

Co-Creation Workshops and the Energy Transition in Leeuwarden: A Conceptual Model of Social Cohesion

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Abstract

This paper explores the emergence of social cohesion within a group of international students over three co-creation workshops organized to design an energy transition-related event for the Bloeiweek, a week-long positive health festival, in center-city Leeuwarden. These workshops were designed with regard to a conceptual model of a co-creation intervention on individual- and group-level factors of social cohesion. Surveys were conducted before and after workshops, followed by a focus group to contextualize the results. The results suggest that co-creation workshops effectively enhance social cohesion. Sample size limitations and the context-specific nature of the study necessitate further research. This study shows that co-creation workshops are a valuable tool in fostering social cohesion, including beyond the scope of academic settings. They can be implemented across various fields, including in the effort to build a community to implement an energy transition, for example.

Key words: social cohesion, co-creation, energy transition, conceptual model, international students
Energie Coöperatie Binnenstad Leeuwarden

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Introduction

As climate change has become a pressing issue in our current way of life, efforts have to be made to transition away from gas towards renewable energy sources (Van Noort, 2021). By 2050, the Netherlands aims to transition seven million homes and one million buildings away from natural gas, instead relying on insulation and renewable, clean energy sources (Van Noort, 2021). The Dutch Climate Agreement emphasizes that the energy transition is social, as it greatly impacts the everyday life of citizens (Ministerie van Economische Zaken en Klimaat, 2019). Researchers have echoed this sentiment, pointing out that social and behavioral barriers are widespread and call for new ways of collaboration, decision-making, and societal mobilization (Van Noort, 2021).

Recognizing the social efforts needed to meet the goals of a sustainable energy transition, Energy Cooperatives mobilize citizens and communities to invest in renewable energy technologies, both in rural and urban areas (Lode et al., 2022). Yet, there is one key condition that makes the situation in the rural and urban areas not exactly the same: social cohesion (Maillé & Saint-Charles, 2012). In rural communities, residents are more likely to know and trust their neighbours, to volunteer, and to feel a sense of belonging to the place and community than citizens in urban areas (Maillé & Saint-Charles, 2012). This influences the likelihood of people joining Energy Cooperatives and participating in the energy transition. Unfortunately, these social aspects of the energy transition are often neglected in research (Van Noort, 2021). Rising discrimination, segregation, and unequal opportunities worsen social cohesion in the Netherlands even more (Turkenburg, 2024), dividing people into social groups. This social segregation may lead to less understanding among people, more inequality, and a weaker social cohesion (Turkenburg, 2024). These increase social divisions; therefore, they urge academics to address the issue of social cohesion and the need for practical projects to strengthen this.

Building on previous research and responding to the call to address the issue of social cohesion, this study aims to develop, apply, and test a framework for social cohesion that can be utilised by Energy Cooperatives as a tool to enhance social cohesion for a sustainable energy transition. Despite focusing on social cohesion and the energy transition, we acknowledge that the proposed model could be adopted for any common goal for social action and community building.

In this research, we are collaborating with Energie Coöperatie Binnenstad Leeuwarden (ECB), a newly emerging Energy Cooperative that has identified a number of roadblocks to implementing more sustainable sources of energy in the city centre of Leeuwarden. These roadblocks include a lack of space for the construction of solar and wind farms, as well as the historic infrastructure in the city. In the face of these extra barriers to the energy transition in Leeuwarden, ECB considers social cohesion to be a crucial first step. To that end, they are contributing to a weeklong festival called the Bloeiweek, in which the community of Leeuwarden shows “how they engage with climate, *mienskip*, health and nature” through collectively organised activities (Fryslân Bloeit, 2025). *Mienskip*, a Frisian word, is officially defined as “the interconnectedness between people to protect the community” by the Dutch Centre for Intangible Cultural Heritage. More than just referring to a community, *mienskip* embraces a deep sense of interconnectedness and interdependence among its citizens (Van Den Bergh, 2022).

To investigate the conditions necessary for establishing social cohesion, this study examines how co-creating the activities of the Bloeiweek with students in Leeuwarden could impact social cohesion.

Co-creation emphasizes the active role of citizens at every stage of the process, positioning them as both participants and drivers of change (Leino & Puumala, 2020). Co-creative processes emerge and evolve from a need for change; with its capacity to reinforce participation, it can be used as a strategic method to strengthen social cohesion in fragmented and individualized societies (Leino & Puumala, 2020). We adopt this method by bringing together international university students for three consecutive weeks of co-creation workshops. These co-creation workshops may encourage deliberation, activate members of the community who often do not otherwise participate, and reduce individualization (BrandSEN et al., 2018). As international students are often seen as inhabiting “parallel societies” and “living on the margins” with limited connection to their local communities (Mittelmeier et al., 2025), they are less able to meaningfully engage in local action. Still, they compose a large demographic in the city of Leeuwarden (2,762 international students in 2022) (*Netherlands International Student Statistics*, n.d.), while also calling on governments to take action on the environmental crises (Septier & Zeijlmans, 2022), it is necessary to include them in our efforts to improve social cohesion for the energy transition.

Drawing on the goal of the ECB, the following research question has been developed: *How can co-creation workshops increase the perceived social cohesion among (international) students in Leeuwarden, the Netherlands, in the context of the sustainable energy transition?*

We hypothesize that co-creation by students will increase the reported social cohesion over time.

In order to answer the research question, existing literature on social cohesion will be discussed and presented in a conceptual model. This conceptual model will be the starting point for the co-creation workshops with the goal of creating a Bloeiweek activity. The theoretical framework draws upon interdisciplinary concepts from social psychology, participatory design, and community development, allowing us to analyse how co-creation can foster group cohesion in diverse student populations through different lenses.

In the following section, our conceptual model of social cohesion will be explained through a review of the relevant literature. The use of this model in the co-creation workshops and the further collection of the data will be described in the methods section, as well as the statistical approach. Then, the results will be discussed, and tools for Energy Cooperatives will be proposed. Next, a conclusion will be drawn in which the research question will be answered. Finally, limitations of the present study will be mentioned, as well as directions for future research. We hope the present paper can provide a ground for future research and research for social action other than the energy transition.

Literature review

Defining Social Cohesion

Social cohesion is not a novel social concept and, as such, it has been defined and conceptualized in many different ways (Lode et al., 2022). Maybe the most intuitive definition describes social cohesion as the metaphorical glue that binds society together, allowing interactive social beings, collective identities, and the social world to exist (Berman & Phillips, 2004). The same paper also suggests that social cohesion is the degree of connectedness and solidarity among groups in society (Berman & Phillips, 2004).

Consequently, the vagueness of the construct has been argued to make it adaptable to various situations, while making it hard to pin down the exact meaning. (Bernard, 1999). This ambiguity of social cohesion can also be seen in research related to the energy transition. Much of the literature linking social cohesion

to the development of community energy uses social cohesion as an umbrella term that implies collaboration, but without giving a clear definition of the term itself (Lode et al., 2022).

For the purpose of this research, we have borrowed from the conceptualization of social cohesion by Chan et al. (2006), who describe the concept as the overall state of relationships in a society, both between individuals and groups (horizontal relationships) and between people and institutions (vertical relationships). These relationships are characterised by a set of attitudes and norms, including trust, feelings of belonging, and the willingness to participate and help. More than just beliefs, these attitudes are manifested in actual behavior (see section on Conceptual Model). However, many other definitions and conceptualizations have informed our choice, overlapping in more ways than has often been assumed (Schiefer & Van Der Noll, 2016). These conceptualizations will be described hereafter.

In its most basic form, social cohesion has been described as the willingness of people to get involved and collaborate with their peers (Maillé & Saint-Charles, 2012). Behind this basic form lies a complex and dynamic process, implying that social cohesion can also mean “the construction of interpretative communities that provide people with a shared identity, common norms and values — and behaviours that reflect these norms and values — and a sense of belonging” (Maillé & Saint-Charles, 2012). The first definition highlights that social cohesion is about participation and collaboration; the second definition emphasizes the key components of a shared identity and a sense of belonging. Both contribute to our conceptual model. From the previous two definitions, a third emerges, which conceptualizes social cohesion as “a process of a society that brings about a sense of belonging and collaboration for mutual benefits” (Lode et al., 2012). This adds a new idea to our theoretical framework: mutual benefits, or in other words, common goals.

Furthermore, an earlier perspective, but still one of the most prominent, adopts the definition of social cohesion as “the ongoing process of developing a community of shared values, shared challenges and equal opportunity within Canada, based on a sense of trust, hope and reciprocity among all Canadians” (Jenson, 1998). The same paper found that social cohesion is “a set of social processes that help instill in individuals the sense of belonging to the same community and the feeling that they are recognised as members of that community.” These definitions led Jenson (1998) to break the concept of social cohesion into five dimensions: *belonging, inclusion, participation, recognition, and legitimacy*. Both the subjective experience of individuals and the objective functioning of communities are reflected in these dimensions.

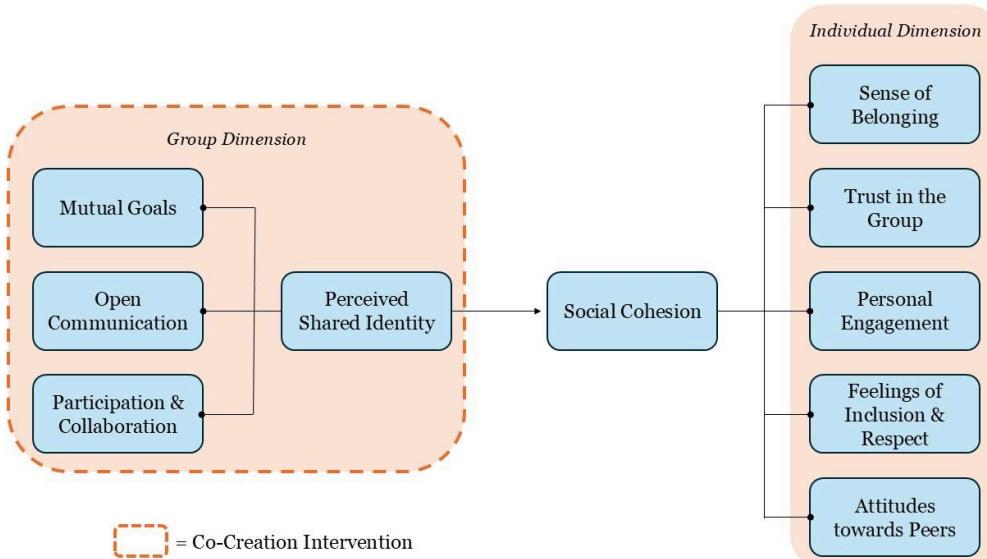
Many of the factors captured by the different definitions and levels of social cohesion are influential for the emergence of collective actions and local initiatives (Lode et al., 2022). We will therefore propose a conceptual model, including the indicators *Sense of Belonging, Trust in the Group, Personal Engagement, Feelings of Inclusion and Respect, Attitude towards their Peers, Perceived Shared Identity, Mutual Goals, Open Communication, and Participation and Collaboration*, based on the discussed literature, to be used by Energy Cooperatives in their efforts to empower local communities towards a sustainable energy transition.

