Master Thesis

Can an act of joint action motivate individuals for further action towards a better environment?

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Abstract

Climate change represents the largest crisis of present times, and its mitigation is considered the biggest challenge humans may have ever faced (Raihani & Aitken 2011). The crucial question is, how to be effectively engaged as a society in its mitigation? A lot of effort has been put into strengthening pro-environmental actions at the individual level; however, this has not shown to be effective enough (Fritsche et al., 2018). And that mainly for two reasons. The first is that many people feel like they have too little impact and believe they can't make any difference on their own, which subsequently leads to apathy and inaction. And the second is that even if people would believe that their personal contribution is important, the anticipated inaction of others can de-motivate them (Fritsche & Masson, 2021). However, a promising strategy has emerged in recent years that addresses these issues, which is labeled as Joint action. This research aims to bring new insides into this field by exploring the relationship between joint action and motivation, specifically whether an act of joint action can motivate individuals to engage in further activities with group members and additional actions toward a better environment. An experiment with two experimental conditions was conducted to explore differences in motivation between people in high coordination and low coordination condition. The results didn't significantly confirm the expectation that people in high coordination condition will be more motivated for further engagement. This suggests that a single act of joint action, as conducted in this experiment – in its intensity and task characteristics, might not be sufficient to enhance motivation for further action. However, further research is needed to overcome the limitations of this study and identify the optimal level of coordination required to effectively increase individuals' motivation for pro-environmental actions.

Keywords: climate crisis, joint action, coordination, motivation, pro-environmental behaviour

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Introduction

The climate crisis threatens the entire human society and there is an unceasing urgent need to search for effective solutions (Ripple et al., 2020). A lot of effort has been put into strengthening pro-environmental actions at the individual level; however, this has not shown to be effective (Fritsche et al., 2018). Climate change and the resulting environmental challenges arise from collective behavior, and therefore, addressing them is much more effective through collective actions (Fritsche et al., 2018). However, limited research has been done in this area, and there is a pressing need for further investigation (Bamberg et al., 2015). In this research, I aim to investigate whether an act of joint action on an environmental task can motivate individuals to engage in additional actions toward a better environment. I will explore differences in three types of motivation between two experimental conditions: in one condition, people worked together on a particular task of potting flowers (high coordination), and in the other, people worked separately on the same task (low coordination). Specifically, I will examine (1) how motivated people are for future non-environmental activities with the group members, (2) for future individual actions toward a better environment, and (3) for future collective actions toward a better environment.

According to the World Meteorological Organization (2024), the year 2023 was the hottest year on record, with the global average near-surface temperature 1.45°C above the pre-industrial baseline. Extreme weather events, including heatwaves, floods, and wildfires, occurred in every region across the globe and caused widespread adverse impacts and losses to nature and people (IPCC, 2023). At the present time, society has sufficient scientific evidence of ongoing climate change, including its causes and solutions (IPCC, 2023). Governments worldwide are addressing this crisis to varying degrees of effectiveness by implementing new laws and policies (IPCC, 2023). However, environmental protection depends not only on national governments formulating relevant systems but also requires the public to actively engage in environmentally friendly behaviors (Zhihau et al., 2024). And it is precisely the question of how to be properly involved as a society in solving this problem that is so crucial.

So far, a lot of effort has been put into strengthening pro-environmental actions at the individual level however, this approach has not been very effective (Fritsche et al., 2018). Some of the most common practices include supporting individuals to reduce energy consumption, save water, use sustainable transportation, and limit meat consumption,

(Truelove et al., 2014). These are all very important recommendations. However, for two reasons, they are often not effective enough. The first reason is that many people feel like they have too little impact and believe they can't make any difference on their own. That often leads to feelings of helplessness, which subsequently result in apathy and inaction (Fritsche & Masson, 2021). When people think their efforts are futile, they are less motivated to take even the smallest steps toward positive change (Bandura, 1997). The second reason is that even if people would believe that their personal contribution is important, the anticipated inaction of others can de-motivate them to personally invest in the collective good of climate change mitigation (Fritsche & Masson, 2021).

In recent years, a new approach has emerged that may bring a solution – labelled as a collective action approach. According to Bamberg et al. (2015) collective or joint action is viewed as a core mechanism in social transformation and these days, supporting individuals to take action as a group is becoming more widely recognized as an effective strategy also in the context of environmental crisis. However, many questions in this field remain unanswered and there is a need for further investigation. In this research, I will try to bring new insides into how joint action affect people's motivation for further activities.

