measure of risk perception. Research revealed that risk perception predicted intentions (Nox & Miles, 2017), actual behaviours undertaken (Martin et al., 2009) and interest in consultation and mitigation programs (Hall & Slothower, 2009). In contrast to Hall and Slothower (2009)'s expectations, heightened risk perceptions among residents did not influence their intention to manage vegetation around the house. Additionally, more recent evidence showed a surprising negative relationship between risk perception and fireproofing one's home (Koksal et al., 2020). The authors speculated that the sample highly valued living near nature and accepted possible damage to their homes. This consideration may have caused residents to conclude there is nothing they can do to reduce the negative impact of wildfires. Still, the overall evidence seems to indicate a positive effect of risk perception on mitigation intentions and behaviours (Cowan & Kennedy, 2023). Therefore, the following hypothesis is advanced:

H1: Risk perception is positively related to residents' intentions to perform wildfire mitigation behaviours.

1.1.3 Attitude Towards Wildfire Mitigation

Within the TPB, attitude refers to "the degree to which a person has a favourable or unfavourable evaluation or appraisal of the behaviour in question" (Ajzen, 1991, p. 188). Interestingly, much research has examined how residents evaluate the effects of wildfires on the environment and humans (e.g., Asfaw et al., 2022; Brenkert-Smith et al., 2012). Only a

handful of studies have been concerned with attitudes towards taking mitigation measures. These studies often use attitude measurements that include response efficacy, one of the determinants described in the PMT (e.g., Nox and Miles, 2017). Response efficacy is a person's belief as to whether the recommended behaviour is effective in reducing the threat (Rogers, 1975).

Regarding the evidence, Bates et al. (2009) analysed how participants perceived the benefits of protecting their properties. Attitudes affected intentions to perform fire-safe behaviours in the next six months. Moreover, residents' attitudes towards clearing and landscaping recommendations proved to be the strongest predictor of the intention to implement them (Bright & Burtz, 2006). This is consistent with Nox and Miles (2017), who found that attitude was the most important variable relating to intentions to mitigate wildfire risks. Based on these observations, the second hypothesis is formulated:

H2: Attitude is positively related to residents' intentions to perform wildfire mitigation behaviours.

1.1.4 Subjective Norms Regarding Wildfire Mitigation

Ajzen (1991) defined a subjective norm as "the perceived social pressure to perform or not to perform the behaviour" (p. 188). The construct was originally operationalised as an injunctive norm, which is a person's perception of whether a behaviour is approved or disapproved of (Cialdini et al., 1990). Later, however, Ajzen and Fishbein (2005) recommended including injunctive and descriptive norms in measurements of subjective norms. Descriptive norms refer to a person's perception of which behaviour is performed by most people (Cialdini et al., 1990). In other words, injunctive norms indicate what ought to be done, while descriptive norms indicate what is done.

Cialdini et al. (1990), among others, have argued that the two types of norms are conceptually distinct because they represent different sources of motivation. Injunctive norms motivate by setting expectations on whether a behaviour comes with social rewards or punishments. Descriptive norms, on the other hand, motivate by suggesting what behaviour is likely to be effective or normal in a given situation. People tend to reason that "if everyone is doing it, it must be a sensible thing to do" (Cialdini et al., 1990, p. 1015). Support for the argument by Cialdini et al. (1990) has been provided by various subfields of psychology. Meta-analyses on TPB studies (Manning, 2009) and Reasoned Action Approach studies (McEachan et al., 2016) have been conducted. The results confirmed that both norms are consistent predictors of risk and protection intentions and behaviours. For clarification, the Reasoned Action Approach is an extension of the TPB.

With respect to fire safety, recent research showed that injunctive and descriptive norms were associated with employees' evacuation decisions (Le Aurora et al., 2022). Although the norms acted simultaneously, they made independent contributions to the explanation of intentions to leave the office when a fire alarm is activated. Notably, conceptual models including injunctive and descriptive norms are lacking in the literature on wildfire mitigation. To illustrate, Bates et al. (2009) characterised friends, family and coworkers as sources of social pressure. They reported a positive relationship between injunctive norms and residents' intentions to protect their homes. Additional research considered neighbours, forest managers and the local fire department, and observed comparable results for the intention to perform clearing and landscaping activities (Bright & Burtz, 2006). Others have drawn attention to descriptive norms. Asfaw et al (2022) revealed that a lack of preparedness among neighbours negatively influenced the adoption of FireSmart recommendations. One study combined items on injunctive and descriptive norms into a single measure and showed that subjective norms were a predictor of vegetation removal (Nox & Myles, 2017). All things considered, it is hypothesised that:

H3: Subjective norms (i.e., injunctive and descriptive norms) are positively related to residents' intentions to perform wildfire mitigation behaviours.

1.1.5 Self-Efficacy Regarding Wildfire Mitigation

Interestingly, self-efficacy as used in the PMT and perceived behavioural control as outlined in the TPB are compatible, according to Ajzen (1991, 2020). Both refer to a person's confidence in their ability to perform a given behaviour. The level of confidence is based on past experiences as well as foreseen impediments and obstacles (Ajzen, 1991).

Research showed that belief in one's own capacity to minimise wildfire damage positively affected intentions to prepare (Bates et al., 2009; Nox & Miles, 2017) and actual preparedness (Martin et al., 2009; Prior & Eriksen, 2013). Noteworthy is the strength of the evidence provided by Prior and Eriksen (2013), they had a large sample ($n = 831$) and used quantitative and qualitative data to come to their conclusions. However, it also needs to be mentioned that earlier evidence indicated that the positive effect of self-efficacy only applied to residents with high levels of subjective knowledge (Martin et al., 2007). Another study failed to find a significant relationship between the level of confidence and vegetation management (Hall & Slothower, 2009).

Furthermore, based on wildfire scholarship and consistent with Ajzen (1991), Hamilton et al. (2018) concluded that self-efficacy includes several facets. To illustrate, residents in Canada who felt that they possessed the skills to engage in mitigation were reluctant to act if

they did not have the financial resources (McFarlane et al., 2011). Skills and money are, thus, important elements to consider when measuring self-efficacy. Taking the aforementioned into account, the following hypothesis is proposed:

H4: Self-efficacy is positively related to residents' intentions to perform wildfire mitigation behaviours.

1.1.6 Personal Responsibility for the Protection From Wildfires

Personal responsibility may be defined as the extent to which a person perceives oneself to be responsible for protecting one's safety and property (McNeill et al., 2013; Nox & Miles, 2017). Available data on responsibility perceptions focuses on direct relationships with mitigation behaviours. Martin et al. (2009) and McNeill et al. (2013) noted that residents who felt responsible for their own protection scored higher on wildfire preparedness than those who did not. Nonetheless, two additional studies concluded that responsibility was not a determinant of the intention to mitigate (Nox & Miles, 2017) and actual mitigation (Schulte & Miller, 2010). This was a surprising result according to Nox and Miles (2017), as residents reported high feelings of responsibility. They argued that responsibility was captured as part of another variable (i.e., attitude), the poor measurement may have led to a non-significant outcome. Schulte and Miller (2010) also did not find support for their hypothesis, nor did they provide an explanation.