Conceptual Model

In a very influential review, Chan et al. (2006) criticise many definitions or conceptions of social cohesion in the then-existing literature. In their attempt to go beyond this criticism and to redefine social cohesion,

they go back to the term's origin of 'cohere' or 'cohesion'. We developed our conceptual model based on their definition of social cohesion as "*a state of affairs concerning both the vertical and the horizontal interactions among members of society as characterized by a set of attitudes and norms that includes trust, a sense of belonging and the willingness to participate and help, as well as their behavioural manifestations.*" The horizontal dimension focuses on the interactions among different individuals and groups in society, the inter-individual relations, while the vertical dimension refers to the relationship between the state and society at large, including the state and government (Chan et al., 2006).

For this study, we will look at the horizontal interactions. Using the various existing definitions in the previously reviewed literature, confined by their relevance for our research, our conceptualization of social cohesion distinguishes between an individual and a group level. The individual level is experienced differently per participant and includes a *Sense of Belonging*, *Trust in the Group*, *Personal Engagement*, *Feelings of Inclusion and Respect*, and an individual's *Attitude towards their Peers*. On the group level, visible only in the context of the group, *Perceived Shared Identity*, *Mutual Goals*, *Open Communication*, and *Participation and Collaboration* are deemed important for social cohesion. In the following sections, we will dive deeper into these different aspects of our model as seen below.



Model 1. Conceptual Model of Social Cohesion

Group Level

The subjective feeling of "sticking together" is important for the concept of social cohesion. Yet, for social cohesion to exist, it also needs to be translated into objective behaviour, which includes people's actual participation, cooperation, and helping behavior (Chan et al., 2006). For example, a high level of willingness to cooperate and help would be rather meaningless unless it is also witnessed by substantial amounts of social participation and collaboration as a group (Chan et al., 2006).

The behavioral aspects are reflected in the group dimension (excluding Perceived Shared Identity) and have a dual use. While Common Goals, Open Communication, and Participation and Collaboration are objective behaviors that can be fostered by the subjective feelings related to social cohesion, at the same time, they can reinforce these subjective feelings and thus lead to an increased social cohesion among the

group members. The subjective and objective dimensions can therefore be seen as a positive feedback loop; they build on each other to reinforce themselves. Related to this, the behavioural group components form the independent variables of the conceptual model, which we have manipulated to induce the subjective feelings of social cohesion during the co-creation workshops (see Methods section for more details) in line with our hypothesis that increasing the group-level factors leads to more social cohesion. These components, as part of the group level, are explained below.

Perceived Shared Identity

Social identity refers to the group as a perceived collective entity, characterized by shared attributes, group norms, and its relationship with outgroups. These characteristics are, to a certain extent, all shaped by socially shared perceptions; they reflect some degree of social consensus about the key aspects of the group's shared identity (Postmes et al., 2012), revealing the link between the concepts of perceived shared identity and social identity. It is therefore also clearly a subjective, rather than an objective, aspect of social cohesion.

In order to gain a better understanding of how social (or group) cohesion develops, the Social Identity Theory is essential to consider (Tajfel & Turner, 1979/2000). This theory states that individuals gain a part of their identity from the social groups to which they belong. Individuals are motivated to maintain or enhance their self-esteem in order to feel good about themselves. One way to accomplish this is through identification with a specific social group, as social identity is a significant component in one's personal identity (Worley, 2021). According to the Social Identity Theory, social identity is the outcome of social categorisation, social identification, and social comparison. Social categorization stems from the idea that perceived differences and similarities among group members form the basis for categorizing self and others into groups, distinguishing between similar ingroup members and dissimilar outgroup members (Van Knippenberg & Schippers, 2007).

As members of a social group, individuals pick up aspects of that group's behaviour and gain an understanding of the normative behaviour in this group (Worley, 2021). Two processes have been suggested for identity formation: deductive identity formation and inductive identity formation (Postmes et al., 2005). The first is based on conformity to established group norms, while the latter allows for the emergence of shared identity in diverse groups. Postmes et al. (2005) present a model of social identity formation that incorporates the dualism of group-level and individualistic analysis of small group processes, as well as their interaction. This dualism of group and individual levels has also been incorporated in our conceptual model, as it allows us to gain a better understanding of the interaction between these different levels.

Despite social identity having a strong influence on individuals' behaviours, it is not the sole influence, as it is a part of a more complex process that is context-related (Postmes et al., 2005). Self-categorisation theory and its related ideas have greatly improved our understanding of phenomena such as social validation, decision making, and the emergence of shared cognition. However, relying on overly simplistic interpretations of this theory can lead to a mechanistic interpretation, such as the belief that social identity salience leads to uniform and prototypical behaviour (Postmes et al., 2005). Recognizing the complexity of this process helps avoid such oversimplifications and allows for a more nuanced understanding of the social dynamics within a group. All in all, a perceived shared social identity

strengthens group cohesion, and in our conceptual framework, it plays a key role in connecting group-level dynamics to individual feelings of belonging and engagement.

Mutual Goals

The first objective behavioral component of the conceptual model is mutual goals. In the 1800s, French sociologists and political philosophers challenged the British school of thought, which viewed social cohesion as merely an unintended by-product of individual behaviour (Schiefer & Van Der Noll, 2016). Instead, they proposed that society functions as a unified system grounded in shared principles, common values, emphasizing the role of solidarism (Schiefer & Van Der Noll, 2016). From this perspective, social cohesion arises not from individual behavior alone but is rather based on solidarity, shared loyalties, cooperation, and mutual action (Schiefer & Van Der Noll, 2016). We adopt this view in our conceptualization of social cohesion by reflecting solidarity in the pursuit of common goals.

On the group level, a considerable number of experimental studies have been done to strengthen the perspective of the community within the broader concept of social cohesion (Fonseca et al., 2019). Some are notably related to the aspect of mutual goals. For example, one study focused on different group dynamics, specifically competition vs. collaboration, towards group goals. They found that certain basic elements related to group harmony and effectiveness such as the open communication of ideas, the coordination of efforts, the friendliness towards other group members, and the pride in one's group tend to break down when members perceive themselves to be competing for mutually exclusive goals (Deutsch, 1949). Having a shared goal thus makes a group more socially cohesive and productive.

Open Communication

The previously mentioned study by Deutsch (1949) highlights open communication as a fundamental element of social cohesion. One reason for this might be the strong connection to the formation and reinforcement of social identity, allowing people to make sense of the otherwise unorganised world around them (Maillé & Saint-Charles, 2012). In this context, rituals and conversations are important for group members and serve to strengthen their (shared) social identity (Maillé & Saint-Charles, 2012). Therefore, it is through ongoing communication and social interaction that members develop and maintain their identification with the group. As such, open communication emerges as a crucial second objective behavioral component of our conceptual model.

Coined as a cornerstone of close relationships and crucial to healthy self-development (Roos et al., 2023), feeling heard plays a considerable role in the context of open communication for social cohesion. Feeling heard means being able to speak freely to someone who listens attentively and shows empathy and respect (Roos et al., 2023). While this happens on an interpersonal, one-on-one level, truly feeling heard also depends on a certain degree of shared understanding between the speaker and listener. For this mutual understanding to happen, a superordinate, collective level is required that goes beyond the individual relationship (Roos et al., 2023). An interesting key finding is the relation of feeling heard to conflict. Not feeling heard in a conversation can cause people to avoid the next conversation with the same partner or group, reducing open communication in the group. So, to improve social cohesion, it is not only important that a group experiences open communication, but group members also have to feel heard, both at the individual and the collective level.

Participation and Collaboration

The final objective component of the theoretical framework is participation and collaboration, which is again strongly connected to the previous components. A link between experiences of feeling heard and effort has been identified in an experimental study by Roos et al. (2023). Participants felt more heard when the interaction partner or group came into action after their conversation, helped them without request, or collaborated with them through collective decision-making and negotiating. This indicates that participation and collaboration in a group might strengthen social cohesion through experiences of feeling heard (under the aspect of Open Communication).

The framework developed by Chan et al. (2006), serving as the foundation for our conceptual model, suggests that the horizontal objective dimension of social cohesion involves *social participation* specifically. This social participation includes voluntary action, which produces two effects: an internal effect on the group members, fostering their collaboration, and an external effect on the wider community, promoting social cooperation (Bottini, 2016). Other research found evidence for the reciprocal relationship between voluntarism and social cohesion; social cohesion creates an environment that encourages volunteering to emerge, while voluntary action, in itself, strengthens feelings of social cohesion (Davies et al., 2024). This bi-directional relationship seemed to only apply to the horizontal forms of social cohesion, providing justification for our choice to focus on that dimension of social cohesion in the current study. In short, participation and collaboration can impact social cohesion through, e.g., the relation with voluntarism and the perceived feelings of being heard.

Individual Level

Moving on from the subjective component (Perceived Shared Identity) and the objective components (Mutual Goals, Open Communication, Participation and Collaboration) at the group dimension, the following sections dive deeper into the aspects of social cohesion that play a role at the individual level.

As mentioned earlier, social cohesiveness or “sticking together” is ultimately a reflection of individuals’ subjective feelings, which will be manifested in certain objective behavior (Chan et al., 2006). The subjective component refers to an individual’s norms, feelings of trust, sense of belonging, and willingness to help. In addition to the group aspect of Perceived Shared Identity, the five aspects of the individual level all revolve around an individual’s feelings, therefore making them subjective components of social cohesion. More importantly, these are the dependent variables in our two studies, expected to change in line with our hypothesis.

Sense of Belonging

The first individual aspect that we have identified in the conceptual model is Sense of Belonging. In numerous articles, the concept of belonging is described as a vital element for social cohesion (Moustakas, 2023). In Beauvais & Jenson (2002), belonging is one of the five dimensions examined, and it is opposed to isolation. The sense of belonging is tied to the mechanism of inclusion and exclusion (Moustakas, 2023). It is influenced by how individuals perceive their opportunities and recognition within the group. Belonging is both affective and structural; thus must be actively created through both group interactions and inclusive practices. First of all, the sense of belonging is fundamental to the existence of the group, making it a constituent of the concept of social cohesion (Chan et al., 2006). Secondly, the sense of belonging is a significant factor in how members perceive the social cohesion within the group.

