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Bachelor's thesis

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Norwegian University of Science and Technology
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What Does It Take To Invest In Protective Actions Against Flooding?

PSY2900 Bachelor thesis in psychology

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Foreword

After meetings with my supervisor, Amanda Elizabeth Lai, and fellow students where literature regarding flooding and environmental psychology was presented, I was fascinated by risk psychology. Reading more articles on the topic, I understood there was an interesting relationship between risk perception and psychological distance. I was further engaged in investigating how this predicted willingness to invest in protective actions. Most of the articles I came across pointed out the problem of poor communication as a significant barrier to action. Focusing on improving communication strategies, I soon wanted to explore if being a parent would substantially affect the relationships between the study variables. With some guidance from the supervisor and her assistant, Francesca Tiroto, I was recommended to investigate the parental factor as a moderator for the mediation between psychological distance and risk perception and how this affected the willingness to invest. Suppose the results indicated that having children could work as a driver to action. In that case, the implication could be to adapt communication strategies to condition parents into protecting their children through investing in flood mitigation behavior.

The supervisor provided relevant literature regarding environmental psychology as an introduction to the theme, which some are used in the current study regarding flooding events. Other literature was searched independently through Oria (NTNU) and Google Scholar. The survey was created by collaborating students and the supervisor and was distributed through social media. The analysis used was suggested by the supervisor and further independently interpreted. I asked the supervisor to check the results to ensure it was done correctly.

I am grateful to my supervisor, Amanda Elizabeth Lai, and her assistants, Francesca Tiroto and Per Helge Haakstad Larsen, for guidance, feedback, and support throughout the process, from which I have learned a lot. I also want to thank my fellow students for the collaboration and valuable discussions and family members for reading the thesis for language improvements and clarifications.

Abstract

Floods are one of the most destructive natural hazards in Europe and are predicted to be more severe than before in Norway. Lack of effective communication is pointed out to be one of the barriers to protective behavior against flooding, and the need for improvement is existent. Psychological distance and risk perception affect how one makes decisions, which is the foundation of behavior. Therefore, it is essential to investigate the relationship and how it predicts willingness to invest in protective actions. Further, it is of interest to explore how being a parent moderate the association, as it is assumed that parents are more willing to invest in protection for their children. A total of 293 respondents participated in the survey, including 183 parents and 110 non-parents. The hypothesized model was analyzed using SPSS. The results indicated that psychological distance negatively correlated with willingness to invest and risk perception, and there was a positive correlation between risk perception and willingness to invest. Risk perception significantly mediated the association between psychological distance and willingness to invest. The most exciting finding was that the mediation depended on the conditions of the moderator values and that parents were significant, whereas non-parents were not. Thus, all four hypotheses were supported by statistically significant results. The findings improve flood risk communication strategies through important indications on activating flood mitigation behavior. Further, the current study presents empirical results that add to previous parental theories and environmental psychology research.

1.0 What does it take to invest in protective actions against flooding?

As a result of climate change, increasing temperatures are causing a higher number of natural hazards such as flooding. Floods are one of the most frequent and destructive natural hazards in Europe (Suk et al., 2020), as it is responsible for one-third of all natural disasters (Lechowska, 2018). This has become a larger problem over the past years in Norway, where experts predict that the frequency and intensity of floods will be more severe than before. Previous flooding events in Norway have caused massive destruction (Amundsen & Dannevig, 2021). A study showed that farmers highly threatened by climate change ranked the lack of information about weather and climate as barriers to adaptation (Eitzinger et al., 2018). Such indications imply the importance of investigating the mechanisms behind the reactions and adaptations to flooding, and improvement of communication, which is much needed (e.g., Amundsen & Dannevig, 2021; Cruz et al., 2006; Krasovskaia et al., 2001; Rasool et al., 2022; Xie et al., 2019;). The current research explores the drivers and barriers to action, focusing on how the relationship between risk perception and psychological distance predicts willingness to invest in protective measures against flooding. Further, the thesis investigates if the connection is affected by whether you are a parent or not, as it is assumed that parents are more willing to invest in protecting their children. The current study aims to improve the understanding of what it takes to invest in protective actions against flooding and how to inform, prepare, and influence the exposed population.

