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Do I Perceive That We as a Community Can Persist, Adapt Flexibly, and Positively Transform? The Relationship Between Collective Transilience and Community-Based Adaptation

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Abstract

Climate change is happening and has negative impacts on communities. To adapt to climate change risks, people need to take action to protect, not only themselves, but also their community. We study whether collective transilience predicts community-based adaptation, such as joining a community initiative to protect the community from climate change risks. Collective transilience reflects the extent to which people perceive they can persist, adapt flexibly, and positively transform as a community in the face of climate change. Two studies (in the United States and the Netherlands) showed that, as expected, higher collective transilience is associated with increased engagement in different examples of community-based adaptation, even when controlling for individual transilience (i.e., the perceived capacity to persist, adapt flexibly, and positively transform in the face of climate change as an individual). Notably, collective transilience was the only significant predictor of individual adaptation behaviours, corroborating the relevance of examining transilience at the collective level to promote widespread adaptation. Theoretical and practical implications are discussed.

Keywords

climate change, transilience, community resilience, community initiatives, adaptation behaviours

Non-Technical Summary

Background

The negative impacts of climate change are increasingly visible. People can take different actions that may help to protect their communities from climate change risks, such as joining a community initiative that aims to protect their neighbourhood from the negative impacts of floods and heatwaves, or voicing their support for local policies that reduce vulnerability to climate change risks. We studied what motivates people to take actions to protect their community from climate change risks.

Why was this study done?

We examined how collective transilience, that reflects the extent to which people perceive they can persist, adapt flexibly, and change for the better as a community in the face of climate change, is related to the likelihood that people engage in actions to protect their community from climate change risks. We further examined whether higher collective transilience is more strongly associated with actions aiming to protect one's community from climate change risks than individual transilience (i.e., the extent to which people believe they as an individual can persist, adapt flexibly, and change for the better in the face of climate change).

What did the researchers do and find?

We conducted two studies, one in The United States and one in the Netherlands. We found that people do think they can persist, adapt flexibly, and positively transform as a community in the face of climate change. Yet, they are generally not very likely to engage in actions that may protect their community against climate change risks. As expected, higher transilience was related to stronger intentions to engage in a variety of behaviours that can protect one's community and oneself from climate change risks. Interestingly, collective transilience was found to better predict intentions to adapt (both at the individual and at the community level) than individual transilience, suggesting that the extent to which people believe their community can persist, adapt flexibly, and positively transform can promote a wide range of adaptation behaviours.

What do these findings mean?

Our findings bring a positive perspective by showing that humans think they have the capacity to adapt and even thrive as a community when adapting to climate change, and the higher this collective transilience, the more likely they are to engage in climate adaptation actions. Future research can examine which factors strengthen collective transilience, and encourage people to engage in actions to protect both themselves and their community from climate change risks, and also to change for the better.

Highlights

- Participants perceive they can persist, adapt flexibly, and positively transform as a community when facing climate risks, and thus perceive collective transilience.
- Participants are not very likely to engage in community-based adaptation to protect their community from the risks of climate change.
- Collective transilience generally predicts different types of community-based adaptation indicators, also when controlling for individual transilience.
- Higher collective transilience is also related to stronger individual adaptation intentions and behaviours.

Climate change poses various risks for communities in specific ways. For instance, in the United States, inhabitants of a coastal area in the North-East face increased rainfall and sea-level rise, while those living in the South-West face risks of droughts and wildfires (Clayton et al., 2016). There is an increasing interest in understanding climate change adaptation at the community level (McNamara & Buggy, 2017; Schlingmann et al., 2021). Studies have provided insights on the vulnerabilities, adaptive capacities, and adaptation strategies of specific communities (e.g., Ahmed et al., 2021; Cinner et al., 2018; Galappaththi et al., 2020; Mees et al., 2019; Nguyen & James, 2013; Truelove et al., 2015; Ziervogel et al., 2022), as well as on community resilience in the face of climate change (Carmen et al., 2022; Ensor et al., 2018; Faulkner et al., 2018; Fazey et al., 2018; Ntontis et al., 2019). Yet, little is known about what encourages people to engage in concrete actions to protect their community from climate change risks. Community-based adaptation behaviours reflect actions within and in the interest of one's community, such as helping others prepare for natural hazards, joining initiatives to purchase sandbags or replacing concrete and tiles with greenery (i.e., trees and bushes) for flood protection, sharing knowledge, developing measures to protect one's community from climate-related hazards, and supporting local climate adaptation policies.

Research on how to motivate climate change adaptation behaviours has mainly focused on individual behaviours that people can take to protect themselves and their household from climate change risks (van Valkengoed & Steg, 2019a, 2019b). We aim to extend this research by studying a) to what extent people (intend to) engage in community-based adaptation behaviours; b) which factors predict community-based adaptation behaviours, and whether these differ from what has been found to promote individual adaptation behaviours. Specifically, we studied to what extent collective transilience, reflecting the extent to which people perceive they, as a community, can persist, adapt flexibly, and positively transform in the face of climate change risks, can predict community-based adaptation responses. We elaborate on our reasoning below.

Individual Transilience and Adaptation to Climate Change

Transilience was proposed as a novel way to assess individuals' perceived adaptive capacity in the face of climate change (Lozano Nasi et al., 2023a). It acknowledges that humans may be able to change for the better by adapting to climate change, and thus do more than 'bounce back' by maintaining or recovering what they had (as captured by psychological resilience; Bonanno, 2004; Smith et al., 2010). Transilience comprises three key components: persistence, adaptability, and transformability (Lozano Nasi et al., 2023a).

Persistence reflects the extent to which people perceive they can persist and have the resources to cope and carry on in the face of climate change risks, which is important to (at least) maintain and recover the status quo (i.e., to 'bounce back'; Bonanno, 2004; Smith et al., 2010). *Adaptability* reflects whether people perceive they can adapt flexibly and have a broad range of options to adapt to climate change risks, which allows people to revise and switch strategies when needed. Such a flexible approach is important for long-term climate change adaptation, which likely requires a variety of responses (Barnes et al., 2020; Cinner et al., 2018; Linquiti & Vonortas, 2012). *Transformability* captures whether people perceive they can positively transform by adapting to climate change, for instance by learning something good. Although prominent definitions of climate change adaptation explicitly refer to "finding new opportunities" (IPCC, 2014a, 2014b), this positive side of climate change adaptation has remained under-investigated. Importantly, historical analyses have shown that humans were able to not only persist and adapt flexibly, but also thrive in the face of past examples of climate change (Degroot et al., 2021). For instance, during the Little Antique Ice Age (sixth century AD) and the Little Ice Age (thirteenth to nineteenth century AD), communities responded to climate change by introducing new and better economic practices, technologies, customs, and traditions (Degroot et al., 2021). Although the current rates of global warming are unprecedented (IPCC, 2022), it is plausible that present climate change adaptation also implies challenging and improving the status quo (e.g., finding new, better ways and exploiting new opportunities; cf., Davoudi et al., 2013; IPCC, 2023).