Feeling like one belongs in a group has multiple strong effects on emotional patterns and on cognitive processes, making it an important aspect of our conceptual model (Baumeister & Leary, 1995).

The belongingness hypothesis states that humans have a pervasive drive to form and maintain lasting, positive, and significant interpersonal relationships (Baumeister & Leary, 1995). In order to satisfy this drive, one needs frequent, affectively pleasant interactions with a few other people. These interactions must take place in a temporally stable network of mutual concern. The belongingness hypothesis emphasizes that interactions with constantly changing partners will be less satisfactory than interactions with the same person (Baumeister & Leary, 1995). From this perspective, the sense of belonging is not a luxury but a fundamental psychological need, and its absence can lead to cognitive and emotional disturbances.

Individuals who perceive themselves as valued and accepted members of the group are more likely to experience emotional security and social motivation (Baumeister & Leary, 1995). With a bigger sense of belonging, members tend to participate more actively, trust others more, and show more openness to collaborate. Fostering a sense of belonging thus plays a significant role in promoting horizontal social cohesion.

Trust in the Group

As explored in the previous paragraph, having a sense of belonging is closely linked to trust in others. Trust is an essential aspect of social groups, and groups are described as “bounded communities of mutual trust and obligation where members trust fellow members to do them no harm and to be acting in the best interest of the group” (Hogg, 2020). Within the Uncertainty-Identity Theory, trust is especially relevant for group members who perceive themselves as marginalized within the group or opposite from the group prototypes; those who feel they do not fit in or align with the group’s attributes. These people may experience great self-uncertainty and may go to great extremes to demonstrate commitment and try to win the group’s trust and secure acceptance (Hogg, 2020).

Trust is a necessary component of social cohesion, both on the horizontal and the vertical dimensions (Schiefer & Van Der Noll, 2016). In political science, for instance, trust among citizens is perceived to be the key to overcoming basic problems of collective action on the societal level. The problem of collective action can be illustrated by the classic example of the Prisoner’s Dilemma, which shows that individuals choose self-serving solutions that make the group as a whole worse off when there is no mutual trust (Larsen, 2013). So, trust acts as a moral foundation for solidarity, as it enhances collaboration among group members, fosters unity within the group, and strengthens group identification.

Personal Engagement

Personal engagement refers to the degree to which individuals are psychologically and behaviorally invested in the shared processes, goals, and values of a group (Fonseca et al., 2019). Social cohesion includes creating shared values and enabling people to be engaged in a common enterprise. This collective engagement is both a driver and an outcome of cohesion. An individual’s engagement has been used in different studies to measure group cohesion (MacKenzie, 1981; MacKenzie et al., 1987). Research has shown that participation, conflict, and avoidance shape the emotional and functional climate

of the group. An individual's perception of outcome in the group is related to group cohesion, which includes positive engagement around common goals (Budman et al., 1987; Fonseca et al., 2019).

Engagement can be understood as a multifaceted and malleable construct (Fredricks et al., 2004). It is responsive to contextual features and influenced by environmental changes. Personal engagement has been described as having behavioural, emotional, and cognitive dimensions. Since these different dimensions change and evolve over time, we are able to influence them through the design of our study. For our co-creation workshops, personal engagement is a core mechanism to measure social cohesion in the group.

Feelings of Inclusion and Respect

Connected to the sense of belonging, feelings of inclusion and respect are common components of social cohesion (Moustakas, 2023). This subjective individual aspect of the theoretical framework refers to the informal networks of emotional, social, and material support (Chan et al., 2006). Many definitions of social cohesion include dimensions such as inclusion, recognition, participation, and legitimacy (Moustakas, 2023; Fonseca et al., 2019; Chan et al., 2006). These aspects collectively contribute to an individual's perception of being respected and included.

According to the Uncertainty-Identity Theory, the feeling of inclusion in a group is closely related to an individual's self-uncertainty and belonging within a social group. When people feel unsure about who they are or where they belong, they seek to reduce this discomfort by identifying with groups that offer a clear sense of identity. However, in order to reduce one's uncertainty effectively, individuals must feel accepted within the group (Hogg, 2020).

Furthermore, the feeling of respect has been linked to the concept of Feeling Heard (see also the section on Open Communication). Roos, Postmes & Koudenburg (2023) found that participants felt more heard when they were treated with respect. This feeling of respect included being taken seriously and receiving recognition. So, feelings of inclusion and respect are critical for creating an environment where participants feel recognised and valued.

Attitude Towards Peers

Finally, it is important to acknowledge the effect the attitude an individual has towards their group members has on the group cohesion (Pelostratos, 1982). Positive interpersonal attitudes, such as mutual liking and trust, have been identified as important components to create social cohesion (Fonseca et al., 2019). The degree of liking is an indicator of group cohesion, showing in the amount and strength of reciprocal positive attitudes between individuals in a group (Lott & Lott, 1961). Social cohesion has been framed as a combination of horizontal and vertical interactions characterized by shared norms, trust, and a willingness to cooperate (Chan et al., 2006). These attitudes are both affective and behavioral, including active participation and helping behaviors that reinforce mutual respect and inclusion.

Peer attitudes influence group behaviour through social preferences, conformity, and interpersonal perceptions (Fonseca et al., 2019). Perceptions of support, empathy, and understanding influence trust, participation, and emotional safety within the group. When viewing their peers positively, individuals are

more likely to engage in the group's activities. Thus, in our conceptual framework, individuals' attitudes toward their peers play a key role in shaping social cohesion.

Conceptualizing Co-Creation

Co-creation refers to collaborative processes where diverse stakeholders actively contribute to the development of ideas, services, or policies. In this research, co-creation workshops are informed by principles of Participatory Design (PD), a democratic design methodology originally developed in Scandinavian work environments (Schuler & Namioka, 1993/2017). PD emphasizes shared power, inclusivity, and dialogue, making it highly suitable for educational settings that aim to foster student agency and collective responsibility (Sanders & Stappers, 2008). Participatory Design has sustainable, long-term effects, making it relevant for this research.

Co-creation reduces individualisation and fosters collective agency, especially when it involves underrepresented groups. (Brandsen et al., 2018) This is particularly relevant in Leeuwarden, where international students are often excluded from local governance due to language and their limited time living in the municipality. Using co-creation in our workshops allows for shared agency, diverse voices, and a common goal (Brandsen et al., 2018). This method of co-creation may foster social inclusion, empowerment, and mutual trust among participants. Postmes et al. (2005) suggest using intragroup negotiation and debate to dynamically constitute and redefine identity. Through these negotiations and debates, individuals take an active role, allowing them to define, redefine, and change their identity.

Methodology

Study 1

Study 1 consisted of staging a co-creative intervention as a means of improving social cohesion between undergraduate students in the inner city of Leeuwarden.

Participants and Procedure

The participants were undergraduate students living in the city of Leeuwarden recruited via word of mouth, promotion in student group chats, and promotional posters (see Appendix 1) placed in several undergraduate schools, the public library (Treasor), and a student cafe in Leeuwarden. The participants varied from meeting to meeting, with the majority of members attending two or three sessions.

Participants were mostly students from University College Fryslan (UCF) enrolled in the Global Leadership and Responsibility study, with two from NHL Stenden/ Van Hall Larenstein University of Applied Sciences. The age of participants ranged from 19 to 27 years old.

At the first session, there were seven total participants: six female and one male. They were able to add themselves to a group chat for communicating about the workshops. One of the participants was from NHL/ Van Hall, and the other 6 were acquaintances from UCF. There were nine participants present at the second workshop: two from NHL/ Van Hall, seven from UCF. Six completed the survey. There were six females and three males. There were six participants in the final gathering: one from NHL/ Van Hall, 5 from UCF, and all female.

The study was promoted as research on ecological action in Leeuwarden, conducted at a casual social gathering of students. Participants were informed that they would be designing an activity for the

Bloeiweek festival in Leeuwarden. By priming the participants into categorising themselves in a category they all have in common, namely students, we are able to influence their social identification.

We designed surveys using the Likert Scale to measure self-reported sense of belonging, trust in the group, personal engagement, feelings of inclusion and respect, and attitudes toward peers, with optional open-ended questions and a space for feedback included at the end (see Appendix 2 for a detailed overview of the survey questions). There were two surveys; one for before and one after the sessions, with a single differing question between them, and questions were randomly ordered in each survey. The wording of the first survey was modified to measure expectations rather than existing factors of social cohesion. The surveys included information about the study and asked for consent (see Appendix 3), and they provided the participants with a 6-factor personal code to ensure anonymity (see Appendix 4) while pairing their surveys for data analysis. The code contained the number of the participant's month of birth, the letter of the participant's assigned sex at birth, the first letter of the participant's first middle name, the first letter of the participant's mother's first name, and the number of the participant's older siblings.

First Session

Participants gathered in front of the Beurs, where they completed surveys and mingled. We proceeded to the Prinsentuin park on foot. Participants were encouraged to speak with unfamiliar members. We laid out picnic blankets and provided snacks for the participants. We passed bingo cards (see Appendix 5) with personal trivia as an icebreaker and asked participants to work in pairs to fill the cards, discussing the results with all thereafter to introduce members to one another. After introductions were completed, we explained to participants that the goal of the research project was to design an activity for the Bloeiweek, sharing details about our role as researchers working with the Energie Coöperatie Binnenstad Leeuwarden. We asked group members to form pairs and design a flag to represent our group (see Appendix 6) and discussed their design choices. The final activity was to create a mind map (see Appendix 7) of challenges to the sustainable transition in Leeuwarden and potential solutions as a group. Some members were hesitant to participate, so we guided the discussion to include them and fill out the mind map. We concluded by discussing feedback and taking a photograph of the group (to which all participants consented). Participants completed the post-session survey and walked to the Beurs together in discussion.

Second Session

The second session took place a week after the first. Most participants gathered at the Beurs and completed pre-session surveys before walking to the Prinsentuin park, speaking with less familiar group members, where several late-coming participants joined and completed the survey. New group members were introduced. Snacks were provided, and details about the research were shared. The icebreaker activity consisted of participants exchanging answers to prompt questions on Spark cards in pairs, allowing time for organic communication. There was a brainwriting activity, continuing from the mind map, in which participants were asked to suggest potential activities for the Bloeiweek, again, allowing for time to socialize. We provided sticky notes to allow individuals or pairs to offer anonymous suggestions (see Appendix 8). We held a break period to allow participants to enjoy the weather and communicate, and members took pictures. Following the break, we read the notes to the group and discussed them together, categorizing them and asking for input and attempting to combine or refine

suggestions. We concluded with the surveys and feedback, and walked together to the Beurs in discussion.