Joint action

Joint action is defined as any form of social interaction where two or more individuals coordinate their behavior to achieve a shared goal (Sebanz et al., 2006). It is a fundamental part of human life that is present in everything from the most basic actions such as communication to everyday actions like passing a coffee to a friend, to activities that require complex, deliberate cooperation like medical surgery or building a house (Sebanz & Knoblich, 2021). Joint action involves characteristics like shared intention, interdependence, coordination mechanisms, and mutual responsiveness (Knoblich et al., 2011). According to Sebanz et al. (2006), a successful joint action depends on the abilities to share perceptual inputs and events, predict action outcomes, and integrate the 'what' and 'when' of others' actions into one's own actions.

In the context of environmental activities, collective action is typically based on individuals considering themselves as members of a group. These groups come in a wide variety of forms (Fritsche & Masson, 2021). For some people, it can for example simply be "belonging to the young generation," which they consider a group highly interested in the environment as it is an integral part of their future (Fritsche & Masson, 2021). For others, it

may involve being part of various clubs, associations, or neighborhood communities. Another example could be identifying with political parties (Fritsche & Masson, 2021). Furthermore, people can experience joint action also at events like clean-up projects, tree planting, group-based conservation efforts, and others (Fritsche et al., 2018).

There are several explanations for how joint action works and why it is more effective than individual effort. First of all, people have a natural tendency to identify as a part of group and be motivated by what the group can achieve together (Fritsche & Masson, 2021). At the same time, when people feel as a part of a group, they are more likely to align their behaviors with the group's norms and goals (Fritsche et al., 2018; Tajfel & Turner, 1979). Being part of a group also brings support from others and a sense of shared responsibility, which all together makes the collective effort much more powerful than individual efforts alone (Fritsche et al., 2018).

Moreover, there are other psychological and social mechanisms, that make joint action effective. This includes, for example, increasing collective efficacy, creating social bonds, experiencing pleasant emotions, and facilitating behavioral learning (Bandura, 2000; Carr et al., 2012). Collective efficacy refers to a group's shared belief in their collective power to achieve goals and bring about change (Bandura, 2000). It is important because it can enhance peoples' belief in their ability to make a difference and foster a sense of accomplishment and empowerment, that is often missing in individuals' efforts (Bamberg et al., 2015). Collective efficacy also enhances people's self-efficacy, which means that they feel more confident in their own abilities and thus in their contributions to collective efforts. For example, Jugert et al. (2016) confirmed in their research, that collective efficacy improves pro-environmental intentions by enhancing self-efficacy and emphasizing social identity's importance.

Furthermore, by working with others, people strengthen social bonds and create a supportive network, which can encourage them to continue participating in protecting the environment (Xu et al., 2024). The act of coordination itself, which is an integral part of joint action, has also many benefits. It can for example improve pro-social attitudes and behaviours (Michael et al., 2016) or increase trust and perception of a shared goal (Ip et al., 2006).

Joint action and motivation

The relationship between joint action and motivation has two directions. First, people have intrinsic motivation for coordination (Melis, 2013). And second, people feel motivated by

engaging in joint action (Carr et al., 2012). Both directions are crucial for environmental action. In this research, I will focus on exploring the second relationship, specifically whether an act of coordination can motivate people to engage in further activities with a group and take additional action toward a better environment. Investigating this relationship is important because it can help to identify strategies for how to effectively support individuals in taking action as a group, and how to put collective action into practice. Subsequently, it can lead to the development of more efficient and impactful environmental initiatives.

As described above, all the positive effects of joint action and coordination appear to influence people's motivation to continue participating in collaborative activities. For example, collective efficacy can make people see the impact of the group, which fosters the belief that their combined efforts can make significant change. This belief, that people experience during act of coordination, can be a powerful motivator for further actions itself (Bandura, 2000).

Furthermore, when people see others engaging in environmental activities, they are more likely to feel motivated to participate themselves (Carr et al, 2012). Jugert et al. (2016) tested the idea that some might think, that: "communicating the message that other group members are acting - and capably so - could undermine people's motivation to engage in pro-environmental behavior personally" ("other people will take care of the problem"). However, they found no evidence that this process was operating. Instead, messages about working together made people feel more capable both as a group and individually, which then increased their desire to take action (Jugert et al., 2016).