Individual transilience is theoretically and empirically distinct from related constructs like self-efficacy, outcome efficacy and resilience, and it is positively associated with climate change risks, indicating that higher transilience does not reflect denying or downplaying climate change risks (Lozano Nasi et al., 2023a). Higher individual transilience predicts individual and some community-based adaptation behaviours, although the latter not consistently (Lozano Nasi et al., 2023a). Perhaps, protecting the community from climate change risks requires not only perceiving transilience at the individual level, but also at the community level.

Collective Transilience and Community-Based Adaptation

We define collective transilience as individuals' perception that they, *as a community*, can be transilient in the face of an adversity, such as climate change risks. Hence, collective transilience does not reflect the aggregate of individual transilience within a community, but rather the extent to which an individual perceives that their community (including themselves) can persist, adapt flexibly, and positively transform in the face of climate change risks (cf., Bandura, 2000). It follows that community-based adaptation, which implies that people act for and within the interest of their community, is more likely when collective transilience is high, as individual transilience may not be sufficient to promote adaptation at the community level (cf., Chen, 2015; cf., van Zomeren et al., 2008, 2010). Our proposal is also in line with the compatibility principle (Ajzen, 2020), which states that constructs are more strongly related when they are assessed at the same level of specificity. Yet, collective transilience might also predict individual adaptive actions, as these may contribute to protecting one's community in some cases (e.g., greening one's own backyard can help protect the neighbourhood from heatwaves and flooding; Lennon et al., 2014).

Perceptions of collective efficacy, namely the perceived ability of a community to achieve specific goals (Bandura, 1998), have been found to promote community-based adaptation behaviours. For example, people report stronger intentions to address drinking water scarcity when they believe their community can ensure an adequate drinking water supply (Thaker et al., 2016). We aim to expand upon previous studies by investigating whether collective transilience, which captures the perceived adaptive capacity of the community beyond the pursuit of specific goals, and which comprises of flexibility and of the possibility of positive change, can predict different types of community-based adaptive actions across different contexts (i.e., can be a general antecedent of community-based adaptation; cf., van Valkengoed, 2022). It remains an empirical question whether people can perceive collective transilience and whether such general perceived adaptive capacity can translate into concrete actions and intentions. We expect that the more strongly people perceive collective transilience, the more likely they are to engage in different types of community-based adaptive actions (**Hypothesis 1**). Furthermore, in line with the compatibility principle (Ajzen, 2020), we expect collective transilience to be more strongly related to community-based adaptation behaviours (compared to individual transilience), and individual transilience to be more strongly related to individual adaptation behaviours (compared to collective transilience; **Hypothesis 2**). Next, although both collective and individual transilience may reflect the perceived capacity to adapt to climate change, we expect that collective transilience is uniquely related to community-based adaptive action when controlling for individual transilience (**Hypothesis 3**).

The Present Research

We conducted two studies to test our reasoning. In Study 1, a correlational study among a US sample, we examined whether people perceive collective transilience; we also examined whether they (intend to) engage in community-based adaptation behaviours that aim to protect the local community they live in. Next, we tested whether higher collective transilience is associated with more community-based adaptation intentions and behaviours and higher support for local adaptation policies (**Hypothesis 1**). We also explored the relationship between collective transilience and individual adaptation behaviours and intentions, such as checking weather forecasts. Study 2 was conducted in the neighbourhood of Stadshagen, in Zwolle, the Netherlands, where a community initiative was launched to encourage residents to make their neighbourhood more climate adaptive. As in Study 1, we examined whether people perceive collective transilience; next, we examined whether people intend to engage in community-based adaptation, and whether higher collective transilience is associated with stronger community-based adaptation intentions, including interest to join the community initiative (**Hypothesis 1**). Additionally, we examined whether collective transilience, compared to individual transilience, is more strongly related to community-based adaptation intentions and less strongly related to individual adaptation intentions (**Hypothesis 2**). Finally, we examined whether collective transilience is uniquely related to community-based adaptation intentions when individual transilience is controlled for (**Hypothesis 3**). Both studies were approved by the Ethical Committee of Psychology of the University of Groningen.

Study 1

Method

Participants and Procedure

We recruited participants from the US population via Amazon MTurk (crowdsourcing platform), a convenient sample to initially test our hypotheses. To ensure good quality of the data, only participants with a high reputation were allowed to participate in our study (i.e., > 90% approval rate; Peer et al., 2014). Participants were randomly assigned to the present study or to a parallel study on individual transilience; 197 participants consented and received 1 USD compensation for the present study. We removed one duplicate IP address and one participant who failed the attention check question (where we asked participants to select the Option '6' on the 7-point scale). We excluded 10 participants who completed the survey within 2.5 minutes, as it was unrealistic to accurately fill in the questionnaire in such a short time (median completion time = 6.2 minutes). Thus, 185 responses were retained for analyses (60.5% identified as men; M_{age} = 36.6; SD_{age} = 10.9; other demographics are in Lozano Nasi et al., 2024). A post-hoc power

calculation (G*Power; Faul et al., 2007) showed that we had a power of .90 to detect a small-to-medium effect for correlations (r = .20) with this sample.

After consenting, participants indicated whether they agreed with the statement: 'I believe climate change is real' (van Valkengoed et al., 2021), as we assume that people who deny climate change cannot provide meaningful answers concerning the capacity to adapt to climate change. None of the participants denied the reality of climate change, and people generally perceived climate change as a serious risk to their community (M = 5.69, SD = 1.33; see also Lozano Nasi et al., 2024). Participants then completed questions about collective transilience, climate change risks, and climate change adaptation.

Measures

Measures were assessed on a Likert-scale, from 1 = *strongly disagree* to 7 = *strongly agree*, unless otherwise specified. Measures for individual and community-based adaptation behaviours, including policy support, were developed based on literature (Reser & Swim, 2011; van Valkengoed & Steg, 2019b) and in consultation with experts on climate change adaptation. Descriptive statistics and reliability coefficients are provided in Table 1 (see full list of items in Appendix B).

Table 1

Descriptive Analyses, Reliability Coefficients, and Correlations Between Measures Included in Study 1

Variable	*M*	*SD*	α	ω_t	1	2	3	4	5
1. Collective transilience	5.61	0.80	0.91	.92					
2. Community-based adaptation intentions	4.17	1.95	0.95	.95	.26***				
3. Community-based adaptation behaviours	0.55	1.30			.13	.38***			
4. Local policy support	5.38	1.03	0.79	.85	.33***	.35***	.17*		
5. Individual adaptation intentions	4.83	1.52	0.88	.92	.24**	.72***	.29***	.38***	
6. Individual adaptation behaviours	1.55	2.03			.32***	.02	.43***	.15*	.09

Note. M = mean; SD = standard deviation; α = Cronbach's alpha; ω_t = McDonald's omega.
*p < .05. **p < .01. ***p < .001.