After the session, we created an overview using all suggestions from the sticky notes, combining them in four categories: informational fun and games, sustainable lifestyle workshops, educational activities, and community engagement (see Appendix 8). We polled participants in the group chat to confirm which themes we would focus on designing an activity in the next session. There were six votes for ‘community engagement’ and two for ‘sustainable lifestyle workshops.’ As a focus group session was to be held following the conclusion of the third session, participants were asked whether special accommodations were required for dinner time, and it was decided that a potluck dinner would be hosted simultaneously.

Third Session

The final gathering took place a week after the second session. Participants gathered at the Beurs. Due to the poor weather, the session was held inside the Beurs. Participants completed surveys. Group members all brought and shared food. We were asked to once again briefly clarify our goal as researchers by members. Photos were taken of the food prior to an icebreaker activity. The activity consisted of discussing common ground personal statements in pairs, with the aim of sharing the most unique statement with the group. Thereafter, we discussed the suggested themes for activities with the group and asked members for their thoughts on the direction. The discussion of the activity led in another direction than the poll. We held a vote, but split into pairs to brainstorm activities once it was clear participants had a broader range of opinions that could be combined. We discussed suggestions as a group. Members completed the final survey, and five of the six joined in walking to the home of the researchers for the focus group.

Data Analysis

To analyse the survey data, we conducted basic statistical analyses, including the calculation of means, medians, standard deviations, and ranges. Additionally, we created graphs to visualize the data. For each statement and construct, the mean was first calculated at the individual participant level. Following this, the mean from all the participants has been calculated, along with the corresponding median, standard deviation, and range. This allows for a global overview to gain an initial understanding of the data. For visualisation purposes, we used the group mean for each construct. The aspect “Total Social Cohesion” has been added. The Total Social Cohesion (TSC) is the mean of the 5 individual concepts: *Sense of Belonging, Trust in Group, Personal Engagement, Feelings of Inclusion and Respect, and Attitude towards Peers*. For various graphs, the data has been split up per workshop into pre-workshop and post-workshop data. This allows for a better visualisation, taking into account the effect on the participants of the time spent within or outside of the group.

Study 2

Study 2 was a focus group discussion using members who attended two or more of the co-creation workshops. The discussion questions (see Appendix 9) were designed to measure the participants’ perspectives on all of the components within the conceptual model. Due to the short duration of the study and the small number of participants, the focus group was chosen to offer qualitative data to complement the findings of study 1. Consistent with the structure of the conceptual model, we asked participants

about, e.g., their expectations, why they joined, whether the common goals brought them together, and how and why they felt their sense of belonging had evolved over the duration of the gatherings.

Participants and Procedure

There were five of the six members of the third co-creation session, all female, including the NHL/ Van Hall student and four UCF students. The average age of the participants was 21,6 years, ranging from 19 to 27 years old, with a standard deviation of 3,1. Every participant gave consent to participation and audio-recording (see Appendix 10). We followed the questions in our discussion guide (see Appendix 9). One researcher took notes, kept time, and aimed to keep the discussion on track, and the others led the discussion. At the end, the true goal of the study was revealed to participants.

Data Analysis

To analyze the Focus Group Discussion, we transcribed the audio recording using an AI speech-to-text tool, suggested by the EU to be safely used in academia, and engaged in a thorough and active reading of the data to identify common themes and ideas, while reflecting on their meaning.

We adopted an inductive approach to develop effective codes. Through inductive coding, the data can "speak for itself," making it a valuable approach because it allows the themes to emerge directly from participants' perspectives.

The coding was carried out in English by two researchers to enhance the trustworthiness of the analysis. To organize and interpret the findings, we structured the codes using our conceptual model and counted how often each theme appeared.

Results

Study 1: Surveys

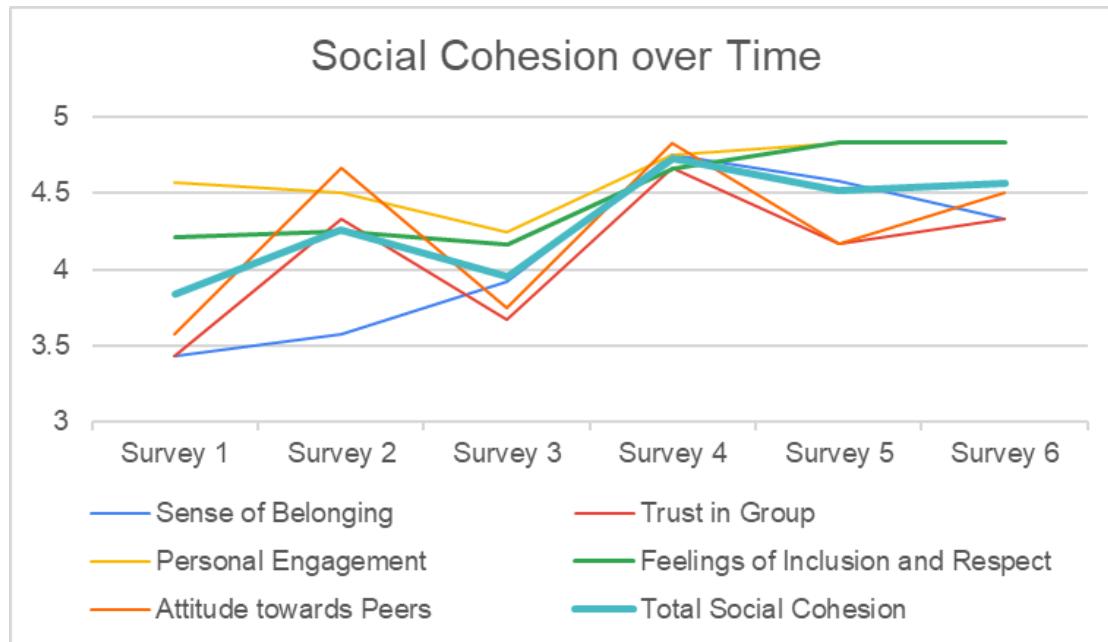
We found evidence that all concepts have increased between the initial and final survey measurements, as visualised in *Graph 1*. *Table 1* shows the rounded means of the whole group per aspect as visualised in *Graph 1*. With the exception of 2 incidents, the concepts all show an increase or no change between the pre-workshop and post-workshop measurements. Most constructs followed a consistent trend: an increase from pre- to post-workshop, followed by a slight decline between sessions.¹ *Graphs 2 through 7* distinguish between pre- and post-workshop. The data showed a general decrease in the variability of responses across participants between the initial and final survey, as indicated by a lower standard deviation. Some participants continuously gave lower ratings than the group, bringing down the average and increasing both the range and standard deviation.

	Survey 1	Survey 2	Survey 3	Survey 4	Survey 5	Survey 6
Sense of Belonging	3.43	3.57	3.92	4.75	4.58	4.34
Trust in Group	3.43	4.34	3.67	4.67	4.17	4.34

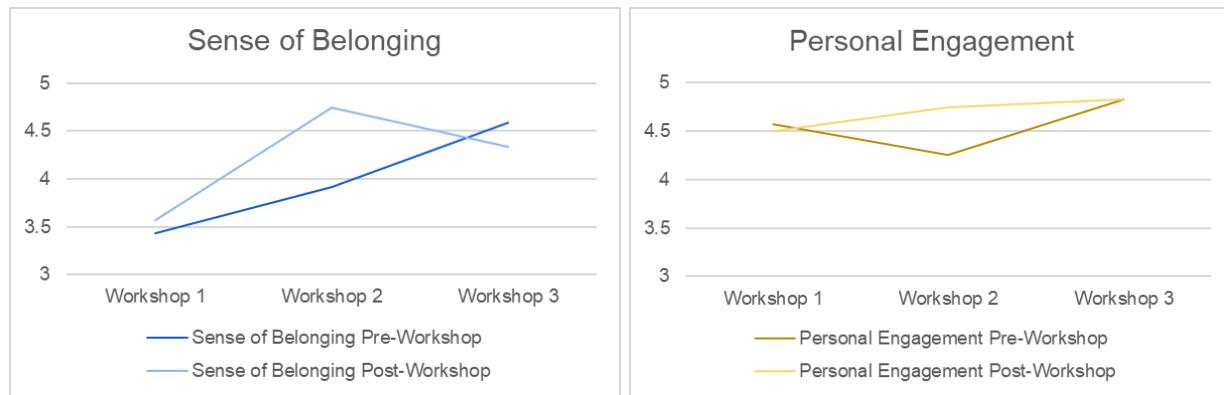
¹ Due to the small sample size of the current study, outliers have a significant impact. When removing these outliers, the pattern found in the survey data is even stronger than presented in the graphs.

Personal Engagement	4.57	4.5	4.25	4.75	4.83	4.83
Feelings of Inclusion and Respect	4.21	4.25	4.17	4.67	4.83	4.83
Attitude towards Peers	3.57	4.67	3.75	4.83	4.17	4.5
Total Social Cohesion	3.84	4.26	3.95	4.73	4.52	4.57

Table 1. Mean per construct for the whole group for each survey, as visualized in Graph 1

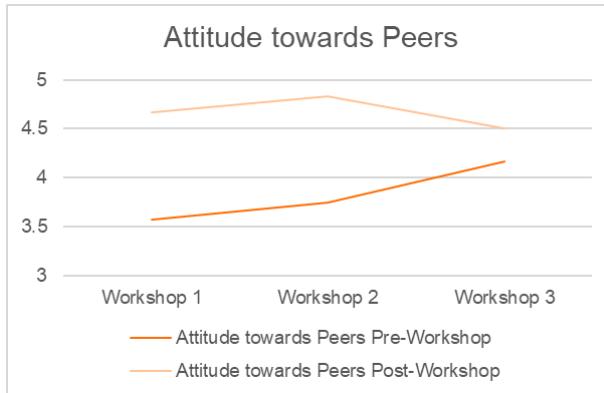


Graph 1. Social Cohesion over Time, as shown in Table 1

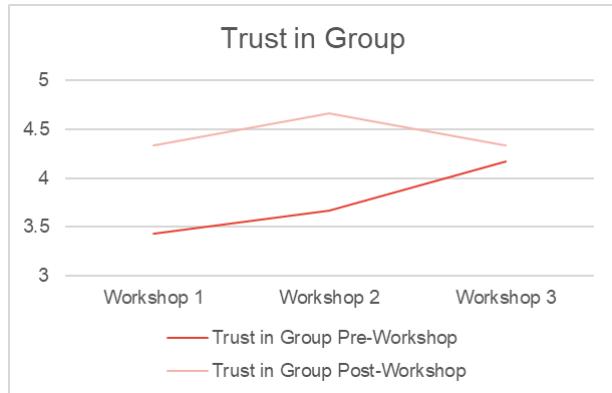


Graph 2. Sense of Belonging

Graph 3. Personal Engagement



Graph 4. Attitude towards Peer



Graph 5. Trust in Group



Graph 6. Feelings of Inclusion and Respect



Graph 7. Total Social Cohesion

Study 2: Focus Group Discussion

The questions were designed to measure the participants' perspectives on all of the individual- and group-level social cohesion components within the conceptual model to support the quantitative results from the surveys. This allowed us to evaluate whether the co-creation intervention functioned as intended and where it deviated from expectations. As such, this section will be organized according to the factors identified in the model.