Research also emphasizes the importance of a sense of belonging to a group. Fritsche et al. (2018) found that a sense of belonging can enhance motivation and lead to more significant and sustained pro-environmental actions. Additionally, Carr et al. (2012) underline that people have an intrinsic motivation to work hard or take action towards common goals even if they are working alone, and at the same time, they feel like they are part of a bigger group where others also take action. Similarly, Soliman et al. (2018) claim that people feel more motivated to take pro-environmental actions when they believe they are part of a collective.

Current research

While there is a sufficient amount of information on the benefits of joint action, there is a gap in understanding of its practical application in the real world (Bamberg et al., 2015). For instance, can a single act of coordination motivate individuals to engage in further activities? Do people need to know each other within the group to effectively perform joint actions? Additionally, how can long-lasting and thriving environmental communities be built? This research aims to address the first question, specifically:

Can an act of joint action motivate people to engage in further individual and collective actions toward a better environment, and other activities with group members?

To answer this question, I will conduct an experiment with two experimental conditions - high coordination and low coordination - and compare three types of motivation between individuals in these conditions.

I will explore this by examining three hypotheses:

H1: Participants in higher coordination condition will have higher motivation for further activities with group members.

H2: Participants in higher coordination condition will have higher motivation for further individual action towards a better environment.

H3: Participants in higher coordination condition will have higher motivation for further collective action towards a better environment.

Method

Participants

Participants were recruited for the experiment through social media and by inviting people personally at a desk that was located at the Utrecht University campus. The opportunity to participate was also published on a university website, where students could sign up for credits. The only requirement for participating was a minimum age of 18 and being able to communicate in English or Dutch language. To determine the required sample size, a power analysis with G*Power 3.1.9.7 was performed using a one-tailed z-test for logistic regression. Assuming an odds ratio of 1.8, a null hypothesis probability of 0.5 for Pr (Y=1|X=1),

a significance level (α) of 0.05, and a desired power of 0.80, it was indicated that a minimum of 84 participants is needed. Eventually, exactly 84 participants took part in the experiment, and no one was excluded from the analysis as everyone provided complete data. There were 57 females (68%), 26 males (31%) and 1 non-binary (1%) participant in the sample. The age ranged from 18 to 71 years (M = 29, Md = 24, SD = 13,6). The majority of participants (57) filled in the questionnaire in the English language while fewer people (27) responded in the Dutch language.

Design and procedure

The research employs an experimental between-subjects design to examine the difference in motivation between two experimental conditions. Participants were assigned to one of the conditions according to the time of their participation, which ensures a random distribution. The first condition comprised participants working in high coordination, which means that groups of participants were working together on one goal, which was to pot certain numbers of plants (violets) into one big pot. The number of flowers was allocated based on the number of people in the group so that each person received three flowers. There were 47 participants in total in the high coordination condition of which the number of participants in one group ranged from 3 to 5. The second condition was low coordination that is, the participants worked on their own goal of potting 3 plants in one average-sized pot of their own. There were 37 participants in total in the low coordination condition of which the number of participants in one group ranged from 2 to 5. Both groups had the same workspace and tools, and in both groups, the participants could communicate with each other as they wished.

The experiment was conducted on the 12th and 13th of February from 9 to 16 o'clock in the Botanical Garden of Utrecht University. There were 15 slots of 30 minutes each day. Participants could sign up through the reservation system into any slot; the maximum capacity per slot was 5 people. Each day, half of the groups were run as high coordination conditions and the other half as low coordination. Participants weren't aware of the fact that there are two conditions neither in which they are placed. After participants arrived at the location they were welcomed, briefed and they signed informed consent form before participation. Then the whole group moved to the table with flowers and pots, and they received instructions on how to pot the plants. Participants in the low coordination group were told to pot 3 plants into one average-sized pot that each participant received on their own. Participants in the high coordination group were told to pot a specific number of plants (depending on a number of people in the group) into one big pot. Regardless of condition, participants received

instructions for plant potting, comprising putting some soil on the bottom of the pot, then taking flowers from the original pot and replanting them to the pot they received. When the instructions were clear stopwatches were started to monitor the speed of groups, but this time was subsequently not included in the analysis. After starting the stopwatches participants took on protective gears (gloves and apron) and the experimenter who had given the instructions left the place to let the group perform the task. When participants had finished the task, the stopwatches were stopped, and they came back to the table where they were asked to fill out the questionnaire. Finally, participants were thanked, debriefed and they received some sweet bars and could take home some plants of their choice.