Collective Climate Change Transilience — We asked participants to what extent they perceive they can persist, adapt flexibly and positively transform as a community, bearing in mind the negative consequences that climate change can have for their community. We adapted the individual transilience scale (Lozano Nasi et al., 2023a), by replacing the pronouns "I" and "me" with "we" and "us", respectively. As a result, collective transilience captures the interdependent perspective of community members on the adaptive capacity of their community (cf., Bandura, 1998; 2000).

Community-Based Adaptation Intentions and Behaviours — We asked participants to what extent they intend to engage in six adaptation behaviours together with their

community *within the next year* (e.g., 'Motivating people in our neighbourhood to maintain their houses well to avoid damage from natural hazards caused by climate change'). Participants rated the items on a scale from 1 = *not at all* to 7 = *very much*. We also included the Option 8 = *I already did it*, which we used to compose a measure of community adaptation behaviour. We calculated the behaviour score by counting, for each participant, the number of behaviours for which '8' was selected. We calculated an intentions score for those behaviours that were not already implemented by averaging the items into an intention scale (after converting '8' to 'missing').

Support for Local Adaptation Policies — We asked participants to what extent they would support the introduction of five climate change adaptation policies in their municipality (e.g., 'Investing public money to make vital infrastructure (for example, energy utilities, power lines, cell towers) more resistant to climate change risks'), on a scale from 1 = *strongly oppose* to 7 = *strongly support*.

Individual Adaptation Intentions and Behaviours — Participants indicated to what extent they intend to engage in seven adaptation behaviours to protect themselves against climate change risks within the next year (e.g., 'Preparing a household emergency kit, containing for example a flashlight, a radio, emergency blankets, first aid kit'). The response and the procedure to create a behaviours and intentions scale was the same as for community-based adaptation.

Results and Discussion

We conducted our analyses using R (version 4.1.2) and Jamovi (version 2.2). We first confirmed content, concurrent, and discriminant validity of the collective transilience scale (see Lozano Nasi et al., 2024). Next, using the *psych* package (Revelle, 2023), we examined the mean scores of all measures. As shown in Table 1, on average, respondents perceived they can be transilient as a community (i.e., mean scores above the midpoint of the scale). They also supported local adaptation policies and intended to engage in individual adaptation behaviours. Respondents were less likely to engage in community-based adaptation behaviours than in individual adaptation behaviours, M_{diff} = 0.66; $t(175)$ = 6.46; $p < .001$; d = .49. While participants on average had engaged in at least one individual adaptation behaviour, they had not engaged in any community-based adaptation behaviour, M_{diff} = 1; $t(184)$ = 7.20; $p < .001$; d = .53.

We used the custom function *corstars* (Bertolt, 2008) to calculate bivariate correlations between all variables (Table 1). As expected, the higher perceived collective transilience, the more participants intended to engage in community-based adaptation behaviours and the more they would support local adaptation policies, with a medium effect (i.e., above 0.24; Lovakov & Agadullina, 2021). Unexpectedly, collective transilience was not significantly related to community-based adaptation behaviours. This may be explained by the

lack of variance in community-based adaptation behaviours, as 141 participants (76.2% of the sample) had not engaged in any community-based adaptation behaviour. Certain behaviours we assessed may not have been feasible in some communities, although we were unable to determine the community affiliation of our participants. Interestingly, higher collective transilience was related with stronger individual adaptation intentions and behaviours, with a medium effect (see Table 1).

Study 2

Study 2 took place in the neighbourhood of Stadshagen in Zwolle (a city in the North-East of the Netherlands), where the community initiative SensHagen was established (https://senshagen-zwolle.opendata.arcgis.com). This initiative asks residents to install a sensor in their backyard to collect data on climate change consequences (precipitation, evaporation, heat, and wind). The municipality will use this data to map local climate risks and decide on adaptation policies and measures to reduce these risks. Joining the SensHagen initiative can be considered a proxy of community-based adaptation, as residents take an action (i.e., installing the sensors) that contributes indirectly to protecting their neighbourhood from the risks of climate change.

We first examined whether participants perceive collective and individual transilience. Next, we tested whether collective transilience is positively associated with community-based adaptation (**Hypothesis 1**), including a more positive evaluation of the SensHagen initiative (reflecting public support for the project, which is an indicator of behaviour, cf., Perlaviciute & Steg, 2014; Stern, 2000) higher interest to join the initiative, a stronger intention to support the initiative (e.g., by motivating others to join the initiative), and more information seeking about the initiative. Furthermore, we tested whether higher collective transilience is associated with stronger community-based adaptation intentions not specifically related to SensHagen (e.g., using a neighbourhood app to warn neighbours about heatwaves and check on their safety). Again, we explored the relationship between collective transilience and individual adaptation intentions. Next, we tested whether collective transilience, compared to individual transilience, is more strongly related to community-based adaptation intentions and less strongly related to individual adaptation intentions (**Hypothesis 2**). Furthermore, we tested whether collective transilience predicts unique variance in community-based adaptation intentions when controlling for individual transilience (**Hypothesis 3**).

Study 2 included an experimental manipulation aiming to strengthen collective transilience, to test whether this would in turn promote community-based adaptation intentions. We hypothesised that emphasising that climate change poses risks to the community of Stadshagen (e.g., 'Climate change poses a risk to *us, residents of Stadshagen*') would lead to higher levels of collective transilience, compared to emphasising the risks posed by climate change only to the individual (e.g., 'Climate change poses a risk

to *you and your household*'). This hypothesis was based on research showing that when people are reminded that they are facing a certain threat *as a group* (i.e., they perceive common fate, that it is "us" against the threat; Drury, 2018), they are more likely to show collective resilience and to engage in actions that serve the interests of the group (as opposed to individual interests; Drury, 2018; Drury et al., 2019; Ntontis et al., 2020). Yet, we found no difference between the experimental conditions, neither in collective transilience, $F(1, 288) = 0.11$; $p = .740$, nor in any of the community-based or individual adaptation intentions (see Appendix A). Therefore, we conducted the analyses without considering these conditions as separate groups.

Method

Participants and Procedure

Data was collected in collaboration with the municipality of Zwolle among inhabitants of Stadshagen, thus among members of the community that could join the SensHagen initiative. Via a panel of residents in Stadshagen, a total of 1250 residents were invited to fill in an online survey, of which 456 consented to participate and filled in our questionnaire (response rate = 36.5%) at least partially. Participants were not yet members of the SensHagen initiative, and were unlikely to know about it, although we did not formally verify this. From the initial sample, 158 participants were removed as they did not fill in the collective and/or the individual transilience scale. The final sample consisted of 298 participants (59% identified as men; $M_{age} = 49.40$; $SD_{age} = 13.30$; see more demographic information in Lozano Nasi et al., 2024). A post-hoc power analysis (G*Power; Faul et al., 2007), showed that we had a power of .95 to determine a medium effect (i.e., $r = .30$ for correlations, $f^2 = .15$ for a multiple regression), thus we had enough participants to test our hypotheses.