The latest literature on pro-social behaviours reveals another interesting direction. Research demonstrated that the positive impact of combining subjective norms on organ donation intentions is driven by personal responsibility (Habib et al., 2022). The effect was shown in three focal studies and two follow-up studies conducted online, in the field and laboratory. Furthermore, Chaudhary et al. (2023) found that feelings of responsibility partially mediated the relationship between descriptive and injunctive norms and anti-littering intentions. In other words, strong subjective norms increased personal responsibility, which in turn encouraged behavioural intentions. A meta-analysis provides additional support by confirming that personal norms, which include feelings of responsibility, act as a mediator (Helferich et al., 2023). Building on theories such as the norm activation model, it is argued that subjective norms directly contribute to the development of personal norms. Injunctive and descriptive norms communicate what behaviours are approved of and most people engage in, in a specific context. Individuals may internalise these standards, thereby providing the content of their personal norms (Helferich et al., 2023).

Chaudhary et al. (2023) and Habib et al. (2022) looked beyond direct effects to gain a better understanding of responsibility and subjective norms. Such an approach is currently

lacking in wildfire research, the field may benefit from performing a mediation analysis involving personal responsibility. Considering the evidence from wildfire and additional social science literature, it is hypothesised that:

H5: Personal responsibility is positively related to residents' intentions to perform wildfire mitigation behaviours.

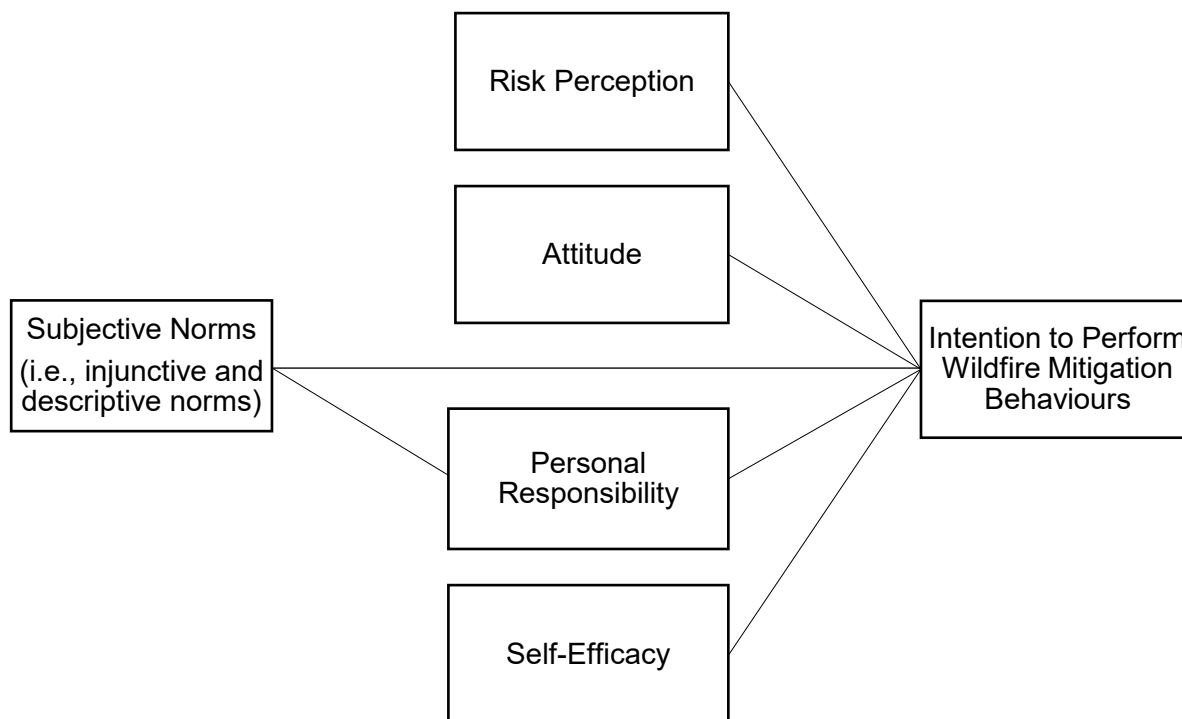
H6: The relationship between subjective norms (i.e., injunctive and descriptive norms) and residents' intentions to perform wildfire mitigation behaviours is mediated by personal responsibility.

1.2 The Present Study

This study examines what socio-psychological factors, including those outlined in the TPB and PMT and personal responsibility, positively affect the intention to perform wildfire mitigation behaviours among residents living in wildfire-prone areas in the Netherlands. The conceptual model is shown in Figure 3. Intentions and underlying determinants were assessed using an online survey. For a practical reason, which is to inform future interventions, residents were also asked which stakeholders they considered trustworthy in sharing information about wildfire mitigation.

Figure 3

The Conceptual Model



2. Methods

2.1 Design

The use of a quantitative instrument, namely a survey, was most appropriate given the research question and purpose. This study explores the direct and indirect effects of socio-psychological factors on residents' intentions to mitigate wildfires.

2.2 Participants

A power analysis calculation demonstrated that for a linear multiple regression analysis with six predictor variables to detect a medium effect size ($f^2 = 0.15$), with a power of .80 and $\alpha = .05$, a sample size of 98 is required (Faul et al., 2009).

Two municipalities in Twente were selected to draw participants from. According to the Dutch Wildfire Risk Index (for more information, see Brandweer Nederland, n.d.), Hellendoorn and Rijssen-Holten qualify as wildfire-prone areas. Both are located near the National Park Sallandse Heuvelrug. In 2023, Hellendoorn and Rijssen-Holten had 36 261 and 38 493 inhabitants respectively (Centraal Bureau voor de Statistiek, n.d.). Preliminary contact with Veiligheidsregio Twente revealed that they do not have a clearly defined intervention targeting residents in fire-prone areas. It was, thus, assumed that residents had not yet taken mitigation measures before receiving the survey.

A convenience sampling technique was used to recruit participants, from December 11 to December 28, 2023. Veiligheidsregio Twente posted an introductory remark on the research and a link to the survey on their Facebook account. To reach a large audience, Veiligheidsregio Twente used paid advertising. Brandweer Twente shared a similar post on their LinkedIn account, no advertisement costs were paid for. Additionally, a short article about the research with a link to the survey was published on *Twente Veilig* and in *Hart van Hellendoorn-Nijverdal* and *Hart van Rijssen-Holten*. *Twente Veilig* is a website owned by Veiligheidsregio Twente, which informs residents about potential safety and security risks in their region (<https://www.twenteveilig.nl/>). The aforementioned local newspapers are run by DWF media and available in print and online (<https://www.hartvannijverdal.com/>; <https://www.hartvanrijssen.nl/>). Snapshots of the posts and articles appear in Appendix A.

