Online vs Offline Brainstorming: The Influence of Feeling Heard on Satisfaction and Engagement in Ideation.

Mallory Kristy Wever

SNR: 2082452

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Tilburg School of Humanities and Digital Sciences

Tilburg University, Tilburg

Supervisor: Carla Roos

Reader: Sara Bögels

Second Reader: Jan Engelen

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Abstract

As remote working is now the new norm, online brainstorming, in which individuals generate a large number of ideas in a short amount of time, has also become particularly popular. Despite the advantages of online brainstorming, research shows it tends to leave participants feeling unsatisfied and disengaged. People feel less heard online; therefore, an underlying mechanism behind these factors can be the feeling of being heard. This study focuses on the difference in levels of engagement and satisfaction between online and offline brainstorming, and whether this difference can be explained by the feeling of being heard. A between-subjects design with 2 conditions was conducted to investigate these effects, with 116 participants randomly allocated to one of these two conditions. The results of the study showed that online brainstorming decreases engagement and satisfaction compared to offline brainstorming. Furthermore, when adding the feeling of being heard to the equation, a mediation effect was uncovered, suggesting that feeling heard mediates the relationship of the mode of brainstorming with engagement and satisfaction.

Overall, people tend to feel less engaged and satisfied in online brainstorming compared to offline brainstorming. This difference can be explained by the sense of feeling heard. According to these findings, an offline mode of brainstorming is suggested for an effective brainstorming session, away from digital devices or online platforms. Furthermore, it is recommended to cultivate a collaborative environment by encouraging active listening and active participation. This entails attentively listening to others' ideas and actively contributing one's thoughts and perspectives. By fostering such a collaborative atmosphere, the exchange of ideas becomes more fruitful, leading to a more effective brainstorming process. We can unlock the potential for enhanced creativity, innovation, and problem-solving by emphasizing the importance of feeling heard in a brainstorming session. These findings help provide insight into how to conduct an effective brainstorming session and how to address it.

Keywords: brainstorming, online, offline, satisfaction, engagement, feeling heard.

Online vs Offline Brainstorming: The Influence of Feeling Heard on Satisfaction and Engagement in Ideation

Online brainstorming has gained significant traction, particularly since the outbreak of the COVID-19 pandemic (Kalmar et al., 2022). Brainstorming is a creative problem-solving technique that involves generating a large number of ideas in a short amount of time, encouraging participants to express their ideas freely, without judgment or criticism (Osborn, 1963). Brainstorming exhibits versatility as it can be used in individual or group settings to generate ideas on a specific topic (Suleri, 2020). Online brainstorming allows participants to share their ideas and collaborate remotely using digital tools (Michinov, 2012). Compared to traditional brainstorming, online brainstorming utilizes virtual platforms for idea generation and problem-solving (Lubart, 2006). The use of virtual platforms for brainstorming and collaboration has become an essential tool for many businesses and organizations, especially since remote work has become the norm (Kosalge et al., 2022). Online brainstorming has emerged as a vital tool, due to its improved accessibility, flexibility, and documentation. However, despite its advantages, online brainstorming may leave participants feeling unsatisfied and disengaged, which is harmful, and could negatively impact performance, communication, and collaboration (Faure, 2004).

One major downside of online brainstorming is the possibility of participants' disengagement or disconnect with the process (Michinov & Primois, 2005). Distractions, difficulty communicating, understanding one's ideas, a lack of enthusiasm, and other issues can all contribute to participants feeling disengaged (Diehl & Stroebe, 1991). When participants are not fully immersed in the process, communication and collaboration can suffer, which in turn has a negative effect on the brainstorming session's results (Michinov, 2012). Moreover, a lack of new ideas and diversity of thought can result from not participating in a brainstorming session (Wuchty et al., 2007). Additionally, a lack of engagement of participants in brainstorming may deter those who are already participating from offering their ideas. This could create a negative environment where participants may feel that their contributions are not valued (Kohn et al., 2011). As a result, not participating

can affect group or individual performance, production, or productivity (Mao et al., 2022). If participants were more involved, they would be more motivated due to having more ideas and be happier and more satisfied with the process (Haslam et al., 2019).

Similar to disengagement, a lack of participants' satisfaction during brainstorming could have unfavorable effects, including lowering morale, decreasing motivation, fostering poor collaboration (Faure, 2004), decrease in critical thinking, and bias toward familiar ideas (Halfhill et al., 2005). When dissatisfied with the brainstorming session, participants may become less invested in the outcome (Rietzschel et al., 2006). This outcome may lead to an absence of idea implementation and a decline in the quality of ideas generated (Zainol et al., 2012). On the other hand, satisfied participants can have a more beneficial session with a more substantial commitment to the project (Zainol et al., 2012). Research has found that participants who are satisfied with their brainstorming are more likely to participate fully and collaborate, leading to a good performance (Peeters et al., 2006).