After consenting, participants read a short text on the climate change risks and the need for climate change adaptation in StadsHagen (i.e., the experimental manipulation, which was not effective as explained above), followed by a short description of the SensHagen initiative (see full texts in Appendix A). Participants then completed a questionnaire about the SensHagen initiative, adaptation intentions, and individual and collective transilience, respectively. While we did not formally assess belief in climate change reality, on average participants indicated they believe that climate change poses a risk to the community of Stadshagen ($M = 4.67$; $SD = 1.66$; see also Lozano Nasi et al., 2024). Participants on average identified with the community of Stadshagen to some extent ($M = 4.27$; $SD = 1.49$, based on the single item 'I identify with the residents of Stadshagen' (Postmes et al., 2013), with response scale 1 = *strongly disagree* to 7 = *strongly agree*).

Measures

Measures were assessed on a scale from 1 = *strongly disagree* to 7 = *strongly agree*, unless otherwise specified. Measures for individual and community-based adaptation intentions were again developed based on the literature and consultation with experts on climate change adaptation from academia and the municipality of Zwolle. Descriptive analyses and reliability coefficients are presented in Table 2. See full list of items in Appendix B.

Individual and Collective Transilience — We slightly adapted the individual transilience scale (Lozano Nasi et al., 2023a) and the collective transilience scale of Study 1. Specifically, in the introductory text, we made explicit that the items referred to the risks of flooding and heatwaves in Stadshagen, hence we did not repeat the risks in every item (e.g., 'I can be brave' replaced 'I can be brave in the face of climate change risks'). This made the items more concise and easier to read for participants. In the case of collective transilience, we included the community (i.e., 'residents of Stadshagen') in each of the items (e.g., 'We, residents of Stadshagen, can be brave').

Evaluation of the SensHagen Initiative — Participants responded to the question 'I think the SensHagen project is…' on three scales, ranging from 1 = *a very bad idea* to 7 = *a very good idea*; 1 = *totally not relevant* to 7 = *totally relevant*; and 1 = *totally unacceptable* to 7 = *totally acceptable,* respectively (adapted from Liu et al., 2020).

Interest to Join the SensHagen Initiative — We measured interest to join the SensHagen initiative with three items (e.g., 'I am interested in the SensHagen project'; adapted from Sloot et al., 2019).

Intentions to Support the SensHagen Initiative — We measured intentions to support SensHagen with two items (e.g., 'I am planning to motivate other inhabitants of Stadshagen to participate in the SensHagen project'; adapted from Sloot et al., 2018).

Information Seeking About the SensHagen Initiative — Participants indicated whether they wanted to receive a link to the SensHagen website at the end of the survey, by answering either 1 = *yes* or 2 = *no*. The link was provided to all participants at the end of the survey because the survey platform used (Enalyzer) did not allow for selective distribution based on participant responses. Furthermore, we could not verify whether participants clicked on the link, which implies this measure is not a true behavioural measure.

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Table 2

Descriptive Analyses, Reliability, and Bivariate Correlations Between the Measures Included in Study 2

Variable	*M*	*SD*	α	ω_t	1	2	3	4	5	6	7	95% CI[a]
1. Collective transilience	4.52	1.05	0.96	0.98								
2. Individual transilience	4.98	1.01	0.93	0.97	.57***							
3. Evaluation SH	5.65	1.26	0.92	0.92	.37***	.25***						[0.02, 0.22]
4. Interest to join SH	4.46	1.82	0.86	0.86	.39***	.30***	.65***					[-0.01, 0.19]
5. Intention to support SH	3.32	1.64	0.83[b]		.35***	.30***	.53***	.72***				[-0.04, 0.15]
6. Information seeking SH	0.63	0.48			.21***	.16**	.45***	.63***	.46***			[-0.05, 0.15]
7. Community-based adaptation intentions	3.92	1.44	0.89	0.93	.44***	.31***	.54***	.63***	.68***	.49***		[0.03, 0.23]
8. Individual adaptation intentions	3.92	1.30	0.80	0.88	.32***	.24***	.45***	.50***	.57***	.33***	.74***	[-0.02, 0.18]

Note. SH = SensHagen; *M* = mean; *SD* = standard deviation; α = Cronbach's alpha; ω_t = McDonald's omega.

[a] Comparison 1-2. Procedure recommended to statistically compare correlations (Diedenhofen & Musch, 2015; Zou, 2007). [b] Spearman-Brown reliability coefficient for measure with two items.

*p < .05. **p < .01. ***p < .001.

Community-Based Adaptation Intentions — We asked participants to what extent they intend to engage in six community-based adaptation behaviours *within the next year*. We aimed to capture a broad range of behaviours, thus we included three incremental behaviours that preserve the status quo (van Valkengoed & Steg, 2019b; e.g., 'participate in a neighbourhood initiative to protect Stadshagen against flooding, for example by jointly purchasing sandbags to hold back the water') and three transformative behaviours that challenge the status quo by developing new alternatives and seeking opportunities (Fedele et al., 2019; Wilson et al., 2020; e.g., 'contribute to a plan for the redevelopment of Stadshagen to reduce flood risks'). Two items focused on adapting to climate change risks in general, two items focused on flooding and two items on heatwaves, as these are climate change risks faced by residents of Stadshagen. Participants rated each item on a scale from 1 = *not at all* to 7 = *certainly yes*.

Individual Adaptation Intentions — We asked participants to what extent they intend to engage in six individual adaptation behaviours *within the next year*. As for community-based adaptation intentions, we included three incremental behaviours (e.g., 'buy insurance to cover the costs of the consequences of a flood on my household effects and/or house') and three transformative behaviours (e.g., 'greening my backyard and/or getting a green roof to keep cool during a heatwave'). Again, items were about adapting to climate change risks in general, or to the specific risks of flooding and heatwaves. Participants rated each item on a scale from 1 = *not at all* to 7 = *certainly yes*.

Results and Discussion

First, we confirmed the content, concurrent, discriminant and incremental validity of the collective transilience scale (see Lozano Nasi et al., 2024). Next, using the *psych* package (Revelle, 2023), we examined the mean scores of all measures. Table 2 shows that respondents perceived they can be transilient, although more strongly as an individual than as a community, M_{diff} = 0.46, $t(297)$ = 8.22; $p < .001$; d = .48. Respondents evaluated the SensHagen initiative positively, showed interest to join SensHagen (i.e., both mean scores were above the midpoint of the scales), and generally seemed interested to seek additional information about the SensHagen initiative (62.8% of respondents wanted more information). However, respondents on average showed somewhat low intentions to engage in both community-based and individual adaptation behaviours (i.e., identical mean scores slightly below the scale midpoint). On average, respondents did not intend to support the SensHagen initiative by motivating others to join or participate in related activities. This may be due to their unfamiliarity with the initiative before taking our survey, which may have made them hesitant to immediately intend to act to support it.