Individuals were eligible if they were 18 years or older, understood Dutch (level B1), lived in Hellendoorn or Rijssen-Holten and resided in a house with a garden. They were not offered (monetary) compensation for their participation. One hundred and thirty-two people started the survey, 14 did not fit the sample and 35 were unable or unwilling to answer any of the questions related to the dependent variable and predictors. The total sample therefore consists of 83 participants (43 men, 25 women, 15 unknown; age $M = 49.55$ years, $SD = 12.70$, $n =$

66). Due to time and resource constraints, the required sample size of 98 was not obtained. Thirty-six participants were residents of Hellendoorn and 47 resided in Rijssen-Holten. Participants differed in highest level of education completed, practical education (LBO) = 2, prevocational secondary education (VMBO) = 3, senior general secondary education (HAVO) and pre-university education (VWO) = 7, senior secondary vocational education (MBO) = 22, higher vocational education (HBO) = 22, university education (WO) = 11, professional certificate program = 2, and unknown = 14.

2.3 Procedure

Prior to the data collection, approval of the Behavioural, Management and Social Sciences ethics committee of the University of Twente was obtained. Residents were invited to fill out an online survey in Dutch. The survey began with two qualifying questions to verify whether they were living in Hellendoorn or Rijssen-Holten and resided in a house with a garden. Individuals who did not meet these criteria were redirected to an exit screen with a link to *Twente Veilig* with information on wildfires and thanked for their time and effort. Those who were eligible were shown a brief explanation of the research goal and how the data was managed. To guarantee anonymity no personally identifiable information, such as the IP address and location data, was collected. Before proceeding to the questions, participants provided informed consent. The consent form stated that they entered the research voluntarily and were free to withdraw at any moment. The questions related to the dependent variable and predictors followed. As recommended by Van der Gaast et al. (2019), questions that measured a single concept (e.g., attitude) were presented on a page to minimise survey fatigue. Thereafter, demographic details, including age, gender and highest level of education completed, were gathered. At the end, participants were shown a thank-you message and a link to *Twente Veilig* with information on wildfires.

2.4 Materials

The data was collected through a survey in Qualtrics (<https://www.qualtrics.com>). For each of the variables, participants were asked to rate how much they agreed with the given statements on a 5-point Likert scale (1 = *strongly disagree*; 5 = *strongly agree*). The present study used 5-point scales instead of 7-point scales to ensure response scale simplicity (Simms et al., 2019). Additionally, in the design of the survey thought was given to the Dutch language proficiency of the sample. Governmental guidelines were followed, these recommend using B1 in public texts (Dienst Publiek en Communicatie, n.d.). The survey is presented in Appendix B.

2.4.1 Intention to Perform Wildfire Mitigation Behaviours

The dependent variable, intention to perform wildfire mitigation behaviours, was measured using four items drawn from a brochure distributed by Brandweer Noord- en Oost-Gelderland. The brochure outlines methods for locals to prepare their homes and gardens to withstand wildfires (Brandweer Noord- en Oost-Gelderland, n.d.). Similar materials are not yet available for the Twente region, therefore using an alternative Dutch source was considered justifiable. The phrasing of the recommendations was adjusted slightly to improve readability. The selected items related to vegetation management around the house.

Participants responded to the following items: (a) “I intend to remove leaves from my roof and gutters during dry and hot weather;” (b) “I intend to remove plant litter within 1,5 metres from my house during dry and hot weather;” (c) “I intend to prune my trees and plants during dry and hot weather;” and (d) “I intend to keep my grass low during dry and hot weather.” Intention was scored as the total means of the items. A high score indicated a strong intention to mitigate. The scale demonstrated acceptable internal consistency (Field et al., 2012; $\alpha = .78, \lambda = .76, n = 83$).

2.4.2 Risk Perception

Concerning the predictors, severity and vulnerability were combined into a single measure of risk perception. Items were taken from the Risk Behaviour Diagnosis Scale (RBD Scale; Witte et al., 1996). The original scale encompasses six items related to severity and vulnerability. To keep the survey concise, four items were selected. Participants were asked to respond to the following items: (a) “Wildfires are a serious risk to human habitats;” (b) “Wildfires are harmful to human habitats;” (c) “I am at risk for having a wildfire damage my house;” and (d) “It is very likely that a wildfire damages my house.” Risk perception was scored as the total means of the items. A high score signified high perceived risk. The scale had acceptable internal consistency ($\alpha = .73, \lambda = .76, n = 83$).

2.4.3 Attitude

Attitude was assessed using two items from Bates et al. (2009) and one item related to response efficacy from the RBD Scale. Participants responded to the following items: (a) “Taking measures to protect my house from wildfires is important;” (b) “Taking measures to protect my house from wildfires is beneficial;” (c) “The abovementioned measures in my garden reduce the chance of having a wildfire damage my house.” Attitude was scored as the total means of the items. A high score indicated a positive attitude towards mitigation behaviours. The scale demonstrated good internal consistency ($\alpha = .81, \lambda = .77, n = 82$).

2.4.4 Injunctive and Descriptive Norms

Injunctive and descriptive norms were measured with four items designed by Nox and Miles (2017). As highlighted before, social pressure may come from various sources, therefore, family and friends, and neighbours were taken into account. Participants were asked to respond to the following items: (a) “My (family and friends, neighbours) think it is important to take measures to protect their house from wildfires;” and (b) My (family and friends, neighbours) intend to take measures to protect their house from wildfires.” Injunctive norm was scored as the means of the former two items and descriptive norm as the means of the latter two items. A high score signified a highly salient subjective norm. Both scales had good internal consistency (injunctive norm, $r(72) = .83, p < .001$; descriptive norm, $r(72) = .94, p < .001$).

2.4.5 Self-Efficacy

Self-efficacy was assessed using two out of the three items from the RBD Scale. The phrasing was adapted to include different facets of self-efficacy (Hamilton et al., 2018). Participants were asked to keep the mitigation behaviours listed earlier in the survey in mind and respond to the following items: (a) “I have the (skills, time, financial resources) to take measures in my garden;” (b) “It is easy for me to take measures in my garden.” Self-efficacy was scored as the total means of the items. A high score indicated strong confidence in one’s ability to perform mitigation behaviours. The scale demonstrated acceptable internal consistency ($\alpha = .71$; $\lambda = .77, n = 72$).

2.4.6 Personal Responsibility

Personal responsibility was measured using the following item from Nox and Miles (2017): “I am responsible for taking measures to protect my house from wildfires.” A high score indicated strong feelings of responsibility. The measure yielded a mean of 3.75 and a standard deviation of 0.93 ($n = 72$).