Mutual Goals

The common goal as a social glue and facilitator was the most discussed topic in the focus group, identified 15 times in coding. It was seen as a means through which social cohesion, inclusion, and co-creation were made possible, rather than existing as the primary objective for participants. By some members, it was mentioned that another unrelated goal would have sufficed for facilitating cohesion; others suggested that it was critical that the goal was personally relevant. It was noted that participants would be interested in participating in a new group project with an adjacent focus following the conclusion of our study. The existence of a clear and achievable goal that could be fulfilled within a timescale similar to or somewhat longer than our own study served to motivate participants to attend each gathering, viewing the duration and time investment as convenient. One member reported feeling more connected through the shared objective. Some participants reported that the common goal might not

necessarily be enough motivation, specifically referencing feelings of overlap with discussions had in their studies, as a reason they might be less motivated by the opportunity to participate.

Open Communication

Mentions of successful open communication as a theme of our gatherings were identified 8 times in the coding, along with socialization group members as being critical to its success. One member mentioned that connecting through small talk offered alternative pathways to the mutual goals for achieving social cohesion, and identified it as having a potential spillover effect. The icebreakers served as an important tool for facilitating discussion for all, with some members viewing it as a crucial invitation to communicate with others. However, it was mentioned that existing relationships between group members might render improving social cohesion via icebreakers difficult. It was felt by many that the safe social space facilitated this discussion as well, and that it benefited from members taking others seriously and adopting a 'yes, and' attitude towards co-creation rather than dismissing diverse ideas and opinions. It was generally appreciated that opportunities for anonymous communication were given via the surveys and in the group sessions, by way of sticky notes read by the researchers. It allowed participants to express themselves more freely, including in sharing ideas in which they were less confident, contributing to innovative suggestions when designing the research product. For a less familiar member of the group, it was mentioned that their openness increased with the progression of the sessions.

Participation and Collaboration

Members felt that everyone was able to participate in the discussions, facilitated by the mutual goal and co-creation. The low-stress atmosphere, which prioritized social cohesion, was referenced as permitting a balance between socializing and productively collaborating that made participation enjoyable for members. Already knowing other participants or the researchers also contributed to a desire in the group to help with the study. Participants mentioned on numerous occasions that their joining the study was also informed by their desire to meet new people.

Convenience of Participation

Convenience was not one of the elements of our conceptual model; however, it emerged as a theme in the coding. Participants reported the convenience of participating as a reason for joining the gatherings, both in contributing to the research and in participating in the co-creation. That participants could communicate with the researchers and with other members of the study directly and freely, encouraged them to participate, in contrast with other research searching for participants to fill in surveys. The regularity also made planning convenient, and the fact that participants viewed the co-creation and goal as worth their time and fun, they viewed the time investment as positive and enjoyable rather than as an inconvenience. It was mentioned 10 times that the atmosphere was fun and made participating easy, and that the co-creation did not feel like work, allowing for more productivity and creativity. There was a motivation to be present every time for those reasons as well. The food that was offered allowed participants to stay later, rather than leaving for dinner. It did, however, serve as a distraction when sharing took a significant amount of time.

Co-Creation

Co-creation was viewed as a means of increasing the salience of the mutual goal. Participants reported feeling that the group dynamic of co-creation allowed for more meaningful interaction and that it

encouraged group members to be productive, rather than strictly socializing with friends. It improved inclusivity and was seen as necessary for achieving the goal of designing the research product.

Perceived Shared Identity

The connection through the shared goal was perceived as a basis for social cohesion and a group identity. We noted social categorization processes from a less acquainted member, attempting to connect with others, while for a more acquainted member, they reported not needing to interpret behavior due to already feeling a part of the friend group. The presence of a topic was seen by some members as being more important than the specific topic, but the shared interest in sustainability and the energy transition as a theme was considered critical to the formation and retained cohesion of this group. Personal interest in the project as a product of coherence within the subject of sustainability also brought members together. Hosting gatherings in the park was seen as a positive for some in connecting with nature and keeping the energy transition in mind.

Sense of Belonging

Participants reported feelings of connectedness with other group members that helped with social inclusion and belonging. Increased familiarity and comfort allowed one participant to better fit in after observing others to learn social rules and cues and to avoid making social errors. A desire to spend time with previous acquaintances and friends helped some participants to feel that they belonged in the setting. Members reported that the people and the objective created a sense of belonging to the project and the group.

Trust in the Group

Trust was difficult for some members to discuss, as they did not know how to quantify it. Some members reported that trust was essential – that without trust, they would not have returned for more gatherings. One member reported that the neutral and open venue of the park allowed them to feel more comfortable with newer acquaintances. Some members reported increased trust and comfort with others over time, and that trust is influenced by shared experiences with peers.

Personal Engagement

The diversity of avenues available to participants to contribute was viewed as significant to the inclusion and comfort of participants, as they felt their contributions were taken seriously. Because the project was co-creative, participants enjoyed exercising the freedom to shape the progression of the project and felt responsible for the direction of the process. The interactive nature of the study encouraged participants to regularly attend and share thoughts with the goal in mind. Participants reported the conversational structure of the discussions at points, and the casual venue allowed for participants to connect more thoughtfully and comfortably. The icebreaker exercises were seen as valuable conversation starters for shyer members in the group, allowing them to engage with others and participate more fluidly. Members reported the survey could have been modified to allow for more engagement, either by changing questions for understandability, including more open-ended questions, or giving more time for responding to the questions, rather than having participants complete them at the start or end of the sessions.

Feelings of Inclusion and Respect

Members felt they and their ideas were included and respected. They appreciated the ‘yes, and’ approach to incorporating new ideas, and felt that it contributed to co-creation and strengthening social cohesion. Shy members reported feeling free to communicate openly due to the actively inclusive dynamic, and there was appreciation for the balanced use of multiple modes of communication – group discussion, regular possibilities for anonymous individual feedback, discussing in pairs, and the use of sticky notes to share ideas – in enabling all voices to be heard. The small group size and personal connectedness of members were viewed by members as enhancing inclusivity.

Attitudes Towards Peers

Members reported deciding to participate in the group because they were directly invited by acquaintances, viewing positive peer pressure or a desire to support friends as a reason for regularly attending and participating. One member reported positive peer pressure as the most important reason for deciding to participate. Members generally viewed the expectations of others as motivation to participate. Important for all members that they liked their peers and the researchers, and some would otherwise not have continued to participate. Liking members increased comfort and trust while alleviating insecurity and nerves in new company and settings. Viewing members in a different setting contributed to increased social cohesion among previously acquainted members, who reported learning new things about friends. Forming impressions also helped less acquainted participants identify social cues and navigate, allowing them to connect more freely with peers.

Strengthening of Cohesion over Time

Members reported social cohesion increasing with each session, but also over the duration of individual sessions. Members reported trust or open communication enhanced as sessions progressed, and that seeing peers in differing settings also increased cohesion. It was reported that members who had felt excluded in other situations took more time to feel trust.

Survey Notes

The surveys were a topic of discussion in the focus group as well, due to some confusion. Participants reported filling in surveys immediately before and after sessions allowed for more honesty, but detracted from deliberation. The disparity between the survey questions and the topic of designing the research product was noted as a source of confusion for the participants.

Discussion

The proposed conceptual model of Social Cohesion was designed as a theoretical tool to test the perceived social cohesion among members of a social group. When the results of the two studies and the discussed literature are taken as a whole, there is some evidence of the validity of our conceptual model. We found that co-creation by students has increased the reported social cohesion over time. The following sections discuss how the different dimensions of social cohesion contributed to this development.

Co-Creation

Starting with the Co-Creation factor first, as we intended it to mediate the group and thereby individual dimensions of social cohesion, and found that it did play a role in fostering the behavioral aspects of social cohesion. The literature suggested that co-creation allows for shared agency, diverse voices, and a

common goal (Brandsen et al., 2018), which was confirmed in the focus group where participants identified that mutual goals, open communication, and participation and collaboration are unified and intensified under a co-creation approach and are strongly linked to the success of social cohesion in this intervention. The method of co-creation, through Participatory Design, was also found to improve inclusivity, as identified in the literature review (Sanders & Stappers, 2008; Brandsen et al., 2018).

Group Dimension

Our findings of the group-level components of social cohesion (Study 2) were in keeping with the literature. Regarding Mutual Goals, we found in Study 2 that the common goal was seen as a social glue and facilitator, uniting the group and guiding their collective action. This agrees with the perspective that social cohesion goes beyond individuals' subjective feelings; it emerges from a group's solidarity, shared loyalties, cooperation, and mutual action (Schiefer & Van Der Noll, 2016). Furthermore, having a shared goal was discussed to make the group more socially cohesive and productive (Deutsch, 1949), which participants of Study 2 highlighted by addressing the common goal as the stimulator of social cohesion, inclusion, and co-creation, rather than just existing as the primary objective for participants. Adding to the body of literature, we found that a shared goal was perceived to be improving social cohesion only when it was personally relevant, significant, or interesting to group members. At the same time, it can work as a motivator to join the group by being perceived as clear and achievable within a reasonable time frame. Finally, the common goal played a part in the willingness to invest time and effort to keep on joining the group gatherings, therefore, contributing to developing and maintaining a perceived shared identity.

Secondly, our findings support the idea that Open Communication is a fundamental element of social cohesion as described by Deutsch (1949). Participants (Study 2) mentioned the interactive aspects of the co-creation workshops to be a crucial factor pulling them towards the group, while the icebreakers and small talk helped to maintain identification with the group, which aligns with previous studies (Maillé & Saint-Charles, 2012). Moreover, the importance of a safe social space where people are taken seriously, respected, and their feelings heard was emphasized. This was illustrated through the constructive ways in which new ideas were handled during the co-creation process, even if they did not perfectly align with the activities or the common goal. This created a safe space, preventing people from feeling unheard, which could have otherwise led to the avoidance of future conversations with the same group (Roos et al., 2023). Going beyond the literature, Study 2 suggested that anonymous ways of participating are helpful in communicating and including ideas, as people were free to express their ideas without judgment.