Collective Transilience and Community-Based Adaptation

We used the custom function *corstars* in R (Bertolt, 2008) to examine bivariate correlations between collective transilience and community-based adaptation intentions (**Hypothesis 1**). Table 2 shows that collective and individual transilience were both positively associated with all community-based adaptation intentions, and with individual adaptation intentions, with a medium to large effect (i.e., correlation between .20 and .40; Lovakov & Agadullina, 2021). Note that these significant positive correlations uphold (except for information seeking), when controlling for collective efficacy (see Lozano Nasi et al., 2024). Individual transilience showed a similar correlations pattern. Stronger individual transilience was related to stronger collective transilience, yet these constructs did not overlap (i.e., the correlation was below .85; Kenny, 2016). Thus, although collective and individual transilience are related, they reflect different constructs.

Collective Transilience, Individual Transilience, and Adaptation Intentions

We used the package *cocor in R* (Diedenhofen & Musch, 2015) to test whether collective transilience, compared to individual transilience, is more strongly associated with community-based adaptation intentions and less strongly associated with individual adaptation intentions (**Hypothesis 2**). Collective transilience was indeed more strongly related to the evaluation of the SensHagen initiative and to community-based adaptation intentions, compared to individual transilience (i.e., Zou's confidence intervals did not include zero; Zou, 2007; see Table 2). Yet, we did not find a significant difference in the strength of the correlations between the other adaptation intentions and individual and collective transilience, respectively (i.e., Zou's confidence intervals included zero; see Table 2). Hence, we found partial support for Hypothesis 2 for community-based adaptation measures, and no support for Hypothesis 2 regarding individual adaptation intentions.

We conducted a series of two-step hierarchical multiple regressions using the *jmv* package (Jamovi Project, 2021) to assess whether collective transilience predicts unique variance in the relevant community-based intentions when controlling for individual transilience. For information seeking, which is a dichotomous variable, we conducted a hierarchical binary logistic regression. We applied the Bonferroni correction to limit chances of Type I error, leading to an adjusted significance level of $p < .008$ (i.e., .05/6). For each dependent variable, individual transilience was entered at Step 1, and collective transilience was entered at Step 2. Multicollinearity was not an issue (VIF = 1.48).

Table 3 shows that individual transilience was significantly related to all indicators of individual and community-based adaptation. As expected, adding collective transilience to the model consistently led to a significant increase in explained variance. Interestingly, in all cases collective transilience became the only significant predictor in the model. The effect sizes for collective transilience were small-to-medium (i.e., $.02 < f^2 < .10$; Selya et al., 2012), except for community-based adaptation intentions, where the effect was

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Table 3

Hierarchical Regressions Conducted in Study 2

	Evaluation SH				Interest to join SH				Intentions to Support SH				Information seeking SH				Community adaptation				Individual adaptation			
Variable	***B* (*SE*)**	**CI**	***p***	f^2	***B* (*SE*)**	**CI**	***p***	f^2	***B* (*SE*)**	**CI**	***p***	f^2	***OR* (*SE*)**	**CI**	***p***	f^2	***B* (*SE*)**	**CI**	***p***	f^2	***B* (*SE*)**	**CI**	***p***	f^2
Step 1																								
Individual transilience	0.31 (0.07)	[0.17, 0.65]	<.001	–	0.49 (0.09)	[0.32, 0.67]	<.001	–	0.49 (0.09)	[0.32, 0.67]	<.001	–	0.33 (0.12)	[0.09, 0.57]	.007	–	0.44 (0.08)	[0.29, 0.60]	<.001	–	0.31 (0.07)	[0.17, 0.46]	<.001	–
Step 2																								
Individual transilience	0.06 (0.08)	[-0.01, 0.23]	.434	.00	0.22 (0.12)	[-0.00, 0.45]	.051	.01	0.25 (0.11)	[0.04, 0.46]	.019	.02	0.12 (0.15)	[-0.17, 0.41]	.408	.00	0.12 (0.09)	[-0.05, 0.30]	.175	.01	0.11 (0.09)	[-0.06, 0.28]	.204	.01
Collective transilience	0.41 (0.08)	[0.26, 0.57]	<.001	.09	0.55 (0.11)	[0.33, 0.77]	<.001	.08	0.41 (0.10)	[0.21, 0.61]	<.001	.06	0.38 (0.15)	[0.09, 0.67]	.009	.02	0.54 (0.09)	[0.37, 0.71]	<.001	.14	0.34 (0.08)	[0.28, 0.51]	<.001	.06
Total R^2		.14				.16				.14				.04				.21				.11		
ΔR^2		.08				.07				.05				.02[a]				.11				.05		
ΔF		27.72***				23.65***				15.94***				7.06[b]***				39.19***				17.00***		

Note. OR = Odds Ratio; CI = lower limit (LL) and upper limit (UL) of the 95% confidence interval for *B* or *OR*: [LL, UL].

[a] McFadden's R^2 for binomial logistic regression; [b] Chi square statistic for binomial logistic regression.

***$p < .001$.

medium (i.e., around f^2 = .15; Selya et al., 2012). Thus, collective transilience seems more relevant than individual transilience for predicting different types of climate change adaptation intentions.

General Discussion

Protecting one's own community from the negative impacts of climate change is as important as protecting oneself. In this paper we studied which factors may motivate individuals to engage in community-based adaptation measures (e.g., joining a community initiative to protect the community from climate change risks). These are measures aiming to help protect the community from climate change risks, rather than focusing solely on individual protection (e.g., purchasing insurance). We focused on collective transilience, which captures the extent to which people perceive they, as a community, can persist, adapt flexibly, and positively transform in the face of climate change risks.

Our scale to assess collective transilience showed good validity (content, concurrent, discriminant and incremental; see Lozano Nasi et al., 2024). Across two studies, we found that on average people perceive they can be transilient as a community, yet they do not strongly (intend to) engage in community-based adaptive actions. As expected, across both studies we found that stronger collective transilience is related to stronger community-based adaptation intentions (**Hypothesis 1**), such as installing an app that allows to warn neighbours in the case of a climate related hazard and to check on their safety (Study 1 and 2). Unexpectedly, higher collective transilience was not significantly associated with more community-based adaptation behaviours (Study 1). Collective transilience was positively related to community-based adaptation indicators associated with SensHagen, a community initiative for making the Dutch neighbourhood of Stadshagen more climate adaptive. Specifically, higher collective transilience was associated with more positive evaluation of SensHagen, higher interest to join it, and a stronger intention to support it, as well as higher likelihood to seek information about such an initiative (Study 2). Furthermore, higher collective transilience was associated with stronger support for local adaptation policies (Study 1). Interestingly, higher collective transilience was also associated with more individual adaptation intentions (exploratory analysis, Study 1 and 2) and behaviours (Study 1).