2.4.7 Information on Wildfire Mitigation

Lastly, Veiligheidsregio Twente, among other safety regions, aim to develop interventions related to wildfires in the near future. To improve public communication efforts, participants were asked what stakeholder(s) they perceived as being trustworthy in sharing information on wildfire mitigation. The following response options were provided: the fire service, the safety region, the municipality, the forests managers and the home insurance companies. Participants were allowed to check more than one answer and note down any stakeholder that was not mentioned yet.

2.5 Analysis

A few matters related to data validation are worth mentioning. Firstly, as shown in Table 1, the n -values range from 66 to 83, meaning that there were participants who did not answer all the survey questions. Although listwise deletion was not considered the most ideal solution to deal with the missing values, this method was preferred over mean imputation. Given the correlations between the variables, mean imputation would likely have led to biased estimates (Lodder, 2014). The analyses discussed next were performed using the data of 72 participants. Important to note, the number of observations is lower than the required sample size, thereby reducing the likelihood of detecting an effect of the predictor variables on the dependent variable (Field et al., 2012). Secondly, control variables were not accounted for. No correlations between age, gender, education and intention to perform wildfire mitigation behaviours were found (see Table 1).

Table 1*Means, Standard Deviations and Pearson's Correlation Coefficients*

Variables	<i>n</i>	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9
1. Intention to perform wildfire mitigation behaviours	83	3.24	0.90									
2. Risk perception	83	3.23	0.82	.35***								
3. Attitude	82	3.37	0.97	.34**	.61***							
4. Injunctive norm	74	2.76	0.93	.47***	.39***	.52***						
5. Descriptive norm	74	2.78	0.97	.44***	.45***	.58***	.89***					
6. Self-efficacy	72	3.79	0.60	.24*	-.06	.15	.10	.06				
7. Personal responsibility	72	3.75	0.93	.37***	-.04	.08	.08	.05	.44***			
8. Age	66	49.55	12.70	.20	.08	.16	.27*	.25*	-.04	.08		
9. Gender	68	43 M, 25 F		.17	.22	.22	.10	.13	-.16	.04	.34	
10. Education	69	-	-	-.12	.19	.14	.12	.22	.08	.06	-.18	.06

*** $p < .001$, ** $p < .01$; * $p < .05$

3. Results

3.1 Descriptive Statistics and Correlations

To begin with, boxplots and histograms were created for the dependent variable and predictors. Outliers were identified in the data on risk perception, attitude, injunctive norm, descriptive norm and personal responsibility. *z*-scores were computed for these variables. No values less than -3 and greater than 3 were found, therefore, no transformations were applied to the data (Field et al., 2012). Next, means, standard deviations and Pearson's correlation coefficients were calculated (see Table 1).

The dependent variable and predictors are positively correlated, which underlines the importance of examining these socio-psychological factors. Additionally, risk perception and attitude are very strongly and positively correlated. Participants who reported high levels of wildfire risk scored high on attitude towards mitigation behaviours. Moreover, subjective norms (i.e., injunctive and descriptive norms) and risk perception, and subjective norms and attitude, were moderately and positively correlated. In other words, participants for whom subjective norms were salient, perceived the risk to be high and had a positive attitude. Injunctive and descriptive norms were also very strongly and positively correlated. This indicates that if injunctive norms were salient, descriptive norms were too. Finally, personal responsibility and self-efficacy are moderately and positively correlated. Participants who felt they were responsible for acting, felt capable of doing so.

3.2 Hypotheses Testing

The four assumptions underlying most statistical tests were checked. A linear model was created with risk perception, attitude, injunctive norm, descriptive norm, self-efficacy and personal responsibility as predictor variables and mitigation intention as the dependent variable. A scatterplot with the fitted regression line indicated linearity. The Shapiro-Wilk test verified the data was normally distributed ($W = .97, p = .08$). The Breusch-Pagan test confirmed homoscedasticity ($\chi^2 = 10.30, p = .11$). The Durbin-Watson test ($D = 1.59, p = .07$) detected positive autocorrelation, yet the statistic value was within acceptable boundaries (Field et al., 2012).

3.2.1 The Effect of Socio-Psychological Factors on Mitigation Intentions

A multiple linear regression model was used to determine whether risk perception, attitude, injunctive norm, descriptive norm, personal responsibility and self-efficacy predicted the intention to perform wildfire mitigation behaviours (see Table 2). Overall, the predictor variables explained 28% of the variance in mitigation intentions ($R^2 = .28, F(6, 65) = 5.53, p < .001$). Personal responsibility had a significant positive effect on mitigation intentions, but

none of the other variables did. Hence, the present research yielded no support for hypotheses 1, 2, 3 and 4. Hypothesis 5, in contrast, was confirmed.

Table 2

Linear Regression Analysis for Hypotheses Testing

Predictor	<i>B</i>	<i>SE</i>	<i>t</i>	<i>p</i>
Risk perception	0.160	0.154	1.035	.305
Attitude	0.049	0.146	0.333	.740
Injunctive norm	0.301	0.204	1.481	.143
Descriptive norm	0.006	0.206	0.027	.979
Self-efficacy	0.107	0.170	0.628	.532
Personal responsibility	0.303	0.106	2.849	.006

3.2.2 Personal Responsibility as a Mediator

Following Baron and Kenny (1986), mediation occurs when (a) the predictor variable significantly affects the dependent variable; (b) the predictor variable significantly affects the mediating variable; and (c) the mediating variable significantly affects the dependent variable. Here injunctive and descriptive norms are the predictor variables, intention to perform wildfire mitigation behaviours is the dependent variable and personal responsibility is the mediating variable. Four separate linear regression analyses were performed to evaluate steps a and b of Baron and Kenny (1986)'s method. The results revealed a significant positive effect of injunctive norm ($B = 0.45$, $SE = 0.10$, $t = 4.55$, $p < .001$) and descriptive norm ($B = 0.40$, $SE = 0.10$, $t = 4.14$, $p < .001$) on mitigation intentions. However, a non-significant effect of injunctive norm ($B = 0.08$, $SE = 0.12$, $t = 0.63$, $p = .53$) and descriptive norm ($B = 0.05$, $SE = 0.12$, $t = 0.45$, $p = .65$) on personal responsibility was observed. In the current study, mediation did not happen through personal responsibility, and hence hypothesis 6 was not supported.

3.3 Additional Analyses

3.3.1 The Effect of Combined Subjective Norms on Mitigation Intentions

Given the strong correlation between injunctive and descriptive norms, an additional analysis was conducted with a variable combining the items from the two measures. Again, the four assumptions were tested, and no violations were found (see Appendix C). A multiple

linear regression model was used to examine the predictive relationship of risk perception, attitude, subjective norms, self-efficacy and personal responsibility with the intention to perform wildfire mitigation behaviours (see Table 3). Everything considered, the predictor variables explained 28% of the variance in mitigation intentions ($R^2 = .28$, $F(6, 65) = 6.57$, $p < .001$). Subjective norms had a significant positive effect on mitigation intention.