This research was ethically approved by the Ethics Review Board at Utrecht University Faculty of Social and Behavioural Sciences on 26.01.2024. The approval is filed under the number 24-0217.

Measures

Participants' demographic information was obtained, including age, gender, and current level of education. In addition, the constructs of interest were assessed using the following measures.

Motivation

The aim of this research is to explore how 3 types of motivation differ between people in high versus low coordination condition. The first is motivation for engaging in a future activity with members of their group. The question was formulated as follows:

1. *Would you like to have a coffee with your group? We have a collective voucher for you – do you want to take it?*

   Yes, I am up for taking a voucher with my group.

   No, I don't want to take a voucher.

The second question explored motivation related to individual motivation for future action toward a better environment. The question was:

2. *Twice a year, the Botanical Garden organizes a planting tree event, where you can plant your tree and contribute to a better environment. Would you be interested in taking part?*

   Yes, I'd be interested, please send me more information in the email.

   No, thank you.

The third question focused on motivation for future collective action toward a better environment with the group. The question was the following:

3. *Utrecht University together with Utrecht Municipality organize Energy saving challenge. This comprises two practical workshops, where you and your group can find out everything about electricity consumption in your current or future home. You will gain knowledge you didn't learn in school, contributing to both the environment and your wallet. You can be part of this project with your group, would you like to take part together?*

    Yes, I'm interested!

    No, thank you.

Control variables

Additionally, two variables were controlled in the experiment. Namely, "Number of other participants known in the group" and "Environmental attitude". The attitude was assessed using the question: *"I consider myself someone who is very involved with environmental/sustainability issues,"* where a score of 5 indicates partial agreement.

Data Analysis

Data were collected using Qualtrics software questionnaires. Subsequent analysis was conducted in IBM SPSS 29.0.2.0. Prior to analysis, the data were inspected for missing values and outliers. All participants met the condition of 18 years of age and provided complete data without missing values or significant outliers, therefore no one had to be excluded from the analysis. Descriptive statistics and frequencies were utilized to obtain standard deviation and means of participant's demographic characteristics. Then, a chi-squared test and one-way ANOVAs were executed to check whether the participants were evenly distributed across the two conditions (randomization check). In addition, a manipulation check was performed. Finally, the research hypotheses were tested using bivariate logistic regressions. Preliminary analysis was conducted to check all the assumptions.

Results

Randomization and manipulation check

To check whether the randomization of participants across the two conditions was successful, a chi-squared test was performed that revealed no significant differences between the groups in terms of gender ($\chi 2 = 3.439$, df = 2, p = 0.179). Differences in age, environmental attitude, and the number of participants known in the group were then explored using ANOVAs. The analysis showed no significant difference between the two conditions in environmental attitude (F (1, 82) = 0.973, p = 0.327). However, significant differences were found for the number of other participants known in the group (F (1, 82) = 8.344, p = 0.005) and for age (F (1, 82) = 5.630, p = 0.020). Therefore, these variables will be controlled in the analysis.

A manipulation check was performed to verify whether coordination manipulation was effective. Two questions were used for this purpose: *1) The other participants and I worked well together* and *2) To what extent did you coordinate your actions with fellow members of your group?* One-way ANOVA showed that participants in the higher coordination condition indeed experienced higher level of coordination then participants in the low coordination condition. For the first question the results were following: F (1, 82) = 12.608, p = 0.001 and for the second one as follows: F (1, 82) = 19.353, p = 0.001. The coordination manipulation was therefore effective.

Descriptive statistics

Descriptive statistics for the total sample, as well as separately for the low coordination (LC) and high coordination (HC) conditions, are presented in *Table 1*. In the total sample of 84 participants, there were 26 males (31%), 57 females (68%), and 1 non-binary participant (1%). The age of participants ranged from 18 to 71 years (M = 29, Md = 24, SD = 13.6). On average, participants reported knowing 2.5 other group members (SD = 1.5). Furthermore, the mean score for environmental attitude was 5.2 (SD = 1.2), with similar distributions across both conditions. Lastly, the table shows differences in three types of motivation between the two conditions and in the total sample. Overall, 66 (78.6%) participants were motivated for further activity with group members (Motivation 1). Next, 62 (72.8%) participants were motivated for future individual action toward a better environment (Motivation 2). Finally, 29 (34.5%) participants were motivated for future collective action toward a better environment (Motivation 3).