1.4 Risk Perception

A person's risk perception refers to evaluating their perceived risk probability and the associated consequences, which are often negative (Lechowska, 2018). Evaluation and coping with risk are individual-level processes, and it is essential to investigate which factors influence flood risk perception. Flood risk perception can be described as three risk characteristics; awareness, worry, and preparedness (Raaijmakers et al., 2008). How someone perceives risk affects how they respond to and prepare for flooding (O'Neill et al., 2016). The characteristics are closely related and affect one another, where awareness could lead to worry, leading to preparedness (Raaijmakers et al., 2008). However, studies have identified an affective component to risk perception, where two fundamental processes, an intuitive system and a rational system, influence how someone comprehends risk (O'Neill et al., 2016). The rational system includes conscious and slow processing, which is more purposeful and analyzing when making decisions. The intuitive system is responsible for a fast and automatic response and is the most natural and common way for humans to cope with risk (Slovic et al., 2004). The two

systems interact with each other, where emotion and affect are necessary for the analytic reasoning to be effective (Lacasse, 2017). Here, the rational system can be linked to awareness, as it is a conscious process, and worry is connected to the intuitive system because of the emotional aspect. Awareness and worry are believed to result in preparedness, which can be argued to be affected by both systems.

Previous research has found that risk perception is an important predictor of willingness to engage in mitigating behavior regarding climate change (Spence et al., 2012). It is an essential factor in flood risk management (Lechowska, 2018). How one perceives risk is of interest to investigate, as it affects how a person makes decisions (Eitzinger et al., 2018), which is the foundation of behavior. O'Connor et al. (1999) found that a higher risk perception of climate change can predict higher behavioral *intention* to invest in a climate-beneficial behavior. However, some studies imply that an increased risk perception would not necessarily lead to *actual* flood mitigation behavior (Bubeck et al., 2012). This could be interpreted as requiring something more for an individual to make active choices to behave differently than usual. Thus, it is essential to investigate the drivers and barriers to action.

1.2 Psychological Distance

One of the barriers of interest is psychological distance, which refers to an experienced cognitive separation between oneself and other instances such as situations, events, objects, other persons, or time (Loy & Spence, 2020). In other words, one feels removed from a phenomenon. People tend to think that unlikely events, such as earthquakes, tend to occur in places far away from oneself, in the distant future, to a unidentifiable victim. This can influence how people process information and their predictions, preferences, and actions (Trope & Liberman, 2010) and affect how a person perceives risk as the phenomena might seem distant from themselves. According to Construal Level Theory, psychological distance can be divided into four dimensions: social (to whom an event occurs), spatial (where), temporal (when), and hypothetical (uncertainty if it happens) (Trope & Liberman, 2010; Loy & Spence, 2020).

According to Construal Level Theory, psychological distance plays a vital role in promoting action (Spence et al., 2012). Research has indicated that a higher level of psychological distance works as a barrier to action, as it affects how one processes information, evaluates and makes decisions (Trope & Liberman, 2010). All four dimensions are perceived as distant when it comes to climate change, and it is believed that manipulating them could lead to more climate-

beneficial behavior (Spence et al., 2012). Loy and Spence (2020) indicated that communication about climate change being closer rather than distant could reduce the socio-spatial distance and, in turn, potentially lead to behavioral investment. This could be because the issue would be viewed as closer and more relevant for the individual.

1.3 The relationship between Risk Perception and Psychological Distance

Several studies have tied risk perception and psychological distance to one another. For example, O'Neill et al. (2016) found a negative correlation between the two, where the increased distance to perceived flood predicted a decrease in flood risk perception. In another experimental study, the intensity of emotions reduced perceived psychological distance (Van Boven et al., 2010). Spence et al. (2012) showed that climate change was perceived as psychologically far away rather than close, and this was also significantly related to how prepared they were to act on climate change. They found that a person's higher worry regarding climate change was associated with lower psychological distance. This is supported by results where the reduction of psychological distance indirectly predicts engagement in climate change (Loy & Spence, 2020). This further points to the need for risk communication in a way that affects the desired recipients.

1.4 Parental factor

The current study is interested in another variable that, to my knowledge, has not been included in the literature previously: whether you are a parent or not. It is generally assumed that as a parent, you would want to protect your child (Ursin & Syltern, 2020). All societies have certain expectations for their members, and some are almost universal across cultures, such as parents providing nurturance and protection for their children (Maccoby, 2000). In a study about parents whose children are bullied, several participants referred to protecting their child as fundamental to being a good parent and even called it an instinct (Hale et al., 2017). This is also seen in evolutionary theory, where species want to secure the survival of their genes. This implies how important it is for a parent to ensure the child's wellbeing and safety. According to parental investment theory, women invest more resources in a child than men (i.e., choosing a partner, bearing a child, and nursing) (Jonason et al., 2012; Trivers, 1972). Mothers carry their children in the womb for nine months, creating chemical and psychological bonds. When the child is born, it is released a considerable amount of oxytocin, also known as the love or bonding hormone (Uvnäs-Moberg et al., 2019), which is said to tighten further the connection between mother and child (Ross & Young, 2009). In other words, the mother invests a lot, both physically and emotionally. Even though the father does not have the same physical investment,

the males often are interested in caring for their children (Jonason et al., 2012). Paternal parenting behavior depends more on how the individual self-defines fatherhood (Fox & Bruce, 2001) and could be influenced by the increasing expectations of parents in society (Maccoby, 2000).