Table 3

Additional Linear Regression Analysis With Combined Subjective Norms

Predictor	<i>B</i>	<i>SE</i>	<i>t</i>	<i>p</i>
Risk perception	0.156	0.154	1.018	.313
Attitude	0.035	0.144	0.244	.808
Subjective norms	0.309	0.121	2.564	.013
Self-efficacy	0.117	0.169	0.695	.489
Personal responsibility	0.303	0.106	2.863	.006

3.3.2 Personal Responsibility as a Mediator and Combined Subjective Norms

An additional mediation analysis was performed to test whether personal responsibility mediated the relationship between subjective norms and mitigation intentions. The results showed a significant positive effect of subjective norms on the intention to mitigate ($B = 0.45$, $SE = 0.10$, $t = 4.50$, $p < .001$). Nonetheless, a non-significant effect of subjective norm on personal responsibility was found ($B = 0.07$, $SE = 0.12$, $t = 0.56$, $p = .58$). Again, personal responsibility did not act as a mediator.

3.3.3 A Reduced Model to Explain Mitigation Intentions

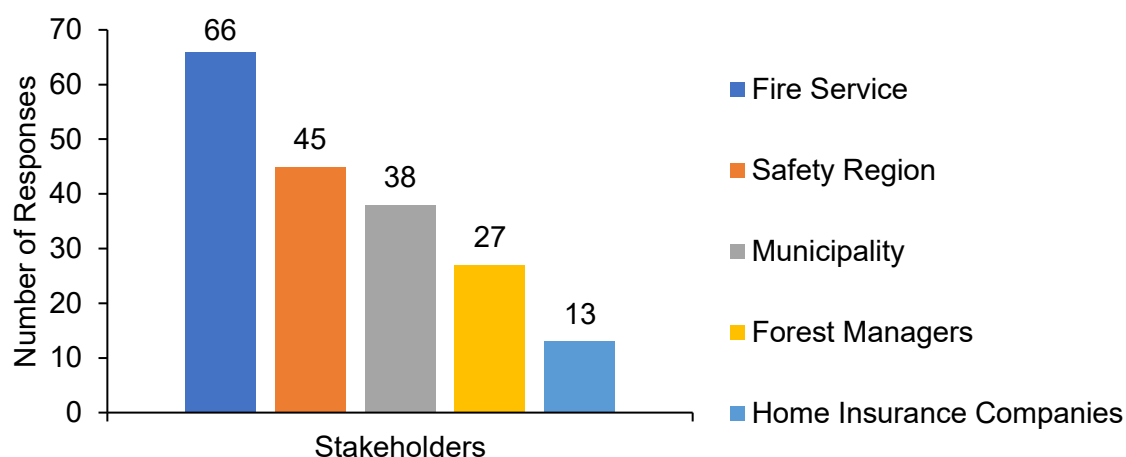
There is an ongoing debate about the effectiveness of stepwise regression among social scientists (e.g., Smith, 2018). Thus, the following results need to be interpreted with caution and are provided for the sole purpose of strengthening earlier findings. A backward elimination regression analysis was used to explore the influence of the predictors, mentioned in Table 3, on the intention to perform wildfire mitigation behaviours. At each step, predictor variables were removed based on their contribution to the Residual Sum of Squares. The Akaike Information Criterion determined the number of predictors included in the final model. As seen in Table 4, the final model encompassed risk perception, subjective norm and personal responsibility.

Table 4*Additional Backward Elimination Regression*

Included Predictors	<i>B</i>	<i>SE</i>	<i>t</i>	<i>p</i>
Risk perception	0.170	0.121	1.416	.161
Subjective norms	0.329	0.110	2.996	.004
Personal responsibility	0.339	0.094	2.583	<.001

3.4 Question Regarding the Trustworthiness of Stakeholders

When asked whom they thought was trustworthy when sharing information about wildfire mitigation, most participants mentioned the fire service (see Figure 4). None of the participants took the opportunity to provide additional stakeholders.

Figure 4*Perceived Trustworthiness of Stakeholders*

Note. The total number of responses does not correspond with the total number of participants, since they were allowed to check more than one answer.

4. Discussion

The current research examined what socio-psychological factors positively affect the intention to perform wildfire mitigation behaviours among residents living in wildfire-prone areas in the Netherlands. Insights from the Theory of Planned Behaviour, the Protection Motivation Theory and literature on feelings of responsibility were integrated.

To begin with, the expected results for risk perception and attitude were not detected in the present sample. Observations from Bates et al. (2009) and, Nox and Miles (2017) were not

replicated. Noteworthy is the strong association between these variables, which is a sign of multicollinearity. This statistical phenomenon makes it more challenging to discern the impact of predictor variables on the dependent variable (Alin, 2010). Here multicollinearity may be attributed to inadequate measurements, possibly the items used to assess risk perception and attitude were too similar. It could also be that the Theory of Planned Behaviour and Protection Motivation Theory are not all that helpful in explaining intentions to mitigate wildfires. The former theory maintains that attitude directly affects intentions. The latter theory proposes a direct effect of risk perception on intentions. The relationship between these socio-psychological factors and residents' mitigation intentions may be more complex than suggested by these theories. To illustrate, literature on natural hazards demonstrated that attitudes influence people's judgements about the seriousness of risks, which in turn affect preparedness actions (for a literature review, see Wachinger et al., 2013).

Furthermore, injunctive and descriptive norms did not make an independent contribution to the explanation of the intention to mitigate. These findings contrast with literature on fire evacuation (Le Aurora et al., 2022) and meta-analyses on a range of risk and protection behaviours (Manning, 2009; McEachan et al., 2016). Cialdini et al. (1990) argued that these two types of subjective norms are conceptually distinct because they reflect different sources of motivation. Injunctive norms motivate by setting expectations related to social rewards and punishments, while descriptive norms motivate by suggesting what is sensible to do. The present study yielded no support for this argument. Additional analyses revealed that when the two norms were combined, subjective norms significantly and positively affected mitigation intentions. It cannot be ruled out that this is the result of removing one variable from the model. The simpler the model, the higher the statistical power, granted that the sample size remains constant (Field et al., 2012). High power indicates a large chance of observing a statistically significant effect if there is any. A more thorough discussion of the power in this study and the sample size is provided later. Nonetheless, it is worth noting that Nox and Miles (2017) used a similar combined measure and observed a positive effect of subjective norms on the intention to manage vegetation. These findings hint that subjective norms are important, still, the role of injunctive and descriptive norms remains ambiguous.