Table 1

Descriptive statistics (N=84)

	Low Coordination *(N=37)*				**High Coordination** *(N=47)*				**Total Sample** *(N=84)*			
Variable	N	%	M	SD	N	%	M	SD	N	%	M	SD
Gender												
Male	15	40.5			11	23.4			26	31		
Female	22	59.5			35	74.5			57	68		
Non-binary	0	0			1	2.1			1	1		
Age			32.7	17.3			25.8	8.7			28.9	13.6
No. of other participants known in the group			2	1			2.9	1.6			2.5	1.5
Environmental attitude			5.1	1.1			5.3	1.2			5.2	1.2
Motivation*												
Motivation 1	26	70.3			40	85.1			66	78.6		
Motivation 2	25	67.6			37	78.7			62	72.8		
Motivation 3	12	32.4			17	36.2			29	34.5		

*Motivation 1 = *No. of participants motivated for future activity with the group members.*
Motivation 2 = *No. of participants motivated for future individual action towards better environment.*
Motivation 3 = *No. of participants motivated for future collective action towards better environment.*

Assumptions check

Before conducting the main analyses, several assumptions were checked to validate the use of binomial logistic regression. Firstly, dependent variables (three types of motivation) were measured on a dichotomous scale, with the only possible answers being 'yes' or 'no'. The assumption of multicollinearity was assessed by examining the multicollinearity diagnostics. The variance inflation factor (VIF) values for all independent variables were below 10, indicating that multicollinearity was not a concern in the analysis.

Additionally, the assumption of linearity between the independent variables and the log odds of the dependent variable was assessed using the Box-Tidwell transformation. This assumption ensures that the relationship between continuous independent variables and the logit (log-odds) of the dependent variable is linear. Firstly, the natural logarithms of variables

age, environmental attitude, and the number of participants known in the group were computed. Then interaction terms between each continuous variable and its logarithm were created. These interaction terms were included in the logistic regression models along with the original continuous variables and other predictors. The significance of the interaction terms was examined using the Wald statistic and p-values. For all three motivations (Motivation 1, Motivation 2, and Motivation 3), none of the interaction terms were significant (all p-values > 0.05). This indicates that the assumption of linearity in the logit was met, and the logistic regression analyses can proceed.

Hypothesis testing

Three bivariate logistic regressions were performed to examine the effects of the experimental condition on participants' motivation (Motivation 1, Motivation 2, and Motivation 3), controlling for age, the number of participants known in the group, and environmental attitude.

Motivation 1: Future activity with group members

The results of the logistic regression analysis showed that the experimental condition did not significantly predict participants' motivation for future activity with group members (χ^2 = 1.047, df = 1, p = 0.306).

Age (χ^2 = 1.315, df = 1, p = 0.251) and environmental attitude (χ^2 = 0.308, df = 1, p = 0.579) didn’t have any effect on this kind of motivation, but the number of participants known in the group appeared to significantly predict this motivation (χ^2 = 6.634, df = 1, p = 0.010).

Motivation 2: Future individual action toward a better environment

Similarly, the experimental condition did not significantly predict participants' motivation for future individual action towards a better environment (χ^2 = 0.046, df = 1, p = 0.830).

The analysis has shown that age had a significant effect on this motivation (χ^2 = 7.467, df = 1, p = 0.006), and that neither the number of participants known in the group (χ^2 = 0.032, df = 1, p = 0.857) nor environmental attitude (χ^2 = 0.621, df = 1, p = 0.431) were significant predictors.

Motivation 3: Future collective action toward a better environment

The experimental condition also did not significantly predict participants' motivation for future collective action towards a better environment (χ^2 = 0.015, df = 1, p = 0.904).

In this case, age ($\chi^2 = 2.325$, df = 1, p = 0.127), the number of participants known in the group ($\chi^2 = 0.059$, df = 1, p = 0.807), and environmental attitude ($\chi^2 = 0.008$, df = 1, p = 0.931) didn't have any effect on participants motivation.