The thesis includes parents instead of people who have someone they care about. Parents are obligated by law to offer support for their children. Based on previous literature (e.g., Jonason et al., 2012; Maccoby, 2000; Ursin & Syltern, 2020), it can be generally expected that a parent would care for their child to a greater extent than someone would care for a friend or other family members. The project does not differentiate between biological and adoptive parents, as both have legal responsibilities. It must be specified that it is not given that all parents act upon this duty, as there are parents who neglect their children. However, the thesis is based on the general case, as there is a responsibility to care for one's children by the definition of being a parent.

1.5 The aim of this study

Interventional studies indicate that activation in individuals (regarding skill, confidence, and knowledge) can be modified and changed, which is linked to positive behavioral outcomes (Showell et al., 2022). It is necessary to detect what it takes to activate desired behavior to successfully influence the exposed areas to invest in protective actions against flooding. Lawson et al. (2019) conducted an experiment that found significant results for middle school-aged children fostering climate change worry among their parents by expressing knowledge, attitudes or behaviors from children to parents. Other studies have shown that infants distress signals increase the mothers alertness and arousal (Manini et al., 2013). This indicates that for parents, their children can work as an activator. From another angle, being a parent itself can be a potential driver of action. For that reason, this project aims to explore how psychological distance and risk perception affect the willingness to invest in protective measures and if the relationship is affected by being a parent or not. If a person has a high level of psychological distance, the assumption based on previous findings is that individuals do not perceive flooding as an increased risk. This may predict that one is less likely to invest in protective actions to protect oneself. The central hypothesis is that having a child to take care of could lead to perceiving risk differently than non-parents, resulting in parents having a higher level of risk perception and lower level of psychological distance and, therefore, a higher willingness to invest in protective actions. The current research results could help provide knowledge to help

future communication strategies regarding flood risk and what activates flood mitigation behavior.

1.6 Hypotheses

Based on the previous literature, the following hypotheses are presented for the research question: *How do psychological distance and risk perception affect willingness to invest in protective actions, and how does being a parent moderate this relationship?*

H1) Psychological distance will negatively correlate with willingness to invest and risk perception.

H2) Risk perception will be positively correlated with willingness to invest.

H3) The association between psychological distance and willingness to invest will be mediated by risk perception.

The mediator will explain how the two variables are related: psychological distance will affect risk perception, affecting willingness to invest.

H4) The parental factor moderates the association between psychological distance and risk perception.

The indirect effect is conditional on the values of the moderating variable: the moderator will affect the strength and nature of this relationship.

1.6.1 Hypothetical Model

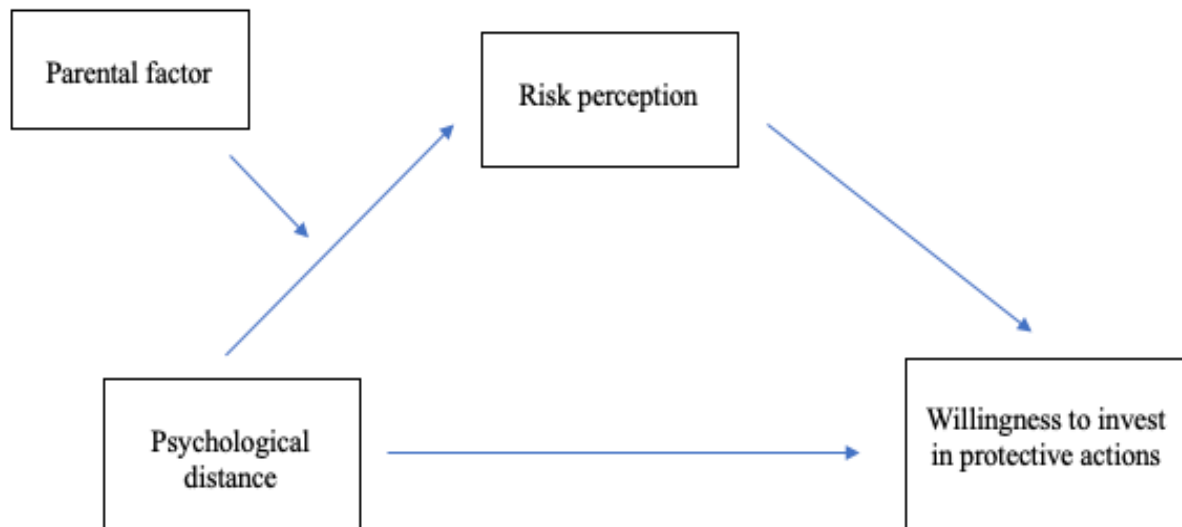


Figure 1. Hypothesized Model. The figure illustrates the conceptual model of a moderated mediation.