With respect to self-efficacy, support for the hypothesised relationship was not found. This was a surprising result because the evidence for self-efficacy as a predictor of residents' mitigation intentions is strong (Bates et al., 2009; Martin et al., 2009; Nox & Miles, 2017; Prior & Eriksen, 2013). In their literature review, Hamilton et al. (2018) pointed out that self-efficacy may encompass various measures of capacity. These include but are not limited to

knowledge, skills and financial resources. Each of the aspects alone may be necessary, yet insufficient to motivate residents to mitigate wildfires (Hamilton et al., 2018). The current research aimed to capture multiple dimensions of self-efficacy. The survey questions, therefore, referred to having the skills, time and money to perform the recommended measures. Many of the reviewed studies did not specifically address these aspects and focussed on a more general belief in one's own capacities. The discrepancy in the results may, partly, be due to differences in operationalisations of self-efficacy. As highlighted earlier, the small sample size may also explain the non-significant findings.

Moreover, in line with the expectations, personal responsibility proved to significantly affect the intention to mitigate wildfires. Research in Australia (McNeill et al., 2013) and the United States of America (Martin et al., 2009) reported similar observations for actual behaviours taken. The fact that the positive impact of personal responsibility has been repeatedly shown strengthens the reliability of the studies. The findings seem to be consistent across time (i.e., the past 15 years) and across samples, which consist of residents living in wildfire-prone areas in western societies.

In addition, mediation did not occur for either type of norm, nor for a combination of the two. Highly salient subjective norms did not increase feelings of responsibility. Expectations were based on literature on pro-social and pro-environmental behaviours (Chaudhary et al., 2023; Habib et al., 2022; Helferich et al., 2023). These behaviours benefit other people or the environment (Helferich et al., 2023). On the other hand, the dependent variable in this study encompassed protective behaviours, which concern personal safety. The purpose of this behaviour is different from pro-social and pro-environmental behaviours, related processes may also vary. Helferich et al. (2023) noted that internalised subjective norms provide the content of personal norms, which include feelings of responsibility. It is possible that for protective behaviours, psychological mechanisms other than the internalisation of subjective norms play a role.

Finally, the high trust ratings for the fire service are consistent with a study on fire-safe behaviour in the home among older adults in the Netherlands (Karemaker et al., 2022). The implications of this finding for future interventions are discussed later.

4.1 Theoretical Implications

In the literature from North America and Oceania, subjective norms and personal responsibility were identified as determinants of residents' mitigation intentions and behaviours. The current research suggests that these findings also apply to residents living in

wildfire-prone areas in the Netherlands. Highly salient subjective norms and strong feelings of responsibility to protect one's property lead them to take action to mitigate wildfires.

In light of the limitations related to the sample size, this study was unable to clarify the contribution of injunctive and descriptive norms to mitigation intentions. Nonetheless, it helped to lay the groundwork for future endeavours, by identifying the gaps in the literature on subjective norms and showing how these may be addressed through survey research.

Moreover, together, risk perception, attitude, injunctive norm, descriptive norm, self-efficacy and personal responsibility added to the explanation of residents' intentions to mitigate wildfires. Still, the model was not fully predictive, which indicates that other factors play a role. Theories in addition to the Theory of Planned Behaviour and Protection Motivation Theory are needed to better understand residents' motivations.

4.2 Limitations and Future Research

A few limitations and research opportunities are worth calling attention to. To start with, the minimum of 98 participants was not reached. The small sample size may have led to reduced statistical power (Field et al., 2012) and failure to confirm some of the hypotheses. Regarding recruitment, online and offline methods were used to reach as many residents as possible. A reasonable number of people started the survey, however, a third of them lost interest after the two qualifying questions. Various measures were taken to keep the survey simple and concise, and the required time was communicated on the consent form. The survey took participants approximately 5 minutes. Still, many people were unable or unwilling to complete it. Possibly they did not feel as if sharing their perspectives was important and useful (Sthli & Joye, 2016). Moreover, the lack of a reward may have prevented them from contributing (Sthli & Joye, 2016). Future studies should consider alternative strategies to increase the response rate. For example, by framing the survey as being in line with residents' beliefs and values or offering a reward (Carpenter, n.d.).

Related to the aforementioned, missing values were a concern and the easiest and most common solution was selected. A major drawback of listwise deletion is the loss of data, therefore, researchers are advised to explore alternatives if feasible. Multiple imputation, for instance, is more robust yet also requires advanced statistical techniques (Lodder, 2014).

Another caveat, which was noted by others as well (e.g., Nox & Miles, 2017), is the presence of a response bias. The majority of the participants were recruited through the social media accounts of Veiligheidsregio Twente and Brandweer Twente, and *Twente Veilig*. Visitors of these platforms were probably already interested in or knowledgeable on the topic of wildfires and mitigation measures. People who do not intend to perform the recommended

behaviours may be underrepresented. Taking up Nox and Miles (2017)'s suggestion, future researchers can pair their survey with another research goal that appeals to a wider audience.

Finally, as noted earlier, further work exploring theories in addition to the Theory of Planned Behaviour and Protection Motivation Theory is needed. An interesting starting point could be the hazard-to-action chain proposed by Wachinger et al. (2013). The model was derived from empirical evidence on perceptions and behaviours related to natural hazards. It includes some of the socio-psychological factors examined here and adds indirect experience, direct experience and trust in authorities. Firstly, experience may be relevant to examine because of the increasing intensity of wildfires (UNEP, 2022). More and more people will face the threat of wildfires in the upcoming years. Secondly, in the introduction it was explained that residents in countries where governments adopt traditional wildfire strategies have become passive actors. Therefore, studying the level of trust in authorities and its effects on mitigation intentions and behaviours in these countries is of added value. Thirdly, although not a theory, the absence or presence of government legislation may be relevant to research as well (see Cowan & Kennedy, 2023). Particularly in the Netherlands, since the national fire service recently published its vision for 2030, in which they emphasised the necessity of laws and regulations for landscaping (Brandweer Nederland, 2024).

4.3 Practical Implications

The practical relevance of the present study for governmental organisations in the Netherlands was enhanced by carefully selecting the sample population and the recommended mitigation behaviours. Residents in Hellendoorn and Rijssen-Holtten are among the first to experience the negative impact of wildfires in Twente. Additionally, participants were asked about behaviours that are deemed effective by the Dutch fire service and are currently communicated by the safety regions.

Based on this study and existing literature, four recommendations for authorities concerned with wildfire management are formulated. First, subjective norms seem to be important in motivating residents to take action (Nox & Miles, 2017). Efforts may be better spent on holding community meetings than costly door-to-door outreach. Community meetings provide an opportunity for residents to interact with one another and establish desired norms, while door-to-door outreach concentrates on the individual. Second, when people are unsure what to do, they look to others (Cialdini, 2008). Therefore, where possible, public communication needs to emphasise that the majority of residents already perform mitigation behaviours (Behavioural Insights Netwerk Nederland [BIN NL], 2019). If mitigation behaviours are not that common, yet are approved of by many people as shown here for

Twente, it helps to highlight the general positive attitude towards mitigation (BIN NL, 2019). Third, messages addressing residents' responsibility for taking measures on their property may be particularly effective. Fourth, the fire service and safety region should leverage their position as a trustful source of wildfire information.