Overall, both lack of satisfaction and engagement can have detrimental effects on participants, particularly in online meetings, as they can hinder effective collaboration (Rietzschel et al., 2006). Considering the abovementioned information, in online meetings, participants may experience reduced satisfaction and engagement due to factors such as technological challenges, limited social interaction, and distractions, all of which can challenge the sense of feeling heard. Therefore, for various reasons, online meetings often result in participants feeling less satisfied and less engaged (Jeong & Chiu, 2020). This could be a result of the following factors: absent eye contact, asynchronous, short on time, and being distracted (Nijstad et al., 2003). In online meetings, participants may feel less satisfied and less engaged as they might not feel heard when people do not look each other in the eye, talk simultaneously, or are otherwise distracted (Zhou & Rouse, 2021). These factors can be detrimental for participants because they can result in someone not feeling heard (Roos et al., 2021). Therefore, an underlying mechanism influencing satisfaction and engagement may be "feeling heard" which could be an important mediator in this behavior and experience. When people feel genuinely heard, it can contribute to participants' overall

satisfaction and foster higher levels of engagement. Considering that being heard might enhance engagement and satisfaction during the brainstorming process, “feeling heard” could be important to enhance the online brainstorming process.

In conclusion, there may be a way to enhance online brainstorming if one can determine why people could be more engaged with or satisfied with the brainstorming processes. By enhancing online brainstorming, it is possible to increase the efficiency and engagement of online brainstorming for all groups. Online brainstorming has been a valuable tool for businesses, organizations, and academics, so it is essential to maximize its potential, be more aware of all the challenges, and mitigate them. Ultimately, the scientific exploration of feeling heard and its effects on engagement and satisfaction provides valuable insight into the dynamics of human interaction, communication, and collaboration, contributing to the advancement of knowledge and the improvement of various social and professional domains. Hence, by comparing online and offline brainstorming processes, we may gain a better understanding of the underlying mechanism influencing participants’ satisfaction and engagement. Therefore, the following research question is emphasized: "*Is there a difference in the level of engagement and satisfaction between online and offline brainstorming, and can this difference be explained by the sense of feeling heard*?"

Theoretical Framework

Online vs Offline Brainstorming

Online and offline brainstorming are two different approaches of ideation generation to conduct brainstorming sessions (Osborn, 1963). Offline brainstorming, also known as traditional brainstorming, involves a physical gathering of individuals in a shared space, allowing for synchronous participation (Martin & Hanington, 2012). In offline brainstorming, participants usually write their ideas on a whiteboard or paper so that everyone can see and build on each other's ideas (Tomitsch, 2018). Offline brainstorming can indeed help build relationships and rapport between participants, which, in turn, can help build trust and encourage more open sharing of ideas, while online brainstorming lacks this aspect (Gilbert et al., 2013). Contrary to offline brainstorming, online brainstorming

sessions are less synchronous, and there is a lack of eye contact, either complete (camera off) or partial (improper gaze direction) (Ghazal et al., 2015). Online brainstorming, on the other hand, takes place virtually, with participants utilizing digital platforms such as video conferencing and meeting tools, chat rooms, or collaborative documents (Michinov, 2012). An important difference between online and offline brainstorming is the level of distractions and interruptions experienced (Sio et al., 2017). Online brainstorming sessions can be disrupted by external factors such as pets, and interruptions from other people around your home. Compared to online, offline brainstorming has different disruptions by external factors such as noise or interruptions from other people (Nijstad et al., 2003). As mentioned before, conducting a comparative analysis of online and offline modes of brainstorming enables a comprehensive understanding of how the virtual environment influences the experience of being heard. By studying the outcomes of engagement and satisfaction, researchers can explore how these modes influence the participants' experiences.

Engagement in Brainstorming

As previously mentioned, the structural differences between online and offline brainstorming can impact the level of engagement in the process. When participants are engaged in a brainstorming session, they are more likely to feel motivated and invested in the process, which contributes to a more effective session (Haslam et al., 2019). Actively engaged participants are more likely to stay focused and less prone to distractions, ensuring that the discussion stays on track and all ideas are considered (Litosseliti, 2003). This engagement allows for a diverse range of perspectives and experiences, leading to more innovative ideas (Wuchty et al., 2007). Considering the abovementioned information, engagement is evidently an influential factor that can maintain momentum and energy throughout the brainstorming session (Agusdinata, 2022), therefore, it is important to understand how it differs between an online and offline setting.