2.0 Method

2.1 Sample

A total of 293 respondents completed the questionnaire. Females represented 160 respondents (55%), and males 126 respondents (43%). One participant identified as non-binary, and six chose not to share (2%). Age ranged from 18 to 79 years, with a mean of 44.48 ($SD = 16.7$) and a median of 47. 24 respondents answered they had been directly affected by flooding (8%) (e.g., flooded property), 102 respondents had been indirectly affected (35%) (e.g., closed roads and flood threats), 30 respondents (10%) had been both, directly and indirectly, affected. In comparison, 137 respondents had never been personally affected by flooding (47%).

2.1.1 Parents and Non-parents

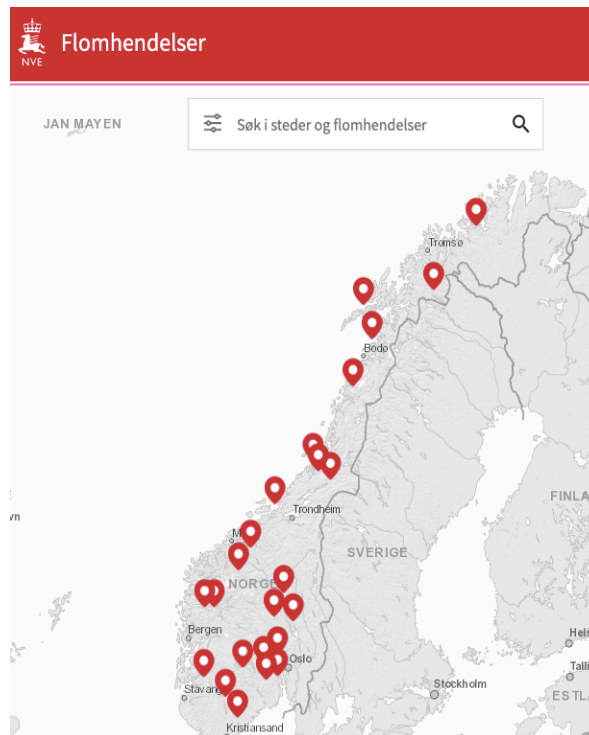
The first group, parents, consisted of 183 participants (62%). Of these, 104 were females (57%), 73 were males (40%), and six preferred not to share (3%). 98 participants answered that they had children living at home (54%), and 85 participants did not have children living at home (47%). Of these, three participants had junior high school (2%) as their highest level of education, 47 answered high school (26%), and nine had finished a year of study (5%). 51 had a bachelor's degree (28%), and 73 had completed a higher degree (40%). 120 participants lived in a flood-prone area (66%), while the other 63 did not (34%).

The second group, non-parents, included 110 participants (38%). Females represented 56 participants (51%), males 53 participants (48%), and one identified as non-binary (1%). As their highest form of education, three participants answered junior high school (3%), 28 had completed high school (25%), two had a year of study as their highest (2%), while 46 had a bachelor's degree (42%) and 31 had a higher degree (28%). 71 lived in an area exposed to flooding (65%), and 39 did not (35%).

2.2 Procedure

The data for the study was collected in April 2022 through a survey made on the platform nettskjema.no, which is caused by the University of Oslo (UiO) and approved by Norges teknisk-natur-vitenskapelige universitet (NTNU). The target group was Norwegians over 18 years of age. Two sampling methods were used to gather data: the convenience method (Meltzoff & Cooper, 2018) and the snowball method (Cohen & Arielli, 2011). A collaborating group of bachelor students shared the survey with friends and family through social media (i.e., Facebook), with a link attached. However, this resulted in a small number of respondents. To gather enough data to run analyses on the represented population, I searched on flomhendelser.no for a map of flooding events in Norway over the last ten years. The map provides facts about the flood event, including an overview of municipalities impacted either to a smaller or larger degree. I then shared the survey on Facebook to 60 groups that were linked to the cities, such as "Hva skjer på Kongsberg?" ("What happens in Kongsberg?", own translation), where group members ranged from 700 to 19 000 Facebook users. Several shared the post on their private Facebook page, helping us reach a considerable proportion of potential respondents. In addition to this, our supervisor placed an advertisement on Facebook. The response rate is unavailable; however, it is believed to be low considering the possible exposure range.