Thirdly, some evidence was found for the significance of Participation and Collaboration within the conceptual model of social cohesion. As indicated above, participation and collaboration in a group contributed to strengthening social cohesion through experiences of feeling heard (e.g., through anonymous participation) (Roos et al., 2023). Other research suggested that social cohesion creates an environment that encourages volunteering to emerge, while voluntary action, in turn, strengthens feelings of social cohesion (Davies et al., 2024). In our findings, this was confirmed by the Focus Group participants who recognized the low-stress atmosphere of the co-creation sessions, prioritizing social cohesion and socializing, to allow for productive collaboration, which in itself made participation enjoyable for members and therefore improved the perceived social cohesion again. Interestingly, convenience emerged as a significant theme in the findings, not centered in the literature we reviewed. The directness and openness of communication, the regularity of the sessions, and the provision of food

were motivations for participants to attend, as they alleviated the inconveniences of anonymous survey research, scheduling, and planning or paying for dinner, respectively, especially since the project was perceived as well worth the participants' time. The opportunity to meet new people further motivated participants to participate in the co-creation as an added convenience.

Lastly, participants expressed thoughts linking Perceived Shared Identity to social cohesion in Study 2. Literature on shared (social) identity discusses how groups share a consensus about the key aspects of the group's shared identity (Postmes et al., 2012). This was reflected in the group identity that was formed over the 3 weeks of participation in the co-creation workshops; group members seemed to share the collective idea of being interested in sustainability and the energy transition, while connecting through a love for nature (Study 2). On top of that, we found that hosting the co-creation gatherings in the park primed these characteristics of the shared identity even more, with a mediating effect on social cohesion. Connection through the shared goal was also perceived as a characteristic of the group, fostering social cohesion. Additionally, social categorization processes were found to be relevant for less familiar participants to connect with the newly formed group. This is coherent with the Social Identity Theory that recognizes the strong link between social categorization and the formation and reinforcement of social identity, allowing people to make sense of the otherwise unorganized world around them (Maillé & Saint-Charles, 2012). Although we found some evidence for the existence of Perceived Shared Identity in the group, the conscious awareness of this component of social cohesion was limited among participants, therefore, leaving much room for future research to dive into the complex topic of shared social identity.

Individual Dimension

The results of Studies 1 and 2 combined proved to be useful in the discussion of the individual-level components of the conceptual model on social cohesion. From the literature, it is understood that a Sense of Belonging is tied to the mechanism of inclusion and exclusion (Moustakas, 2023). Our participants confirmed this link to inclusion (Study 2), describing how feelings of connectedness with group members helped with social inclusion and belonging. According to the belongingness hypothesis, the human drive for meaningful interpersonal relationships leading to feelings of belonging can be satisfied by frequent and pleasant interactions with others (Baumeister & Leary, 1995). Participants' desire to spend time with group members (Study 2) and the increased perceived sense of belonging (Study 1) supported this hypothesis, suggesting that the component of belonging is an important indicator of social cohesion.

Next, the subjective component of Trust was difficult for some members of the group to evaluate in Study 2, as they felt trust was a nebulous concept in the context of the study. However, other members reported that the existence of trust was necessary for their continued attendance, or at least the absence of distrust. The neutral public venue contributed to feelings of safety as well, as well as shared experiences with members of the group. This is as expected, as per the definition of groups as "bounded communities of mutual trust and obligation where members trust fellow members to do them no harm..." (Hogg, 2020). Unexpectedly for our participant pool, support for Uncertainty-Identity Theory (Hogg, 2020) was captured by the single student from a different University (in Study 2). They mentioned that, in their marginalized position, trust was especially a concern before the first gathering. This participant also expressed the most conscious effort to demonstrate commitment to the group by trying to actively figure out the group identity and dynamics, and getting to know the group members. Overall, even though it was hard for participants to self-report it, Study 1 revealed that Trust in the Group did improve over time,

peaking after every co-creation session. This provides us with some evidence for the importance of Trust as a component of social cohesion.

Our findings also confirm that Personal Engagement is a dynamic and context-sensitive factor that contributes to social cohesion. We found that personal engagement is both a driver and an outcome of cohesion, aligning with Fonseca et al. (2019). The interactive nature of the co-creation workshops supported personal engagement by encouraging regular attendance and the sharing of ideas. Personal engagement is behavioral, emotional, and cognitive (Fredricks et al., 2004). Emotional engagement can bloom in a safe environment, where people feel respected and safe, showing how all the different constructs influence each other. The conversational discussions allowed for thoughtful participation, focusing on the cognitive aspect of personal engagement. The structure of the workshops allowed even those less likely to speak up to contribute comfortably, increasing their behavioral engagement. The quantitative data collected in Study 1 show that participants felt higher personal engagement after the final measurement compared to the initial measurement. This supports that, as highlighted in our conceptual framework, fostering engagement through co-creation practices can be an effective pathway to strengthening group cohesion.

Furthermore, Studies 1 and 2 indicated connections between both self-uncertainty and Feelings of Inclusion and Respect, as well as feeling heard and Feelings of Inclusion and Respect, as previous research has suggested. Shy members reported feeling free to communicate openly due to the actively inclusive dynamic, and being grateful for the balanced use of multiple modes of communication, enabling all voices to be heard (Study 2). This aligned closely with the results of Roos, Postmes & Koudenburg (2023), who found that people feel more heard when they are treated with respect. This feeling of respect includes being taken seriously and receiving recognition, which, in turn, was highlighted by the appreciation for the 'Yes, and' approach to idea-sharing; the recognition of each new idea and the constructive feedback when they did not perfectly align with the activities or common goal, hence contributed to co-creation, and strengthening social cohesion (Study 2). This was also emphasized as important for inclusivity by a less acquainted group member, which supports the Uncertainty-Identity Theory that states individuals must feel accepted within the group for an effective reduction in one's uncertainty (Hogg, 2020). Overall, members felt they and their ideas were included and respected, contributing to the perceived social cohesion in the group (Study 1). Study 1 also illustrated an improvement in Feelings of Inclusion and Respect over time. Interestingly, participants reported that the enhancement of these feelings was (partly) due to the small group size, which contributed to personal connectedness and social cohesion, in turn, a concept we did not find in the literature.

Finally, and as expected, participants' attitudes towards peers informed individual factors of social cohesion. Participants reported choosing to attend the first session because they were directly invited by peers, and choosing to continue attending because they liked the group members and researchers and felt positive perceived or real peer pressure to participate. The desire to participate was also motivated by their feelings toward and perceptions of their peers. They reported comfort and trust increased as insecurity and nerves decreased with improved perceptions of the group and peers. One member reported that peer pressure was the strongest motivator for them to participate. This accords with the literature, which indicates that mutual liking is foundational in social cohesion and facilitates participation, influencing conformity and shaping interpersonal and social perceptions (Fonseca et al., 2019).

Strengthening of Cohesion over Time

Social cohesion increased with each session and also over the duration of the sessions. Members reported increased trust and openness of communication, and that getting to know one another in a new setting, for those previously acquainted, increased cohesion. As mentioned before, the repeated interactions with a mostly familiar group of people proved beneficial, in line with the literature. We also noted that some members who had felt excluded in other situations took more time to trust.

The results of study 1 indicated an overall increase in the perceived social cohesion among the participants of the co-creation workshops. The Total Social Cohesion score rose by 0.72 from the initial to final survey, indicating a stronger group cohesion. The same increase was found for the other five components, with the increases ranging from 0.26 (Personal Engagement) to 0.93 (Attitude towards Peers). Additionally, there is some evidence that indicates that there was a growing alignment in perceptions as the variability of responses across participants decreased over time.

However, the data from the surveys also contains outliers, causing fluctuations in the data, such as the decrease in the score for Personal Engagement between the Pre-Workshop and Post-Workshop measurements for the first workshop. Due to the small sample size, a single participant's answers can affect the group averages significantly. This means that small disruptions can have a great impact on the results. If one participant may have interacted with a different person who listened less attentively, showed less empathy or respect, they may have found the interaction less satisfactory (Roos et al., 2023; Baumeister & Leary, 1995). Since the data from the survey is anonymous and limited, we can only speculate by using the data collected in the focus group discussion.

Limitations and Future Research

The small sample size of participants and surveys limited the viable paths for statistical analysis, including significance testing. In addition, it is important to acknowledge outside influences on the participants, as we measured *perceived* social cohesion, such as social desirability biases, mood at the time of completion, and the interpretation of the questions, especially as the scale from 1-5 captures less detail than a larger scale would have been able to. Our participant pool was also generally constricted to acquaintances, which limited our ability to measure trust, for example, and the impact of activities designed to increase cohesion. Future research would therefore benefit from an increased participant pool, control conditions, and statistical tests. We also suggest future applied research in other disciplines, exploring how the conceptual model of social cohesion can be used to organize collective action for social change.

Conclusion

This study explored the development of social cohesion within a group of international students through multiple co-creation workshops, answering the research question of how *co-creation workshops can increase the perceived social cohesion among (international) students in Leeuwarden, the Netherlands, in the context of the sustainable energy transition*. These workshops, designed to improve social cohesion, were based upon our conceptual model that intervenes at the group level to increase individual-level social cohesion.

Findings from the surveys and the focus group indicated an overall increase in the perceived social cohesion throughout the co-creation workshops. The focus group discussions supported the quantitative results, highlighting that shared goals, inclusive dialogue, and the opportunity for meaningful participation contributed to the strengthening of group dynamics and interpersonal trust, in line with the literature. The results suggest that co-creation workshops are an effective way to enhance social cohesion, especially when coupled with an active approach to including members and multiple avenues for members to communicate their thoughts. However, due to the small sample size and context-specific nature of the study, we recommend further research into this topic. Co-creation workshops can be a valuable tool in fostering social cohesion for collective action across a broad spectrum of fields and beyond the academic setting of our study, and we recommend applying these findings to small-scale community efforts in order to organize sustainable transitions in local settings. We hope that the practical recommendations, including anonymous participation options, icebreaker activities, and a neutral environment that primes the group identity, will prove to be valuable tools for Energy Cooperatives in facilitating co-creation and social cohesion for a sustainable energy transition.

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Appendices

Appendix 1. The promotional posters



Appendix 2. Survey Questions

Before creating the surveys, we composed a list of example statement-questions structured according to the individual aspects of the conceptual model. Each survey included two of these questions per individual aspect, which participants could answer by grading their feelings related to the statements on a scale from 1-5 (1 meaning Disagree; 5 meaning Agree). One open question was included at the end of every survey, as an opportunity for participants to elaborate on their answers or feelings.