5. Conclusion

To conclude, as implied by the title, ongoing environmental changes force us to think ahead. Governments, and residents in particular, need to learn to manage and mitigate the risks of wildfires (UNEP, 2022). A comprehensive understanding of residents' motivations to reduce their vulnerability is essential. The present survey study identified two socio-psychological factors that positively affect mitigation intentions among residents living in wildfire-prone areas in the Netherlands. Highly salient subjective norms and strong feelings of responsibility to protect one's property lead residents to take the necessary action.

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Appendix A


Facebook Post by Veiligheidsregio Twente

Veiligheidsregio Twente
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Help je mee? In Twente zijn er veel natuurgebieden met bos, heide en gras. In droge en warme perioden neemt de kans op een natuurbrand toe. De veiligheidsregio en gemeenten hebben hier aandacht voor, maar ook jij kunt bijdragen.

Woon je in Hellendoorn of Rijssen-Holten, in een huis met een eigen tuin? Dan kun je helpen door een vragenlijst in te vullen van masterstudent Marjolijn: "Ik ben een masterstudent Psychologie aan de Universiteit Twente. Ik doe onderzoek naar wat inwoners motiveert om hun huis te beschermen tegen natuurbranden. Dit doe ik samen met het Nederlands Instituut Publieke Veiligheid en de Veiligheidsregio Twente. Hieronder vind je een link naar mijn korte vragenlijst. Alvast hartelijk bedankt voor je tijd."

https://utwentebs.eu.qualtrics.com/.../SV_6ruatvxawISrMTY



TWENTEVeilig.NL
Onderzoek naar wat inwoners weten over maatregelen natuurbrand | Twente Veilig [Meer informatie](#)

LinkedIn Post by Brandweer Twente

Brandweer Twente
3.427 volgers
23 u · 🌐

In Twente zijn er veel natuurgebieden met bos, heide en gras. In droge en warme perioden neemt de kans op een natuurbrand toe. De veiligheidsregio en gemeenten hebben hier aandacht voor, maar ook jij als inwoner kan bijdragen aan een veilig Twente.

Woon je in Hellendoorn of Rijssen-Holten, in een huis met een eigen tuin? Dan kan Marjolein, masterstudent Psychologie aan de Universiteit Twente, jouw hulp goed gebruiken. Ze doet onderzoek naar wat inwoners motiveert om hun huis te beschermen tegen natuurbranden. Dit doet ze samen met het Nederlands Instituut Publieke Veiligheid (NIPV) en de Veiligheidsregio Twente.

Hieronder vind je een link naar een korte vragenlijst.

<https://lnkd.in/e6wHJMEe>



BRANDWEER TWENTE

Article Published on *Twente Veilig*

Article Published in *Hart van Hellendoorn-Nijverdal* and *Hart van Rijssen-Holten* (online and in print)



Handrefw Oeverveel zette in 2022 een toegenbrand in om een grote natuurbrand in de Marispael te bestrijden. Ook de bushelicopters van Defensie zijn bij deze brand ingezet.

Onderzoek natuurbranden: bijdragen aan een veilig Twente

17 december 2023, 18:12 **Algemeen**

TWENTE/SALLAND - In Twente zijn er veel natuurgebieden met bos, heide en gras. In droge en warme perioden neemt de kans op een natuurbrand toe. De veiligheidsregio heeft hier aandacht voor, maar Twentenaren kunnen zelf ook bijdragen aan een veilig Twente.



"Woont u in de gemeente Hellendoorn of Rijssen-Holten in een huis met een eigen tuin? Dan wil ik u hierbij uitnodigen om deel te nemen aan mijn onderzoek over natuurbranden", aldus Marjolijn Verweij. "Voor ik verder in ga op het onderzoek, stel ik mij graag even kort aan u voor. Mijn naam is Marjolijn en ik volg de master Psychology of Conflict, Risk and Safety aan de Universiteit Twente. In de master komen verschillende thema's aan bod, zoals risicoperceptie en risicocommunicatie."

Dat Marjolijn een onderzoek uitvoert in Hellendoorn en Rijssen-Holten is niet willekeurig, gezien de ligging van het Nationaal Park 'Sallandse Heuvelrug'. Door middel van een vragenlijst probeert ze te achterhalen hoe inwoners van deze twee gemeenten kijken naar het risico op een natuurbrand in de omgeving. Ook bestudeert ze in hoeverre zij maatregelen willen nemen om hun huis te beschermen. Dit alles doet ze in samenwerking met het Nederlands Instituut Publieke Veiligheid en de Veiligheidsregio Twente.

Het invullen van de vragenlijst duurt 5 tot 10 minuten en kan tot en met 28 december. De resultaten worden gebruikt om de communicatie over natuurbranden beter af te stemmen op de behoeften van inwoners. Scan de QR code of ga naar: <http://tinyurl.com/2xvhty5m>



Appendix B

Survey

Welkom!

Wat fijn dat je mee wilt werken! Verschillende mensen kunnen reageren op deze *vragenlijst over natuurbranden* via sociale media. Er komen nu twee korte vragen om te controleren of deze vragenlijst voor jou bedoeld is.

In welke gemeente woon je?

- Hellendoorn
 - Rijssen-Holten
 - Geen van deze
-

Woon je in een huis met een eigen tuin?

- Ja
 - Nee
-

Deze vragenlijst is voor jou bedoeld. Lees het toestemmingsformulier voor je verder gaat.

Het doel

Dit onderzoek wordt geleid door Marjolijn Verweij, masterstudent Psychologie aan de Universiteit Twente. Het doel is om te onderzoeken wat inwoners motiveert om hun huis te beschermen tegen natuurbranden.

De aanpak

Ik verzamel informatie door je een online vragenlijst te laten invullen. Het invullen van de vragenlijst duurt ongeveer 5 tot 10 minuten. Je ontvangt voor jouw deelname aan dit onderzoek geen vergoeding.

De praktische voordelen

De onderzoeksresultaten worden gedeeld met [het Nederlands Instituut Publieke Veiligheid](#) en [de veiligheidsregio's](#) om de communicatie over natuurbranden te verbeteren.

De mogelijke risico's

Er zijn *geen* risico's verbonden aan jouw deelname aan dit onderzoek.

De vertrouwelijkheid van gegevens

Ik doe er alles aan om jouw privacy zo goed mogelijk te beschermen. Er wordt geen vertrouwelijke informatie van of over jou naar buiten gebracht, waardoor iemand je kan

herkennen. Dit onderzoek is beoordeeld en goedgekeurd door de ethische commissie van de Faculteit Behavioural, Management and Social Sciences (BMS) van de Universiteit Twente.

De vrijwilligheid

Jouw deelname is volledig vrijwillig. Je kunt jouw deelname op elk gewenst moment stoppen.