Ethical approval was applied for and accepted by NSD (Norsk senter for forskningsdata) on 10.03.2021. A front-page with information about the study and its purpose appeared when clicking on the survey link. The participants had to confirm that they agreed that the provided data could be used for research purposes. It was informed that anonymity was assured, and the data were to be analyzed in groups. The questionnaire consisted of 23 variables with 141 questions or statements, including demographical measures. The survey took 15-20 minutes to complete.



Map of flooding events in Norway over the last ten years; <https://www.flomhendelser.no/>

2.3 Measures

Already established measuring instruments were used in the questionnaire to ensure validated items. If necessary, we adapted the selected questions to fit what we wished to measure (i.e., from climate change to flooding). Since we wanted to investigate the population in Norway, the bachelor students cooperated in translating the items from English to Norwegian. To ensure that the meaning of the questions was not lost in translation, we back-translated each other's questions into English and compared them with the original items. Since nine bachelor students were collaborating on collecting data, there were 23 variables, but for the current research, only four were analyzed in addition to demographical measures. These variables were "Psychological Distance," "Risk Perception," "Willingness to Invest in Protective Actions," and "Parental Factor."

2.3.1 Psychological Distance

The items that included measuring psychological distance were adapted from Loy and Spence (2020). They used 13 questions to measure the four dimensions of psychological distance: social, spatial, temporal, and hypothetical. The current study investigates two dimensions in the construct, referred to as the socio-spatial distance of flooding. The focus is on whether people think flooding could occur where they live as it is more relevant to them (resulting in if they

are willing to invest) than when or uncertainty if it happens. Two items were included from each dimension, resulting in four questions: 1) Serious consequences of flooding primarily impact other people, 2) Flood is a significant problem mainly for others, 3) Serious consequences of flooding primarily occur in places that are far away from here, and 4) Flood mostly affects other parts of the world. The respondents were asked to indicate to what extent they agreed with the following statements, where they answered on a 5-point Likert scale from 1 = Strongly disagree to 5 = Strongly agree. The reliability test provided high reliability, $\alpha = .826$. None of the items would have provided a higher Cronbach's alpha if deleted. Thus, it remained as it was.

2.3.2 Risk Perception

Eight items were adapted from Wilson et al. (2019) to measure risk perception. The questions were meant to measure worry, severity, and probability: 1) When you think about floods, to what extent do you feel worried?, 2) How risky are floods?, and 3) How likely is it that a flood will occur where you live?, to mention some. The respondents were asked to indicate to what extent they agreed with the following statements, where they answered on a 5-point Likert scale from 1 = Not at all to 5 = Very much. The reliability test gave the results of $\alpha = .677$. Item 7 (I am confident that a flood will not occur where I live) is a reversed statement of item 5 (mentioned above) and provided a higher Cronbach's alpha if deleted, $\alpha = .821$. Because of the significant increase, item 7 was removed.

2.3.3 Willingness to Invest in Protective Actions

The items to measure willingness to invest were taken from Seebauer and Babcock (2018). The respondents were asked to answer how likely they were to implement the following preventive measures on a 5-point Likert scale from 1 = Very unlikely to 5 = Very likely. There were seven items such as 1) I intend to prepare an emergency plan for all household members, 2) I am willing to coordinate with neighbors (e.g., joint emergency plan, joint structural measures), and 3) I am interested in receiving more information about flood danger in my local environment, in mentioning some. The reliability test resulted in high reliability, $\alpha = .900$, and removing item 5 would have the Cronbach's alpha to $\alpha = .903$. Because of the insignificant increase, the variable remained as it was.

2.3.4 Parental Factor

The variable for whether the participants had children or not was constructed by me. The question was, "Do you have children, and do they live at home?" including three answer

options: 1) I have children, and they live at home, 2) I have children, but they do not live at home, and 3) I do not have children. This opened the possibility of distinguishing whether the children were living at home or not and examining if there was a significant difference within the parental factor. Further, a dummy variable was made, where answer options 1 and 2 were combined to parents = 1, and answer option 3 remained non-parents = 0.

2.4 Data analysis

IBM SPSS Statistics Data Editor 27 was used as the statistical analysis program for the current study. An add-on program, PROCESS version 4.1, for SPSS was used for mediation (Hayes, 2017), adopting models 4 and 7.