We found that higher collective transilience was related to higher individual transilience, indicating that people who perceive they can be transilient as an individual are also more likely to perceive they can be transilient as a community. Collective and individual transilience are probably related, as they both capture individuals' perceptions about the capacity to adapt to climate change risks. Yet, our results indicate that both not only theoretically, but also empirically reflect different constructs, as the former captures the perceived adaptive capacity of the individual, while the latter captures the perceived adaptive capacity of one's community. Individual and collective transilience

are also likely influenced by different factors, which we did not aim to examine in the current studies. Both individual and collective transilience were positively related to all adaptation indicators. Yet, collective transilience was significantly more strongly related to community-based adaptation indicators, compared to individual transilience (**Hypothesis 2**), only in the case of community-based adaptation intentions and evaluation of SensHagen. We did not find that individual transilience was more strongly related to individual adaptation intentions compared to collective transilience (Hypothesis 2). Thus, we found limited support for the compatibility principle (Ajzen, 2020).

Remarkably, as expected, we found that collective transilience explains unique variance and is the only significant predictor of community-based adaptation indicators when controlling for individual transilience (**Hypothesis 3**). Interestingly, this was also found for individual adaptation intentions. All in all, our results support the relevance of collective transilience for motivating adaptation behaviour, both at the individual and community level.

Theoretical Implications

Our findings have important theoretical implications. Our results indicate that a more positive perspective is possible on how communities, not just individuals, can adapt to climate change. The literature suggests that climate change is predominantly viewed as having negative effects on individuals and communities (Fritze et al., 2008; Manning & Clayton, 2018). Yet, research showed that people perceive they can persist, adapt flexibly, and positively transform in the face of climate change risks as an individual (Lozano Nasi et al., 2023a). Our research extends these findings by showing that people perceive they, as a community, can also do more than 'bounce back' in the face of climate change by recovering and maintaining what they have (cf., Davoudi et al., 2013), and that they see opportunities for positive change for their community as well. As such, our results bring forward a novel understanding of how communities can adapt to adversities such as climate change in line with prominent definitions of climate change adaptation, which explicitly refer to both minimising damage and finding new opportunities (IPCC, 2014b).

Our research also extends previous work on community-based adaptation which showed that the perceived capacity to ensure an adequate drinking water supply as a community (i.e., collective efficacy; Bandura, 1998, 2000) plays a relevant role in predicting intentions to participate in activities to address drinking water scarcity in the community (e.g., encouraging other members to reduce water waste; Thaker et al., 2016). Collective transilience enables a broad assessment of perceived community adaptive capacity, acknowledging flexibility and the possibility for positive change, without being tied to a specific goal. Additionally, our findings show that the more strongly people perceive they can persist, adapt flexibly, and positively transform as a community, the more they intend to engage in a wide range of community-based adaptation actions. Notably, we tested our hypotheses across two different countries (the United States

and the Netherlands) where communities likely face different climate-related risks. As such, it seems that collective transilience can predict different types of community-based adaptation actions, in the face of different climate risks, across different contexts, and thus can be a relevant general antecedent of community-based adaptation (cf., van Valkengoed, 2022).

Our research suggests that perceiving collective transilience is more relevant than perceiving individual transilience when predicting community-based adaptation. While both individual and collective transilience can predict community-based adaptation responses, and we found limited support for the compatibility principle, our study showed that collective transilience is the most relevant predictor of community-based adaptation indicators when individual transilience is also considered. To the best of our knowledge, our research is the first to formally compare perceptions of adaptive capacity at the community and individual level in motivating community-based adaptation to climate change, making a valuable contribution to the literature on community-based climate change adaptation.

Notably, it seems that collective transilience is the most relevant in predicting climate change adaptation also at the individual level, a rather unexpected finding, which does not align with the compatibility principle (Ajzen, 2020). One explanation for this finding could be that some adaptive actions that are taken at the individual level also benefit the collective. For example, greening one's own backyard can contribute to protecting the entire neighbourhood from flooding. Similarly, people may engage in actions to protect the community (e.g., supporting better infrastructure in the neighbourhood) for personal benefits. In general, different adaptation responses may have benefits for both the individual and community.

Another explanation for the relevance of collective transilience also for individual adaptation could be that people may believe the threat of climate change can be addressed by individual efforts to a limited extent (cf., Fritsche et al., 2018; van Zomeren et al., 2010). Given that climate change affects entire communities rather than individuals in isolation (e.g., damaged public infrastructure, food shortages, compromised mobility, disrupted communication or broken energy supplies; IPCC, 2022), protection is likely more effective when other community members engage in adaptive measures as well (e.g., everyone greens their backyard) and when all work together to protect the community. Climate change is a threat that potentially affects 'us' as a collective. Thus, perceiving that 'we' can be transilient as a collective may be especially important to encourage a variety of actions meant to address such a collective threat (cf., Chen, 2015).

Limitations and Future Research Directions

Our research presents compelling findings, yet it also has some limitations and raises important questions for future research. First, we did not examine which factors influence collective (and individual) transilience. Future studies could examine which individual

(e.g., individual resources), social (e.g., social networks and support; Barnes et al., 2020), socio-political (unequal power relations; Barnwell et al., 2020), and contextual factors (e.g., local resources or ecological characteristics; Clayton et al., 2016; Galappaththi et al., 2020) may influence collective (and individual) transilience, and in turn the extent to which it can promote a range of community-based (and individual) adaptive actions. Future studies could also aim to replicate our findings among different samples not taken from WEIRD countries (Western, Educated, Industrial, Rich, and Democratic), such as developing countries, which are the most affected by climate change risks (Mertz et al., 2009) and likely have less resources to adapt.

Particularly in the second study, a big portion of the original sample (35%) filled in neither the individual nor the collective transilience scale. It may be that the similarity between the scales made the survey quite lengthy and repetitive. Future studies can reduce repetitiveness by randomising the order of the transilience items. Additionally, among those who filled in the scales, there were several people (around 20%) who scored neutral (i.e., they selected 4 on a 7-point scale) on the full collective transilience scale, particularly in Study 2. People may have difficulties to answer collective transilience items, and more research is needed to examine whether this is systematically the case. It may also be that questions regarding the community of 'inhabitants of Stadshagen' were difficult, as this community may not be very relevant to people. Future studies could examine whether including different groups with varying levels of self-relevance in the collective transilience scale (e.g., the neighbourhood, a church, a club, the Dutch, EU citizens) affects response rates and patterns. Notably, the transilience scales showed very high reliability across studies, thus some of the items may be redundant. Future research could explore if a shorter scale (e.g., one or a few items per component) yields comparable results to the full scale, potentially enhancing its practicality.