Meer informatie

Heb je vragen over het onderzoek? Of wil je jouw gegevens inzien, wijzigen of laten verwijderen? Neem dan contact op met de onderzoeksleider:

Heb je vragen over de bescherming van jouw gegevens? Neem dan contact op met de functionaris gegevens bescherming: dpo@utwente.nl.

Heb je klachten over de aanpak van het onderzoek? Neem dan contact op met de secretaris van de ethische commissie: ethicscommittee-hss@utwente.nl.

[Ik ben minimaal 18 jaar. Ik heb het toestemmingsformulier gelezen. Ik heb een uitleg ontvangen over het doel, de voordelen en de eventuele risico's van dit onderzoek. Ik neem vrijwillig deel aan dit onderzoek. Het is mij duidelijk dat ik mijn deelname op elk gewenst moment kan stoppen. Ik heb voldoende tijd gehad om te beslissen of ik aan dit onderzoek wil deelnemen.]

- Ik wil deelnemen aan dit onderzoek.
- Ik wil *niet* deelnemen aan dit onderzoek.
-

Er komen nu zeven vragen over natuurbranden. Denk niet te lang na over jouw antwoord, er bestaan *geen* verkeerde antwoorden. Er is maar één antwoord mogelijk, behalve als het anders is aangegeven.

De maatregelen tegen natuurbranden

Er zijn verschillende maatregelen die je kunt nemen om jouw huis te beschermen tegen natuurbranden. Die maatregelen hebben te maken met onderhoud aan jouw tuin. De maatregelen zijn vooral belangrijk in warme en droge perioden.

Geef aan of je het oneens of eens bent met de volgende stellingen.

	Helemaal oneens	Oneens	Niet oneens, niet eens	Eens	Helemaal eens
Ik ben van plan om in droge en warme perioden mijn dak en dakgoten vrij te maken van bladeren.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik ben van plan om in droge en warme perioden dode plantenresten en takken binnen 1,5 meter rondom mijn huis weg te halen.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik ben van plan om in droge en warme perioden mijn bomen en planten kort te houden.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik ben van plan om in droge en warme perioden mijn gras kort te houden.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

De gevolgen van natuurbranden

Geef aan of je het oneens of eens bent met de volgende stellingen.

	Helemaal oneens	Oneens	Niet oneens, niet eens	Eens	Helemaal eens
Natuurbranden zijn een serieus risico voor de woonomgeving van de mens.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Natuurbranden zijn schadelijk voor de woonomgeving van de mens.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik loop het risico dat een natuurbrand mijn huis beschadigt.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Het is zeer waarschijnlijk dat een natuurbrand mijn huis beschadigt.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Het nut van het nemen van maatregelen

Geef aan of je het oneens of eens bent met de volgende stellingen.

	Helemaal oneens	Oneens	Niet oneens, niet eens	Eens	Helemaal eens
Het nemen van maatregelen om mijn huis te beschermen tegen natuurbranden is <i>belangrijk</i> .	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Het nemen van maatregelen om mijn huis te beschermen tegen natuurbranden is <i>nuttig</i> .	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
De eerdergenoemde onderhoudsmaatregelen in mijn tuin verkleinen de kans dat een natuurbrand mijn huis beschadigt.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

De rol van de sociale omgeving

Geef aan of je het oneens of eens bent met de volgende stellingen.

	Helemaal oneens	Oneens	Niet oneens, niet eens	Eens	Helemaal eens
Mijn familie en vrienden vinden het belangrijk om maatregelen te nemen om hun huis te beschermen tegen natuurbranden.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mijn familie en vrienden zijn van plan om maatregelen te nemen om hun huis te beschermen tegen natuurbranden.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mijn burens vinden het belangrijk om maatregelen te nemen om hun huis te beschermen tegen natuurbranden.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mijn burens zijn van plan om maatregelen te nemen om hun huis te beschermen tegen natuurbranden.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Het vertrouwen in het eigen kunnen

Geef aan of je het oneens of eens bent met de volgende stellingen. Denk aan de maatregelen die eerder in deze vragenlijst zijn genoemd om je huis te beschermen tegen natuurbranden.

	Helemaal oneens	Oneens	Niet oneens, niet eens	Eens	Helemaal eens
Ik heb <i>de vaardigheden</i> om de onderhoudsmaatregelen in mijn tuin uit te voeren.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik heb <i>de tijd</i> om de onderhoudsmaatregelen in mijn tuin uit te voeren.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik heb <i>het geld</i> om de onderhoudsmaatregelen in mijn tuin uit te (laten) voeren.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Het is makkelijk voor mij om de onderhoudsmaatregelen in mijn tuin uit te voeren.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Het gevoel van verantwoordelijkheid

Geef aan of je het oneens of eens bent met de volgende stelling.

	Helemaal oneens	Oneens	Niet oneens, niet eens	Eens	Helemaal eens
Ik ben zelf verantwoordelijk voor het nemen van maatregelen om mijn huis te beschermen tegen natuurbranden.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Het delen van informatie

De volgende organisaties delen mogelijk informatie over maatregelen om jouw huis te beschermen tegen natuurbranden. Welke organisatie(s) vind je een betrouwbare bron van informatie? Je kunt *meerdere* antwoorden invullen.

- De brandweer
 - De veiligheidsregio
 - De gemeente
 - De natuurbeheerders
 - De woonverzekeraars
 - Anders, namelijk:
-

Tot slot komen er nu drie korte vragen over jouw achtergrondkenmerken. Er is per vraag maar één antwoord mogelijk.

Wat is jouw geslacht?

- Man
 - Vrouw
 - Overig
-

Hoe oud ben je?

Wat is de hoogste opleiding die je hebt afgerond met een diploma?

- Lagere school / basisschool
 - Lbo, praktijkonderwijs, vso (lts, leao, vbo, huishoudschool, ambachtsschool)
 - Vmbo, lwoo Mavo (ulo, mulo)
 - Havo, vwo, gymnasium, atheneum (hbs, lyceum)
 - Mbo (mts, meao, middenstandsdiploma, pdb, mba)
 - Hbo (hts, heao, kweekschool, associate degree)
 - Universitaire opleiding (inclusief promotieonderzoek)
 - Een andere (bedrijfs)opleiding of cursus (van 6 maanden of langer)
 - Geen van deze
-

Wil je meer weten over natuurbranden? Ga dan naar: [twenteveilig.nl/natuurbrand](https://www.twenteveilig.nl/natuurbrand).

Jouw antwoorden zijn verzonden. Hartelijk dank voor je tijd.

Appendix C

A linear model was created with risk perception, attitude, subjective norms, self-efficacy and personal responsibility as predictor variables and mitigation intention as the dependent variable. A scatterplot with the fitted regression line indicated linearity. The Shapiro-Wilk test showed the data was normally distributed ($W = .97, p = .12$). The Breusch-Pagan test confirmed homoscedasticity ($\chi^2 = 10.36, p = .07$). The Durbin-Watson test ($D = 1.59, p = .06$) verified the independence of the residuals.