3.0 Results

Table 1

Correlation table for descriptive statistics (N = 293)

<i>Variable</i>	<i>1. Parental factor^a</i>	<i>2. Psychological Distance</i>	<i>3. Risk Perception</i>	<i>4. Willingness to invest</i>
<i>1. Parental factor^a</i>	-			
<i>2. Psychological Distance</i>	-.24***	-		
<i>3. Risk Perception</i>	.05	-.27***	-	
<i>4. Willingness to invest</i>	.10	-.25***	.51***	-
<i>M</i>	.62	2.35	4.28	2.25
<i>SD</i>	0.49	0.69	1.27	0.99

^a Non-parents = 0, Parents = 1

*** $p < .001$

Table 1 shows descriptive statistics for the variables: means, standard deviations, and correlation coefficients. The correlation analysis showed a negative, significant correlation between psychological distance and the other three variables: parental factor, $r(291) = -.24, p < .001$, risk perception, $r(291) = -.27, p < .001$, and willingness to invest, $r(291) = -.25, p < .001$.

Finally, risk perception had a positive, significant correlation with willingness to invest, $r(291) = .51, p < .001$.

A path analysis tested the hypothesized model as model 4 in PROCESS with 5000 bootstrap samples for the confidence intervals and standard errors of indirect effects (Hayes, 2017), excluding the moderating role of the parental factor. The results (Figure 2) indicated the direct effect from psychological distance to risk perception was negative and statistically significant, $b = -.20, t(291) = -4.69, p < .001$. The path between risk perception and willingness to invest was positively significant, $b = .69, t(291) = 9.15, p < .001$. Finally, a negatively significant effect was found between psychological distance and willingness to invest, $b = -.13, t(291) = -2.38, p = .018$.



Figure 2. Statistical diagram of the hypothetical model (excluded parental factor) with significant results from path analysis using model 4 in PROCESS.

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

Model 7 in PROCESS with 5000 bootstrap samples for the confidence intervals and standard errors of indirect effects (Hayes, 2017) was used to test the associations among psychological distance, risk perception, and willingness to invest, as well as the moderating role of the parental factor in the relationship between psychological distance and risk perception. The index of moderated mediation showed that the parental factor moderated the indirect effect, Index = $-.18, 95\% CI = -.33, -.04$. When including the parental factor as a moderator, the path between

psychological distance and risk perception was insignificant; however, the path between parental factor and risk perception was positively significant, $b = .90$, $t(291) = 2.70$, $p = .007$. Psychological distance and parental factor interacted together had a negatively significant path to risk perception, $b = -.26$, $t(291) = -2.84$, $p = .005$. When testing the conditional effects of psychological distance on risk perception at values of the moderator parental factor, non-parents were insignificant, $b = -.02$, $t(291) = -0.31$, $p = .753$. At the same time, parents were negatively significant, $b = -.29$, $t(291) = -5.44$, $p < .001$. This means that parents had a conditional effect on the relationship within the parental factor, whereas non-parents did not. Similar results were found when testing the indirect path moderated by the parental factor, where non-parents were not significant, $IE = .02$, $95\% CI = -.13, .11$, but parents were, $IE = -.20$, $95\% CI = -.28, -.13$.