We included a wide range of community adaptation indicators. Yet, we did not examine to what extent people felt able to engage in the adaptation actions or to support the hypothetical policies we measured. Transilience may be less strongly (or not significantly) related to adaptation actions that are difficult or not feasible to people. Additionally, the community initiative we studied (i.e., SensHagen) centred on a proxy behaviour that contributes to adaptation only indirectly (i.e., installing a sensor). Thus, future studies could probe the perceived ability to engage in relevant adaptation behaviours and to support policies within the specific communities studied. Future research could also include more adaptive actions to validate the predictive power of collective transilience, such as support for local adaptation policies (measured only in Study 1) and political action like protests or petitions urging local institutions to protect the community from climate risks (van Zomeren & Iyer, 2009). Such actions typically encourage others, beyond individuals alone, to also act. Moreover, including collaborative adaptive actions (e.g., pooling resources to plant trees in the neighbourhood) can highlight the relevance of collective transilience for promoting collaboration within the community. Besides

adaptation actions, future studies could assess whether perceived collective transilience helps communities to change for the better, for instance whether members develop new and better ways of living as a community, such as more social cohesion and closer caring relationships. A shift towards a more collective and caring society has been proposed as a fundamental aspect of addressing climate change (Weintrobe, 2020).

Given our cross-sectional design, causal conclusions cannot be drawn. Longitudinal or experimental designs are needed to determine if higher collective transilience leads to engagement in later adaptive actions, and if community-based adaptation can foster later collective transilience as well. Besides, sampling procedures may account for some differences in the results. Thus, more research is necessary to corroborate the generalizability of our findings.

Practical Implications

Climate change consequences are apparent worldwide, affecting individuals and communities. Therefore, individuals must act to protect both themselves and their communities from climate risks. While most of the participants in our studies had not engaged in community-based adaptation and showed low intentions to do so, our research implies that promoting collective transilience may foster such adaptive actions. Thus, strengthening collective transilience may effectively boost community-based adaptation. Remarkably, we failed to increase levels of collective transilience using a message that emphasised only the risks posed by climate change to the community, compared to the individual (see Appendix A). It may be that messages also need to emphasise the capacity to persist, adapt flexibly, and positively transform as a community to effectively induce perceived collective transilience. Indeed, threat messages alone may fail to motivate action, as people also require information on what actions to take (McLoughlin, 2021). Future research should examine how to induce collective transilience and promote widespread adaptation effectively.

In conclusion, our research highlights that people perceive they can do more than just 'bounce back' in the face of climate change risks, also as a community. Specifically, the more people perceive collective transilience, the more likely they are to engage in a wide range of climate change adaptive measures to protect themselves, both as a community and as individuals. As we navigate the complex and uncertain terrain of climate change, collective transilience provides a hopeful and promising approach for us to be able to adapt and even thrive, together.

Openness and Transparency Statements

The present article has been checked by its handling editor(s) for compliance with the journal's open science and transparency policies. The completed *Transparency Checklist* is publicly available at:
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Author Contributions.

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Linda Steg: Conceptualization. Methodology. Supervision. Writing – review & editing.

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Diversity Statement. In the list below, the check mark (☑) indicates which steps were taken to increase diversity within the context of this paper. Steps that were not taken or did not apply are unmarked (☐).

- ☐ Ethnically or otherwise diverse sample(s)
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- ☐ Degree of privilege/marginalization considered in authorship order
- ☐ Author(s) from sampled population (avoiding 'helicopter science')

Supplementary Materials. The following table provides an overview of the accessibility of supplementary materials (if any) for this paper.

Type of supplementary materials	Availability/Access
Data	
a. Studies 1–2 dataset.	Lozano Nasi et al., 2023
b. Code book for variables in Studies 1-2.	Lozano Nasi et al., 2023
Code	
R script for Studies 1–2.	Lozano Nasi et al., 2023
Material	
Instructions and materials.	Included in article (see Appendices)
Other	
Additional analyses and results.	Lozano Nasi et al., 2024
Study/Analysis preregistration	
The study was not preregistered.	–

Badges for Good Research Practices.
Open data: YES.
Open code: YES.
Open materials: YES.
Preregistration: NO.
Diversity statement: YES.
Note: YES = the present article meets the criteria for awarding the badge. NO = the present article does not meet the criteria for awarding the badge *or* the criteria are not applicable.

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Appendices

Appendix A

Manipulation Used in Study 2: Full Text (Translated From Dutch)

Community risks	**Individual risks**
Climate change poses a risk to **us**, **people living in Stadshagen**. **Our community** will likely face extreme weather events more often in the future, including floodings and heatwaves. These climate related hazards can have negative consequences **for us, inhabitants of Stadshagen**. For example, **our** houses and the roads **in our neighbourhood** may face severe damage, making **our mobility** more difficult. Furthermore, rising temperatures may limit **our** possibility to use public spaces (for instance during heatwaves) and can have serious negative effects on the physical and mental health **of our inhabitants**.	Climate change poses a risk to **you and your household**. **You** will likely face extreme weather events more often in the future, including floodings and heatwaves. These climate related hazards can have negative consequences **for you and your household**. For example, **your** house and the roads **around your house** may face severe damage, making **your mobility** more difficult. Furthermore, rising temperatures may limit **your** possibility to be outside your house (for instance during heatwaves) and can also have serious negative effects on **your** physical and mental health.

Community risks	Individual risks
Therefore, it is important that **we as a community** take action to prepare **ourselves** against these (future) impacts of climate change.	Therefore, it is important that **you as an individual** take action to prepare **yourself** against these (future) impacts of climate change.

Effect of the Manipulation Used in Study 2 on Relevant Variables

Variable	*F*	df1	df2	*p*
Collective transilience	0.111	1	288.483	.740
Individual transilience	0.320	1	281.380	.572
Evaluation of SH	0.621	1	288.717	.431
Interest to join SH	1.100	1	288.374	.295
Intentions to support SH	1.379	1	281.066	.241
Information seeking about SH	0.890	1	287.293	.346
Community adaptation	1.882	1	289.164	.171
Indiviudal adaptation	1.272	1	287.181	.260

Description of the SensHagen Initative (Translated From Dutch)

Note: this text was not part of the manipulation and was therefore presented to all participants

> *In response to concerns from inhabitants of Stadshagen about climate change risks, a new initiative has been set up, called the SensHagen project. The SensHagen project generally aims to protect Stadshagen against the risks of climate change by making Stadshagen climate adaptive. If you join the SensHagen project, you will get sensors installed in your backyard. These sensors will monitor air quality, precipitation, evaporation, heat and wind to establish what kind of climate risks Stadshagen faces. Based on the data collected, the municipality can learn what policies they need to implement to make Stadshagen more adaptive to climate change.*
>
> *We will now ask some questions about your thoughts and opinions on the SensHagen project. Please read the statements carefully.*

Appendix B

Overview of All Measures Included in Study 1 and Study 2

Study 1	Study 2 (translated into Dutch)
Collective transilience	
Please indicate how much you agree or disagree with the following statements. Please bear in mind that the questions refer to the negative consequences that climate change can have *for your community.*	The following questions are about how you think that the confrontation with climate change affects **the residents of Stadshagen**.