The statement-questions are listed below. The bolded statements are the ones we used in the survey. All three pre-surveys contained the same questions, and the same goes for the after-surveys.

Sense of Belonging

- **I belong in this group.**
- **I share values and/or interests with other group members.**
- **I identify with this group.**

Trust in Group

- **I trust the other participants.**
- **I can rely on the other participants.**
- **I feel safe in the group (in sharing my opinions/ideas/input).**

Personal Engagement

- **I would like to stay in touch with people from this group after the workshop.**
- My input matters/influenced the outcome.
- **We worked toward a common goal.**
- I am contributing to/part of something important in these meetings.
- **I would like to spend more time with the participants.**

Feelings of Inclusion and Respect

- The other participants listen to my ideas.
- **I am an accepted and valued member of this group.**
- **I believe others in this group are interested in my contributions.**
- **I am respected by the other participants.**

Attitudes towards Peers

- **I am emotionally connected to other participants.**
- I like the other participants.
- **I enjoyed the gathering.**
- **I view the other participants as friends.**
- **I had a good feeling about the other people in the group.**

There was a feeling of togetherness in the group.

There is a feeling of unity and cohesion in the group.

Appendix 3. Informed Consent Form Survey

Dear participant,

Thank you for your interest in participating in this research. The following explains what the research entails and how it will be conducted. Please take the time to read the following information carefully. If any information is not clear, kindly direct questions to the researchers using the contact details provided at the end of this letter.

What is this research about?

This study explores how social gatherings of students in Leeuwarden can help create an activity for the Bloeiweek; a week-long event at the end of June with the goal of promoting positive health in the community, including sustainability. Your participation will help expand knowledge on how students can contribute to a sustainable energy transition by being involved in the creation of activities that aim to raise awareness for this issue. This research is not sponsored or funded and is conducted as part of the Living Lab (research internship) of the Global Responsibility and Leadership program at Campus Fryslân (University of Groningen), on behalf of the Energiecoöperatie Binnenstad Leeuwarden.

What does participation involve?

This study involves a survey before and after every social gathering, as well as a focus group discussion at the end of the last gathering. A separate consent form will be given at a later date for the focus group discussion. Completing the survey will take at most 5 minutes. Besides the survey and the focus group discussion, participation in the study also requires partaking in the social gatherings. There are three social gatherings planned, each taking 1,5 hours. There are no right or wrong contributions to the gathering, nor right or wrong answers to the survey. We are merely interested in your opinions and involvement. Your participation in the social gatherings, and therefore in the survey, is not anonymous, since you will meet the other students participating in the social gatherings. However, data collection in the surveys will remain completely anonymous through a Self-Generated Identification Code and will be used solely for academic purposes. Your participation is completely voluntary, and you may stop at any time without providing a reason.

Do you have to participate in this research?

No, participation is completely voluntary. Participants are free to withdraw from the focus group discussion, to abstain from submitting a completed survey, or to leave the social gathering at any time without providing a reason and without facing any consequences.

Are there any risks in participating?

This study does not involve any physical, psychological. Participation involves very low social risks.

Are there any benefits in participating?

Joining in the social gatherings may benefit the participants in social ways (meeting new people, making new friends) and in terms of well-being (spending time outdoors, fostering creativity, and enjoying snacks). Furthermore, your contributions will help us to finish our research internship, and will help create an activity for the Bloeiweek.

How will the information you provide be stored and protected?

All data collected will be treated as confidential. No personally identifiable information will be collected. Instead, anonymous Self-Generated Identification Codes will be used by the participants in the survey (with further explanation given within the survey form as to how to make a code). Responses will be analyzed on the group level and will be securely stored under a two-factor security lock and later on the Y-drive of the University of Groningen server, only accessible to the research team.

What will happen to the results of the research?

The findings will be used for a research report as part of the Global Responsibility and Leadership programme. If the results are published, they will be shared in compliance with ethical guidelines, ensuring participant confidentiality. The results will be presented at the Campus Fryslân Conference. You can request a summary of the findings if you are interested.

Ethical approval

This research study follows the ethical guidelines from the Campus Fryslân Ethics Committee. Researchers will uphold themselves to all relevant ethical standards.

Informed consent form

By signing below, you confirm that you have read and understood the information provided about this research study. You agree to participate in the study with the understanding that your participation is voluntary, and you have the right to withdraw from the study at any time without any consequence.

Who should you contact for further information?

Contact Information for further questions, information or complaints:

Primary contact persons:

Alec van Iperen | a.d.van.iperen@student.rug.nl | Campus Fryslân (University of Groningen)

Rabea van Nieuwenhuijsen | r.van.nieuwenhuijsen@student.rug.nl | Campus Fryslân (University of Groningen)

Sophie de Groot | s.de.groot.9@student.rug.nl | Campus Fryslân (University of Groningen)

Living Lab supervisor:

Professor Josefine Geiger | j.l.geiger@rug.nl | Campus Fryslân (University of Groningen)

Signature

By signing below, you confirm that you:

- Are a student.
- Live in the city of Leeuwarden.
- Have read the study description.
- Agree to participate voluntarily and understand that you can withdraw at any time.
- Give informed consent for partaking in the survey.

Appendix 4. Self-Generated Anonymity Code

To ensure anonymity of the participants' survey responses over the course of the three weeks in which the co-creation workshops took place, while still linking participant responses across the multiple data collection points, a self-generated identification code (SGIC) was used. For this method to be effective, the code must be accurate, unique and consistent over time (Audette et al., 2019). As such, the questions used to produce the self-generated identification code should be carefully chosen. Based on literature (Audette et al., 2019; Ripper et al., 2017), we considered five factors: the questions must reflect elements that will be (1) salient (meaning: easy to remember), (2) constant over time, (3) nonsensitive, (4) simple to format consistently, and (5) difficult to for others to decode.

Among various approaches to anonymous participant coding, SGICs are evaluated as one of the most efficient methods, as they balance privacy with data integrity (Audette et al., 2019). Overall, previous research demonstrates that personal information tends to remain more stable over time than family-related information, making it more reliable for code generation. Additionally, using five (or more) code elements has shown to significantly improve match rates between survey waves. As such, Audette et al. (2019) recommend to include three personal and two nonpersonal elements in the self-generated anonymity code. Specifically, they found that the most dependable code elements include the following:

- Birth month
- Assigned sex at birth
- First initial of one's middle name
- First initial of the mother's first name
- Number of older siblings

These elements meet all five criteria listed above. An example of best practices recommendation for self-generated identification codes from the literature can be found below.

Question stem: What is the ...						
	Month you were born?	Sex you were assigned at birth?	First initial of your first middle name?	First initial of your mother's first name?	Number of older siblings	Self-generated identification code
Example response Code created	January 01	Female F	Katherine K	Mary M	2 02	01FKM02

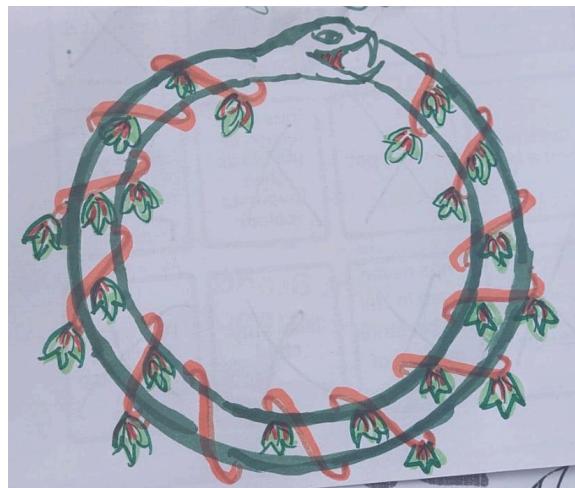
Following this formula we asked our participants this in each of the six surveys:

"The code must consist of the 5 following elements in the following order: (1) the number of the month you were born in, (2) the letter of your assigned sex at birth, (3) the first letter of your first middle name (if you do not have a middle name, use the letter X), (4) the first letter of your mother's first name, and (5) the number of your older siblings (if you do not have older siblings, use the number 00)."

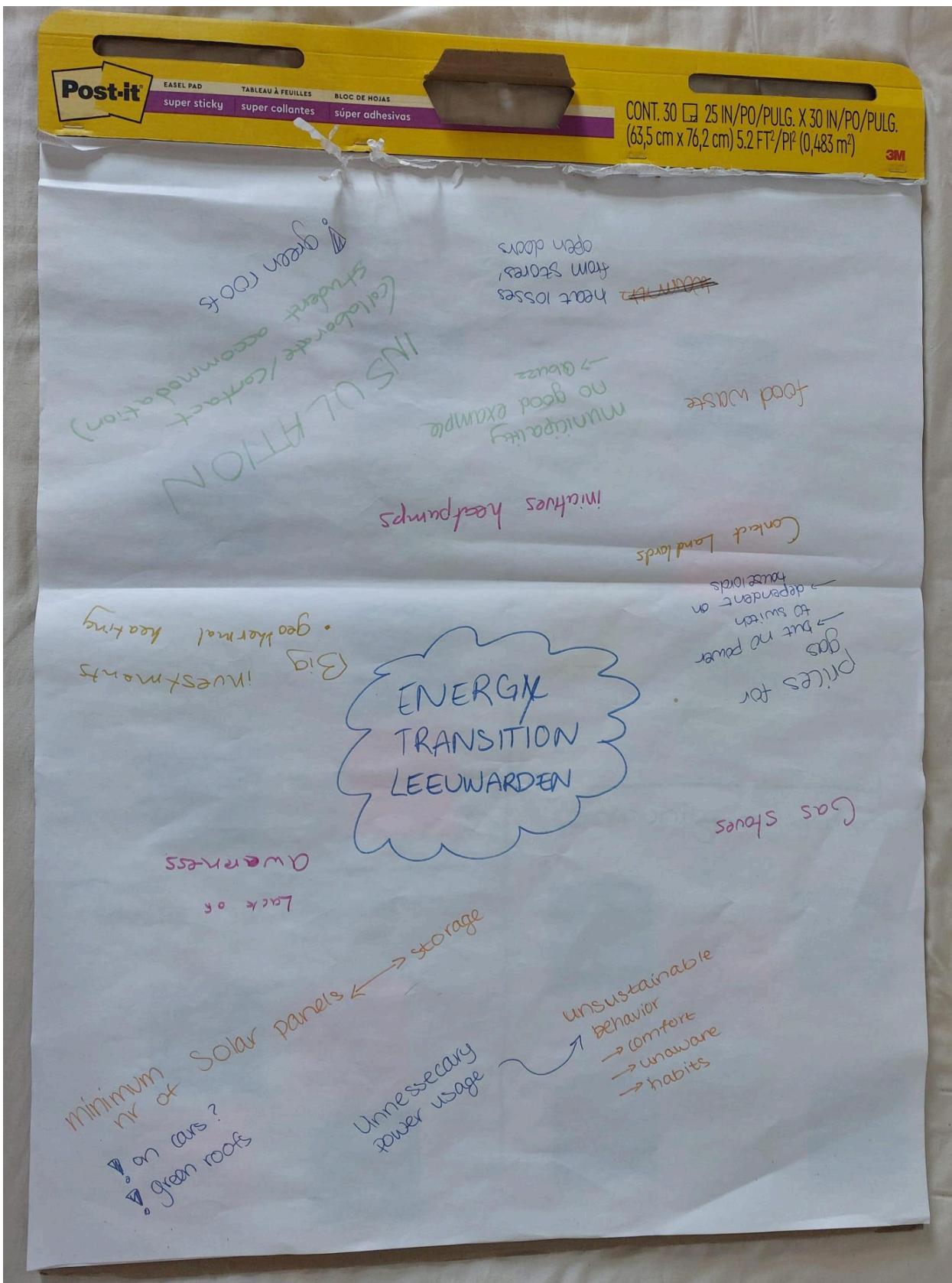
Appendix 5. The Bingo Icebreaker (workshop 1)