Discussion

Climate change represents the largest crisis of our time, and its mitigation is considered the biggest challenge human may have ever faced (Raihani & Aitken 2011). Whereas it is uncontested that the climate crisis is the result of human behaviour, it is also only humans who have the power to address it (Fritsche & Masson, 2021). However, the question of how to take action as a society remains a subject of research and debate. So far, a lot of effort has been put into strengthening pro-environmental actions at the individual level however, this strategy proved not to be very effective (Fritsche et al., 2018). An alternative may be joint action. That is coming to the forefront of research at the present times, but many questions still remain unanswered. This work aimed to bring new insights into this field by exploring the relationship between joint action and motivation.

Specifically, we aimed to explore whether a single act of coordination can motivate people to engage in further individual and collective actions toward a better environment, and other activities with group members. To investigate this, we conducted an experiment with two conditions: in one condition, participants worked together on a task of potting flowers (high-coordination), while in the other condition, participants worked separately (low-coordination) on the same task. Subsequently, three types of motivation were assessed using a questionnaire. Contrary to expectation, none of the hypotheses were confirmed, which means that there was no difference in motivation between people in the high and low coordination conditions. This suggests that a single act of coordination may not be sufficient to motivate people for further engagement and that other processes may be at play. However, more research that use different experiment settings is needed to support these findings.

Motivation for engaging in a future activity with group members

The first hypothesis posited that individuals who worked together on the task would have higher motivation to do further activity with their group members compared to those who worked on the task separately. Specifically, we asked whether they would like to have a coffee with their group members. Contrary to expectation the results did not confirm the

hypothesis. Even though in the high coordination condition 85% of people were motivated to have a coffee with their group and in the low coordination condition only 70%, the difference was not statistically significant.

Research suggests that when people work together on the same task, they share a common goal and experience, which helps them bond (Fritshe et al., 2018). The act of coordination should increase understanding, empathy, and trust among participants. People can experience positive emotions, such as satisfaction, pride or a sense of belonging which can make them more inclined to see each other again and pursue further social interactions (Bandura, 2000; Carr et al., 2012). These factors collectively should make joint action a more powerful motivator for ongoing social connection, unlike working on the same task independently.

One possible explanation for why our first hypothesis was not confirmed could be that the specific task and level of coordination in this experiment might not have been enough to establish a strong foundation for ongoing interaction. It is possible that the task itself—potting flowers— may not have been perceived as significant or impactful enough to generate the kind of bonding and positive emotions that are necessary to drive further social interaction. Future research should explore different types of tasks and the intensity of coordination that is necessary to motivate people for further social interaction.

In this analysis, we found that the number of participants known in the group significantly predicts motivation for further activity with group members, which can provide another explanation of observed results. These pre-existing relationships could even overshade the effects of the coordination task. This finding may also be useful in the context of joint action and climate crisis. It would be beneficial to find out if there is perhaps more value in joining people who already know each other in joint action, rather than strangers. The age and environmental attitude did not appear to play any role in this specific hypothesis.

Motivation for engaging in future individual action toward a better environment

The second hypothesis suggested that participants in higher coordination condition would have higher motivation to engage in further individual actions toward a better environment compared to those who experienced the low-coordination condition. Specifically, the individual action referred to participation in a tree-planting event organized by the Botanical Garden. Participants were asked to choose “yes” or “no” according to their willingness to

participate. This hypothesis was also not supported by the findings, with no significant difference between the groups.

Research indicates that joint action can enhance individual motivation through increased feelings of self-efficacy and feeling of personal responsibility (Bamberg et al., 2015). When individuals work together on a task, they often feel more capable and committed to related individual actions (Carr et al, 2012). Additionally, shared activities can instil a sense of accomplishment, and the awareness that other people also act can foster intrinsic motivation to work even alone on a common goal (Jugert et al., 2016). This all together should drive further individual engagement in similar activities.

Despite these theoretical expectations, the results showed no significant difference in willingness to participate in the tree-planting event between the high-coordination and low-coordination conditions. At the same time, the analysis revealed that age was a significant predictor of this motivation. It would make sense that older people would be less motivated in tree-planting activity as it requires higher physical demand. However, as we previously found out in the randomization check, participants were not equally distributed across the two conditions in terms of age, which makes these results hard to interpret.

Another possible explanation could be the nature of the potting task itself, which might not have been intense enough to trigger the previously mentioned processes and feelings. The task may not have provided a strong enough sense of collective and personal agency to increase participants' belief in their ability to make a difference. Additionally, it would be helpful to determine whether participants perceived the task as sufficiently connected to the environmental cause. Even though these results can’t be clearly interpreted, it might suggest that more intense and complex joint action would be needed to foster individual motivation for further engagement in environmental activities.