Study 1	Study 2 (translated into Dutch)
	Specifically, we want to ask you to think about how being confronted with **the risks of flooding and heat-waves in Stadshagen** affects **the residents of stadshagen**.
Persistence	*Persistence*
1. We can be brave in the face of climate change risks.	1. We, residents of Stadshagen, can be brave.
2. We can be persistent when faced with climate change risks.	2. We, residents of Stadshagen, can be persistent.
3. We can stay determined in the face of climate change risks.	3. We, residents of Stadshagen, can stay determined.
4. No matter what climate change brings about, we can remain strong willed.	4. We, residents of Stadshagen, can remain strong- willed.
Adaptability	*Adaptability*
5. I think we can take different actions to deal with climate change risks.	5. I think we, residents of Stadshagen, can take different measures to deal with this.
6. I think we have several options to deal with climate change risks.	6. I think we, residents of Stadshagen, have several options to deal with this.
7. I believe we can find multiple means to deal with climate change risks.	7. I think we, residents of Stadshagen, can find multiple means to deal with this.
8. There are different ways in which we can cope with climate change risks.	8. There are different ways we, residents of Stadshagen, can deal with this.
Transformability	*Transformability*
9. Coping with the stress caused by climate change risks can strengthen us.	9. Dealing with the stress this causes can strengthen us, residents of Stadshagen.
10. There can be advantages for us in dealing with climate change risks.	10. Dealing with this can have advantages for us, residents of Stadshagen.
11. Dealing with climate change risks can make us grow as a person.	11. By dealing with this we, residents of Stadshagen can grow as a group.*
12. We can learn something good from dealing with climate change risks.	12. We, residents of Stadshagen, can learn something good by dealing with this.
Individual Transilience (Lozano Nasi et al., 2023a)	
(Measure not included)	The following questions are about how you think that the confrontation with climate change affects **you**. Specifically, we want to ask you to think about how being confronted with **the risks of flooding and heat-waves in Stadshagen** affects you. 1. I can be brave. 2. I can be persistent. 3. I can stay determined. 4. I can remain strong-willed. 5. I think I can take different measures to deal with this. 6. I think I have several options to deal with this. 7. I think I can find multiple means to deal with this. 8. There are different ways I can deal with this. 9. Dealing with the stress this causes can strengthen me. 10. Dealing with this can have additional benefits for me. 11. By dealing with this I can grow as a person. 12. I can learn something good by dealing with this.
Community based adaptation intentions (and behaviours)	
To what extent do you intend to take the following measures **together with your community** *within the next year*? 1. Contributing to the development of an evacuation plan in case of an emergency due to a natural hazard. 2. Motivating people in our neighbourhood to maintain their houses well to avoid damage from natural hazards caused by climate change. 3. Joining an app that allows to warn the people in our neighbourhood about a natural hazard, such as heatwave or extreme rainfall, and to check on their safety. 4. Considering and discussing a migration plan, in case climate change risks make it too dangerous to keep living in our area.	To what extent do you intend to take the following measures within the next year? **I intend to...** 1. Contribute to measures to prevent residents of Stadshagen from being harmed by the risks of climate change. 2. Use a neighbourhood app to warn other residents of Stadshagen about a heat wave and to check if they are safe. 3. Participate in a neighbourhood initiative to protect Stadshagen against flooding, for example by jointly purchasing sandbags to hold back the water.

Study 1	Study 2 (translated into Dutch)
5. Joining a community initiative to make my neighbourhood greener to better protect against climate change risks, for example by planting trees, building green roofs or parks. 6. Helping my neighbours to prepare for natural hazards caused by climate change, for instance by sharing knowledge.	4. Changing the way of life in Stadshagen together to make us, residents of Stadshagen, less vulnerable to climate change risks. 5. Participate in a neighbourhood initiative to make Stadshagen greener (tiles out, plants in) to keep temperatures lower in Stadshagen. 6. Contribute to a plan for the redevelopment of Stadshagen to reduce flood risks.
Local climate change adaptation policy support	
To what extent do you oppose or support implementing the following policies *in your municipality*? 1. Implementing heat warning systems in every city so that people can better protect themselves against heatwaves caused by climate change. 2. Investing public money to make vital infrastructure (for example, energy utilities, power lines, cell towers) more resistant to climate change risks. 3. Launching an awareness campaign that provides people with information on how to prepare for climate change risks. 4. Increase local taxes to invest in measures that protect people against potential natural hazards (for example, flooding) caused by climate change. 5. Invest public money in helping local farmers to prepare for increases in flooding or drought due to climate change.	(Measure not included)
Interest to join SensHagen initiative (adapted from Sloot et al., 2019)	
(Measure not included)	1. I would like to receive more information about SensHagen by subscribing to the SensHagen newsletter. 2. I would like to participate in the SensHagen project (by installing sensors at my house. 3. I am interested in the SensHagen project.
Intentions to Support the SensHagen initiative (adapted from Sloot et al., 2018)	
(Measure not included)	1. I am planning to motivate other inhabitants of Stadshagen to participate in the SensHagen project. 2. I am planning to participate in activities organised within the SensHagen project.
Individual climate change adaptation behaviours	
To what extent do you intend to take the following measures to protect yourself against climate change risks within the next year? 1. Preparing a household emergency kit, containing for example a flashlight, a radio, emergency blankets, first aid kit. 2. Adjusting my home to better withstand natural hazards, for example installing wind shutters or painting my house in a lighter colour to reduce heating. 3. Storing bottled water and canned food in case a natural hazard occurs. 4. Purchasing insurance against losses from natural hazards. 5. Looking up information about whether my house is at risk of natural hazards. 6. Looking up information about what I can do to prepare for natural hazards. 7. *Checking weather forecasts to be prepared for natural hazards, such as a heatwave or extreme rain.*	To what extent do you intend to take the following measures within the next year? 1. Take measures to prevent my household from being harmed by the risks of climate change. 2. 'Buy insurance to cover the costs of the consequences of a flood on my household effects and/or house. 3. Stay indoors as much as possible during a heat wave. 4. Change my lifestyle so that my household and I are less vulnerable to the risks of climate change. 5. Greening my backyard and/or getting a green roof to keep cool during a heat wave. 6. Create a migration plan if it is too dangerous to keep living in my area due to flooding.
Community climate change risk perceptions	
1. Climate change poses a risk to my community.	1. Climate change poses a risk to the inhabitants of Stadshagen.

* Item rephrased compared to Study 1 (i.e., 'grow as a person') to make it more appropriate for the collective level. Measures relevant for the collective transilience scale validity are described in Lozano Nasi et al., 2024. Study 1 also included the following measures: valence of consequences of climate change; climate change affect; political collective action; support for national adaptation policies; self-efficacy and outcome efficacy for climate change adaptation; brief resilience scale; identification with US; satisfaction with life; political

preference; party vote. Study 2 included the following measures: self-efficacy; bottom-up initiative formation; number of housemates. These measures are not relevant for the purposes of the present manuscript and therefore they are not discussed.