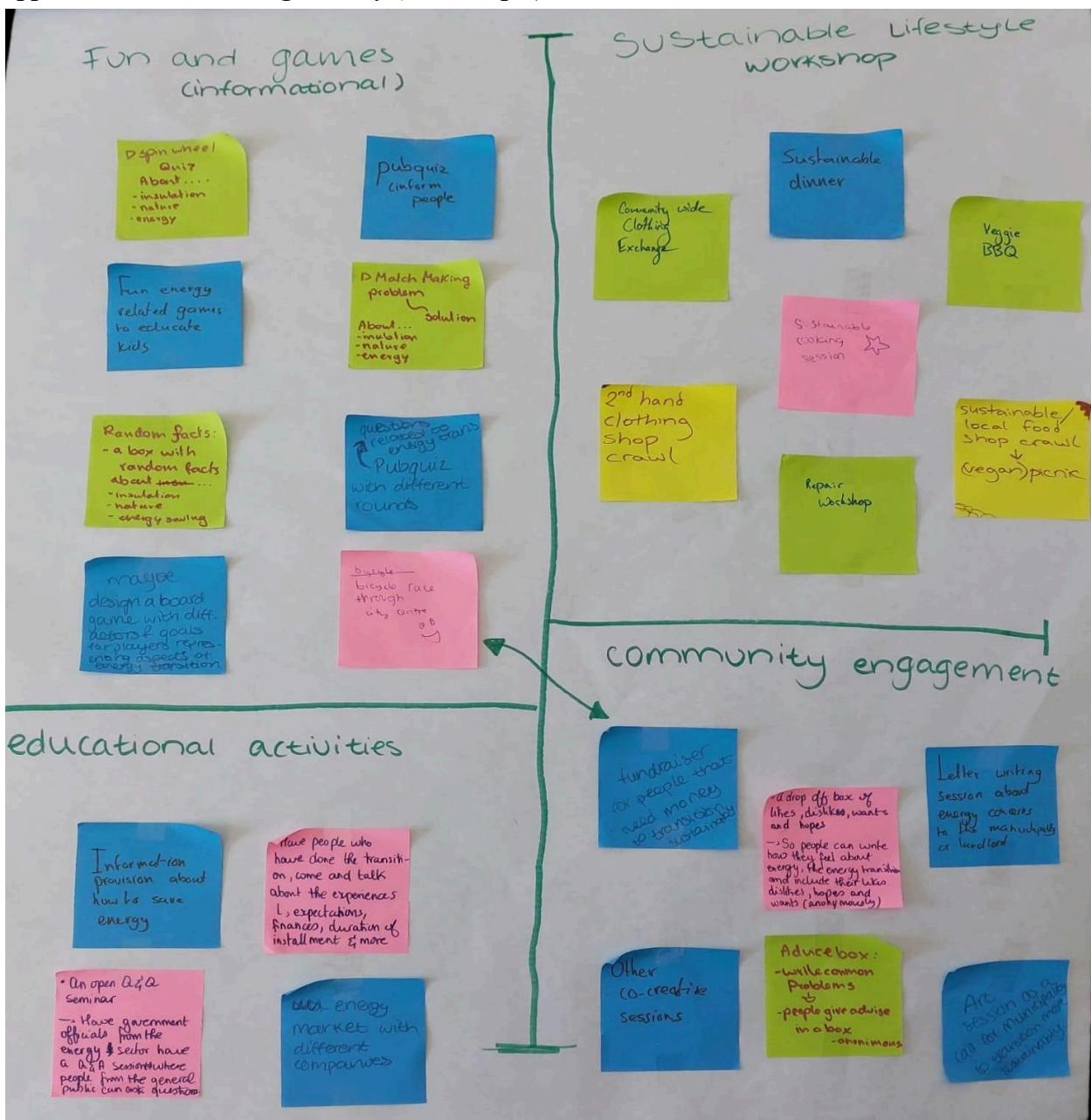
Appendix 6. Flag Drawing Activity (workshop 1)



Appendix 7. Mind Map Activity (workshop 1)



Appendix 8. Brainwriting Activity (workshop 2)



Appendix 9. Focus Group Discussion Guide

Thank you for joining our focus group today. We will use your input in this session and from the surveys for our research on social cohesion. You are free to answer any questions or decline if you prefer not to answer the questions. We have prepared some leading questions, but you are welcome to expand your answers to topics you think are relevant as well. We also encourage you to ask the other participants questions or discuss a topic. There are no right or wrong opinions; we are just interested in how you have experienced the co-creation workshops and how you perceive the social cohesion in the group. If you have any questions or concerns after the focus group, feel free to reach out to one of us to discuss them further in private.

1. Why did you choose to join the social gatherings? What were your expectations going into the meetings?
2. Do you feel that the common goals (of designing an activity, of ecological action) brought us closer together?
3. In our surveys, we asked some questions related to the sense of belonging you feel to the group. To what extent have you felt a part of the group? How has this changed over time, and why do you think that is? How do you think the co-creation workshops improved this?
4. Another topic we touched on was the trust you have in the group. Would anyone be willing to share a bit about their personal experiences on this topic?
5. We are also interested in your perspectives on your feelings of inclusion and respect within the group and towards you. Does anyone have any thoughts they want to share on this topic?
6. One of the other aspects we would love to get to know more about is your attitude towards your peers in the group. How has this changed over the past weeks, and why do you think that is?
7. Do you feel like you had a shared identity within the group? How do you think the co-creation workshops improved this?
8. In regard to communication within the group, did you feel like there was open communication that you felt comfortable with?
9. Have you participated in similar events before?
10. What positive effect have you experienced from this form of creation? Were there negative events you think this form of creation has caused? How did you experience the participation and collaboration in the group?
11. How did you experience the co-creation workshops?
12. Do you have any other comments you would like to discuss?

Appendix 10. Informed Consent Form Focus Group

Dear participant,

Thank you for your interest in participating in this research. The following explains what the research entails and how it will be conducted. Please take the time to read the following information carefully. If any information is not clear, kindly direct questions to the researchers using the contact details provided at the end of this letter.

What is this research about?

This study explores how social gatherings of students in Leeuwarden can help create an activity for the Bloeiweek; a week-long event at the end of June with the goal of promoting positive health in the community, including sustainability. Your participation will help expand knowledge on how students can contribute to a sustainable energy transition by being involved in the creation of activities that aim to raise awareness for this issue. This research is not sponsored or funded and is conducted as part of the Living Lab (research internship) of the Global Responsibility and Leadership program at Campus Fryslân (University of Groningen), on behalf of the Energiecoöperatie Binnenstad Leeuwarden.

What does participation involve?

This study involves a survey before and after every social gathering, as well as a focus group discussion at the end of the last gathering. The focus group discussion will take about 45 minutes, in which we aim to guide a discussion on the findings from the survey. The discussion will be audio-recorded. Besides the survey and the focus group discussion, participation in the study also requires partaking in the social gatherings. There are three social gatherings planned, each taking 1,5 hours. There are no right or wrong contributions to the gathering, nor right or wrong answers in the focus group discussion. We are merely interested in your opinions and involvement. Your participation in the social gatherings, and therefore in the focus group, is not anonymous, since you will meet the other students participating in the social gatherings. However, data collection in the focus group discussion will remain completely anonymous through the use of non-identifiable notes and will be used solely for academic purposes. Your participation is completely voluntary, and you may stop at any time without providing a reason.

Do you have to participate in this research?

No, participation is completely voluntary. Participants are free to withdraw from the focus group discussion, to abstain from submitting a completed survey, or to leave the social gathering at any time without providing a reason and without facing any consequences.

Are there any risks in participating?

This study does not involve any physical, psychological risks. Participation involves very low social risks.

Are there any benefits in participating?

Joining in the social gatherings may benefit the participants in social ways (meeting new people, making new friends) and in terms of well-being (spending time outdoors, fostering creativity, and enjoying snacks). Furthermore, your contributions will help us to finish our research internship, and will help create an activity for the Bloeiweek.

How will the information you provide be stored and protected?

All data collected will be treated as confidential. No personally identifiable information will be collected. Instead, anonymous Self-Generated Identification Codes will be used by the participants in the survey (with further explanation given within the survey form as to how to make a code). The recording of the focus group discussion will be deleted after transcription, which will in turn only make use of non-identifiable markers. Responses will be analyzed on the group level and will be securely stored under a two-factor security lock and later on the Y-drive of the University of Groningen server, only accessible to the research team.

What will happen to the results of the research?

The findings will be used for a research report as part of the Global Responsibility and Leadership programme. If the results are published, they will be shared in compliance with ethical guidelines, ensuring participant confidentiality. The results will be presented at the Campus Fryslân Conference. You can request a summary of the findings if you are interested.

Ethical approval

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Informed consent form

By signing below, you confirm that you have read and understood the information provided about this research study. You agree to participate in the study with the understanding that your participation is voluntary, and you have the right to withdraw from the study at any time without any consequence.

Who should you contact for further information?

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Living Lab supervisor:

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Signature

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- Agree to participate voluntarily and understand that you can withdraw at any time.
- Give informed consent for partaking in the focus group discussion.