Motivation for engaging in future collective action toward a better environment

The third hypothesis supposed that participants in the high-coordination condition would show greater motivation for participating in further pro-environmental action with their group than those in the low-coordination condition. In this case, there was an offer to participate in an energy saving challenge together with the group. The result did not confirm the hypothesis either in this case as there was no difference in motivation between participants in the two conditions observed.

Research supports the idea that coordinated joint action can enhance group cohesion and collective efficacy, which in turn can motivate individuals to engage in collective pro-environmental actions (Bandura, 2000; Carr et al., 2012). The shared experience of working towards a common goal can create a sense of unity and collective purpose, that can motivate participants to take on further group challenges (Xu et al., 2024).

In this case, neither age, the number of participants known in the group, nor environmental attitude significantly affected participants' motivation for further group pro-environmental action. That makes it easier to say, that the act of coordination indeed didn't have any effect on this kind of motivation.

As with the previous hypothesis, there are several possible reasons for this outcome. One explanation is the nature of the task itself; therefore, further research is needed to repeat this experiment with different tasks that maintain the same level of coordination intensity and time demands. Furthermore, other factors might have played a role, such as the perceived relevance to larger environmental goals. These are all factors that need to be further explored to determine under which conditions coordinated actions are effective and can directly influence participants' motivation.

General explanation relating to all three hypotheses

Across all three hypotheses, there are several potential issues that may also explain the lack of significant differences observed in the study. First, the high levels of motivation reported in the first two questions in both conditions could suggest a potential ceiling effect. This indicates that participants in both conditions were already highly motivated, which makes it more difficult to detect differences between the conditions. Second, the observed difference of about 15% in motivation between the two conditions in the first hypothesis may indicate a power issue. The sample size used in the study might not have been large enough to detect this difference as statistically significant. With a larger sample size, the study would have more power to detect true differences. Third, the use of dichotomous measures inherently has low variance, which makes it harder to capture more detailed variations in participants' motivation. This also makes it more complicated to detect differences between the conditions. Further research could benefit from using more sensitive and nuanced measures, larger sample sizes, and possibly tasks with different levels of coordination intensity and relation to the environment.

Limitations and further research

There are several limitations in this study that have to be taken into consideration, some of which have already been mentioned together with the findings. The first is, that randomization of participants across the two conditions wasn’t successful. Specifically, participants were not evenly distributed in terms of age and the number of other participants they knew in the group. Although these variables were controlled for in the analysis, it makes some results difficult to interpret. Other limitations include the mentioned potential for a ceiling effect, a possible power issue, and the use of dichotomous measures. More sensitive and nuanced measures and a larger sample size would be beneficial for further studies. Another limitation is the unclear perception of the task's relevance to the broader environmental cause among participants. Further research should consider this factor, as it might play an important role. Additionally, the cultural context is an important factor in joint action. Different cultural backgrounds can influence how people perceive and engage in collective actions (van Zomeren, 2008). Therefore, these results should be interpreted within the specific cultural setting in which the study was conducted.

Conclusion

In conclusion, climate change represents the most significant crisis of our time, and finding the most effective way for society to engage in its mitigation is crucial. Efforts to address the crisis at the individual level do not bring sufficient results, which highlight the potential of joint action as a more promising strategy. This research explored weather an act of joint action can motivate individuals for further action towards better environment and further activities with group members. The findings suggest that the single act of joint action, as conducted in this experiment, might not be sufficient to enhance motivation for further action when compared to individual effort. However, further research is needed to address the limitations of this study, validate its findings, and identify the optimal level of coordination required to effectively increase individuals' motivation for collective pro-environmental actions.

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Appendix

Appendix 1. Informed Consent

Informed consent (ENG)

Informed Consent to Participate in Planting the future experiment.

12/13 – 02 – 2024 Utrecht

To participate in this study, it is important that you give permission for the following things. You can only participate if you answer yes to the question. You can withdraw your consent at any time by contacting the researchers.

You have been informed about the purpose of the research and the way in which we handle your data;

Yes / No

Do you give permission to participate in the research and for storing the data you enter in the questionnaire anonymously? You can withdraw your consent at any time without negative consequences.

Yes / No

Name:

Signature:

Informed consent (NL)

Toestemmingsverklaring voor deelname aan De Toekomst Planten.