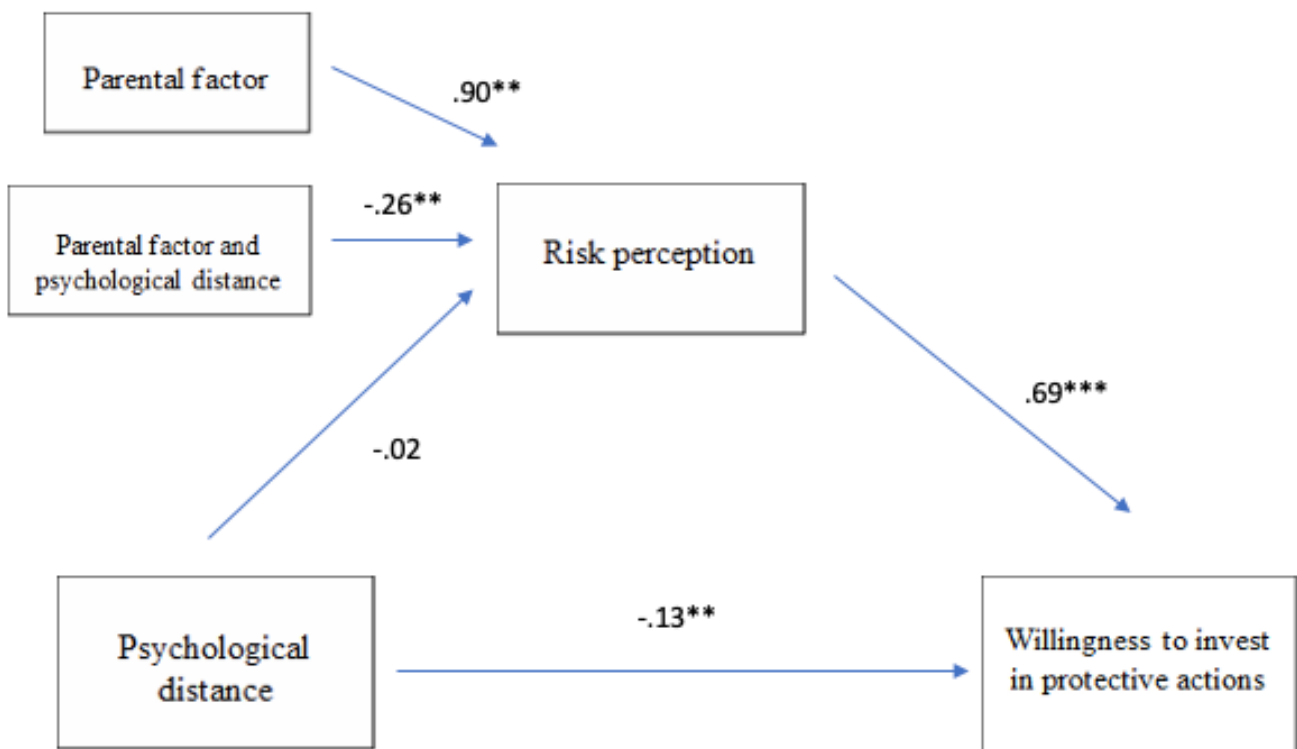


Figure 3. Statistical diagram of the hypothetical model with results from path analysis using model 7 in PROCESS.

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

4.0 Discussion

The analysis showed support for all four hypotheses. The results from the correlation analysis, presented in table 1, showed medium correlations between psychological distance and the three

other variables. The strongest correlation was found between willingness to invest and risk perception (.51). Hypotheses one and two were therefore supported as the psychological distance was negatively correlated with willingness to invest and risk perception, and risk perception was positively correlated with willingness. The current study offers a nuanced account of how being a parent influences willingness to invest in protective actions against flooding. When testing the mediation by itself (excluding the parental factor), there was a statistically significant result for the mediation and the direct path from psychological distance to willingness to invest (figure 2). This indicates a partial mediation, which supports the third hypothesis.

Results from previous research have indicated how psychological distance negatively correlates with risk perception (e.g., O'Neill et al., 2016) and how a lower psychological distance and higher risk perception predict preparedness to act (Spence et al., 2012) and engagement (Loy & Spence, 2020) in climate change. Thus, significant results for the mediation were expected. Interestingly, similar results from previous research regarding climate change could also be found when the issue was regarding flooding. This could indicate that these relationships can be generalized across other aspects of natural hazards. This would need further investigation in future research.

The most interesting finding was that the indirect path of the model was dependent on the conditions of the moderator values and that parents were significant, whereas non-parents were not. When testing the hypothetical model (figure 1), the path between psychological distance and risk perception was non-significant. This means that the parental factor moderated the relationship, meaning psychological distance alone did not affect risk perception but was conditional to the values of the moderator. Within the parental factor, parents were significant, whereas non-parents were not, which indicates that having children worked as a dependent effect on the relationship. The strongest influence was the parental factor on risk perception (.90). When looking at the coefficients of the mediation model and the moderated mediation model, psychological distance and the parental factor had a slightly greater negative effect on risk perception (-.26) than the psychological distance by itself (-.20). This could reflect the assumption that having a child to take care of makes parents more protective (Hale et al., 2017; Maccoby, 2000; Ursin & Syltern, 2020), which then leads to being more alert when it comes to risk, and therefore perceiving it different than non-parents. The results indicate that having a lower level of psychological distance and a higher level of risk perception predicts willingness

to invest, especially for those who have children. Thus, the fourth hypothesis is supported, as the indirect effect depends on the moderator's conditional values, where being a parent affects the strength and nature of this relationship.

It should be noted that the construct *willingness to invest* in protective actions against flooding measured intentions rather than actual investments and the results are indications. Therefore, the current study indicates that parents could have a higher intention of action where having children could work as a driver.