12/13 – 02 – 2024

Voor deelname aan dit onderzoek is het noodzakelijk dat u toestemming geeft voor de volgende toepassingen. U kunt alleen deelnemen als u alle vragen met ja beantwoordt. U kunt uw deelname ten alle tijden terugtrekken door contact op te nemen met de onderzoekers.

U bent geïnformeerd over het doel van het onderzoek en de manier waarop uw gegevens worden verwerkt;

Ja / Nee

Geeft u toestemming voor deelname aan dit onderzoek en ook voor het anoniem bewaren van uw gegevens die u invult in de vragenlijst? U kunt de toestemming ten alle tijden terugtrekken zonder negatieve gevolgen.

Ja / Nee

Naam:

Handtekening:

Appendix 2. Questionnaire

Planting the Future!

Demographics

- Please enter your group number
- Please specify your gender identity (male, female, Nonbinary, prefer not to say, other)
- What is your age?
- What is your highest obtained degree? (MBO, HBO, WO Bachelor, WO Master, PhD)
- How many of the participants did you know from before? (1-5)

Following questions are using a 7-point Likert scale

Strongly disagree (1)	Disagree (2)	Somewhat disagree (3)	Neither agree nor disagree (4)	Somewhat agree (5)	Agree (6)	Strongly agree (7)

Regular Outcome

1. I am capable of potting the plants.
2. I am responsible for potting the plants.
3. I am motivated to pot the plants.
4. As a group, we are capable of potting the plants.
5. As a group, we are responsible for potting the plants.
6. As a group, we are motivated to pot the plants.
7. I felt committed to completing the plant potting.
8. I am capable of making the environment greener
9. I feel responsible for making the environment greener
10. I am motivated to make the environment greener
11. As a group we are capable of making the environment greener
12. As a group we are responsible for making the environment greener
13. As a group we are motivated to make the environment greener
14. I feel committed to making the environment greener
15. The other participants and I worked well together
16. Potting plants was a pleasant experience
17. I felt connected to the others potting the plants

18. I consider myself as someone who is very involved with environment/sustainability issues

In the future ...

19. I would like to do this activity again
20. I would like to do this activity again with any group
21. I would like to do this activity again with this group
22. I would like to do a different activity for the environment
23. I would like to do a different activity for the environment with any group
24. I would like to do a different activity for the environment with this group

Coordination

25. To what extent did you coordinate your actions with fellow members of your group? *To no extent (1) To some extent (2) To a large extent (3)*

Autonomy

26. I felt like I had a choice in how to pot the plants.
27. I felt free to choose how I wanted to pot the plants
28. The circumstances influenced my decisions
29. I felt I had the opportunity to influence the way to pot the plants.

Trust

1. I can rely on those with whom I work in this group.
2. Overall, the people in my group are very trustworthy.
3. There is no ‘team spirit’ in my group.
4. We have confidence in one another in this group.

Collective agency

1. We are in full control of what we do
2. Things we do are subject only to our free will
3. The decision whether and when to act is within our hands
4. Our behavior is planned by us from the very beginning to the very end
5. We are completely responsible for everything that results from our actions

Social cohesion

1. Most people in my group can be trusted
2. People in my group will take advantage of you

3. If you were in trouble, there are a lot of people who would help you
4. I really feel a part of my group
5. Most people in my group are friendly
6. People in my group have lots of community spirit
7. People in my group do things to help the community
8. People in my group treat each other with respect
9. People in my group are tolerant of others who are not like them
10. In my group there is pressure to behave like everyone else

Motivation for Future Action

In the end, we have suggestions for a few practical activities. Would you like to take part in some? Please, answer according to your wish.

1. Would you like to have a coffee with your group? We have a collective voucher for you – do you want to take it?

   Yes, I am up for taking a voucher with my group.

   No, I don't want to take a voucher.

2. Twice a year, the Botanical Garden organizes a planting tree event, where you can plant your tree and contribute to a better environment. Would you be interested in taking part?

   Yes, I'd be interested, please send me more information in the email.

   No, thank you.

3. Utrecht University together with Utrecht Municipality organize Energy saving challenges. This comprises two practical workshops, where you and your group can find out everything about electricity consumption in your current or future home. You will gain knowledge you didn't learn in school, contributing to both the environment and your wallet. You can be part of this project with your group, would you like to take part together?

   Yes, I'm interested!

   No, thank you.