Nonetheless, the current study contributes to exploring a theoretical question with empirical research. Theories regarding parenting consist mainly of theoretical and phenomenological approaches and would benefit from results that indicate an inherent motivation for parents wanting to protect their children. Further, it gives beneficial insight into how being a parent can work as a driver of action. Flooding is one of the most dangerous natural hazards in Europe (Suk et al., 2020), and the frequency and intensity are predicted to increase over time in Norway. Thus, it is essential to inform exposed populations, as it influences the areas to invest in protective measures (Eitzinger et al., 2018). A big part of the population is, in fact, parents, and the current study contributes valuable insight into how to influence them in the direction of flood mitigation behavior. Knowing that there might be an inherent motivation in parents, enhancing this with a flooding campaign could ensure that a more significant portion of the exposed population prepared themselves, their children, and their house. It could also lead to more acceptance of safety measures in the community or increase trust in the government and experts, as such campaigns could condition parents into being more accepting for the purpose of safety. Therefore, the most crucial contribution would be improved communication with the exposed population, which is much needed (e.g., Amundsen & Dannevig, 2021; Cruz et al., 2006; Krasovskaia et al., 2001; Rasool et al., 2022; Xie et al., 2019).

4.1 Strength and limitations

4.1.1 Sample

The sampling methods contributes with both strengths and limitation to the current study. The target group was Norwegians over 18 years and included participants having experienced flooding and not, parents and non-parents, and living in a flood-prone area and not. The convenience method probably provided several respondents to the survey; however, 59 respondents (20%) were students, possibly friends asked by the students creating the survey,

and might not be a representative contribution to the sample. Most likely the students did not have children which may contribute to why the non-parent group within the parental factor was insignificant. Still, the snowball and convenience method's execution ensured that several aspects of flooding, as mentioned above, were covered in the sample. The use of the flood map of Norway ensured the possibility of including a representative portion of respondents that have either experienced or been affected by flooding to different degrees.

It should still be mentioned that some of the groups on Facebook reacted to their municipality being listed as an affected area on the flooding map. Specifically, one group disagreed strongly and claimed that their city had never been exposed. I then received a private message from a person who had seen the post and its accompanying comments, writing that the area indeed was often exposed to flooding, just in the regions that were not near the center where people lived. A limitation could be that parts of the target group might not know they are exposed to varying degrees of flooding. This further points to the need for communication strategies, which the current study seeks to improve.

4.1.2 Measures

The data used in the current study were a part of a larger study, where nine bachelor students collaborated. The survey included 23 variables, and four were used for this research. This could have been redundant for the respondents and may influence how the survey is answered. A large number of questions could make them annoyed or tired, possibly making the answers inaccurate or rushed. However, the timeframe of the survey was informed in advance.

The items included in the questionnaire were initially in English and were translated into Norwegian. The common problem was that not all items could be translated directly in a satisfying way. This could hurt the face validity of the survey, as there is a possibility that the meaning was lost in translation for some of the difficult questions. However, it was prevented to the best of our ability, as we had several reviews among the collaborating students to ensure precise translations. A reliability test for all the items included in the current study resulted in Cronbach's Alpha indicating high reliability for all items except for one, which was then removed. Thus, highly reliable items were used for the subsequent analyses.

5.0 Conclusion and further recommendations

The current research contributes interesting empirical results to both parental theories and the field of environmental psychology. The assumption was that having children could lead to perceiving risk differently than non-parents because, generally, parents provide nurturance and protection for their children (Ursin & Syltern, 2020; Maccoby, 2000). The four hypotheses were all supported by significant results. The findings show that a lower psychological distance and a higher risk perception predict willingness to invest in protective actions, where having children affects the strength and nature of this relationship. Parents make up a large part of the population, and knowledge about what might work as a driver to action is valuable for future communication strategies regarding flood risk to activate the desired behavior. Therefore, the significant results lead to implications for a better understanding of how to inform and influence flood-exposed populations to be more willing to invest in protective behavior.

There are a few further recommendations based on the significant findings of the current study. As this research was exploratory, it is necessary to replicate the results and test if the relationships between the study variables can be generalized across other aspects of natural hazards. Further, it would be interesting to look at the differences in psychological distance, risk perception, and willingness to invest between mothers and fathers based on the differences predicted by parental investment theory. Future research would also benefit from focusing on parents and non-parents explicitly living in flood exposed areas, as it is vital to inform and prepare them more than in non-affected areas. It could also be considered to include all four dimensions of psychological distance, as the thesis only focused on the socio-spatial distance of flooding to see if this could affect the significant and insignificant results. Finally, further research should test experimentally the results of the current study and its central hypothesis with a campaign aimed at parents and see if it conditions them to invest in protective behavior against flooding.

6.0 References

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