Engaging online might be relatively challenging due to several reasons, including technical issues, distractions, lack of visual cues, communication barriers, and social isolation, all of which can impact engagement levels. Technical issues such as slow internet

can cause delays and interruptions, hindering participants' ability to fully engage in the brainstorming process (Ghazal et al., 2015). Additionally, participants choosing to keep their cameras off can create barriers that prevent meaningful connections among participants. The effectiveness of online brainstorming can also be hindered by participants multitasking with technology during the session. Furthermore, in an online brainstorming session, participants may miss out on important visual cues such as body language, expressions, and gestures, which can make it challenging to accurately read and interpret reactions. This, in turn, can result in misunderstandings that may potentially decrease engagement (Ng, 2020). The lack of these cues can make it harder to understand each other and engage in a productive conversation (Trinder, 2016). Lastly, online brainstorming can feel more isolating compared to in-person brainstorming, leading to a lack of social connection among participants. This feeling of disconnection can prove to be a significant barrier to engagement, as participants may feel less motivated to collaborate with others (Wang et al., 2022).

H1: People feel less engaged in online brainstorming compared to offline brainstorming.

Satisfaction in Brainstorming

Satisfaction is another important aspect of brainstorming that can result from success in achieving the brainstorming session's goals and objectives (Peeters et al., 2006). In this context, there are several reasons that may contribute to the decreased satisfaction in online brainstorming, including limited feedback, lack of personal connection, and lack of intrinsic motivation (Brewer & Burgess, 2005; Kennedy & Lynch, 2016; Nijstad et al., 2006). One reason is the limited feedback that participants receive in online brainstorming. Due to the lack of face-to-face interaction, it can be more challenging to obtain immediate feedback on ideas. This can make participants feel that their ideas are undervalued or not given enough attention, leading to lower satisfaction (Nijstad et al., 2006). Another factor is the lack of intrinsic motivation to collaborate, which can divert participants' attention from the brainstorming process and ultimately lead to lower satisfaction. In the context of online brainstorming, virtual environments may pose challenges for individuals to maintain their

intrinsic motivation over time, as the limited collaboration with others can result in a feeling of dissatisfaction (Brewer & Burgess, 2005). Additionally, participants may miss out on the social interactions and personal connections that are often present in offline sessions. The sense of connection with others is important for satisfaction, as individuals who feel connected are more likely to enjoy the process and experience greater satisfaction (Kennedy & Lynch, 2016). Research has shown that individuals on online platforms such as Zoom were less satisfied than in their in-personal social meetings (Kalmar et al., 2022).

H2: People feel less satisfied during online brainstorming compared to offline brainstorming.

Feeling Heard in Brainstorming

An important process variable that can contribute to decreased satisfaction and engagement in online brainstorming sessions is the perception that individuals are less likely to feel heard compared to offline sessions. Feeling heard might be an important factor in brainstorming since it is a crucial component of successful communication. When individuals feel heard in their conversations, they are more likely to engage, persevere, and feel satisfied with the outcome (Roos et al., 2020). Hence, involvement and satisfaction can happen when one feels heard. Research has shown that people feel less heard in online conversations more generally, which can contribute to a decrease in satisfaction and engagement compared to offline sessions (Roos et al., 2021).

According to a study, efficacy suffers significantly when people cannot express their ideas immediately after they are generated due to waiting for turns (Diehl & Stroebe, 1991). When individuals are unable to effectively express themselves, it can result in a lack of being heard by others, which in turn limits their engagement in conversations. When participants feel that their ideas, thoughts, or opinions are not being acknowledged or valued, it can lead to reduced motivation and decreased involvement in the discussion. Thus, one factor of importance for effective brainstorming is people taking speaking turns (Osborn, 1963). This might be difficult to adhere to in online brainstorming, as technology tends to be unreliable, leading to people speaking over each other. Hence, making it difficult for people to be heard.

Thus, indicating that feeling heard might have a mediating effect on the mode of brainstorming on satisfaction and engagement.

H3(a/b): Feeling heard will mediate the effects of mode (online vs offline) of brainstorming on a) engagement and b) satisfaction.

Methods

Design

To investigate the research question and test the hypotheses, an experiment was conducted for this study. The experiment followed a between-subjects design with two conditions. This study aimed to examine the effect between the independent variable (mode of brainstorm) and two outcome variables (engagement and satisfaction) while considering a mediator variable of feeling heard.

Participants, Power, and Sample Size

The design required a sample size of 128 participants. A power analysis using G*Power (Version 3.1.9.2; Faul et al., 2009) confirmed that the projected sample size would provide adequate power (0.80) at $p = .05$ and a medium-sized effect of $f = .5$ for the between-subject design.

The convenience and snowball methods were used to recruit 150 participants for this study, as the principle of "the more, the better" was applied, recognizing that some participants may be unusable. 34 survey responses were deemed unusable due to their ineligibility caused by incompleteness. The final sample included 116 participants of which 87 were females (75%) and 29 were males (25%). The average age of the participants was 32.27 with a standard deviation of 12.04, and it ranged between the age of 18 and 67.

Procedure and Measurements

Participants were randomly assigned to one condition of 2 (online vs. offline) between-subjects design. This was done to test the differences between the conditions. Participants were asked to think back (recall) to an online (N=58) or offline (N=58) brainstorming experience. To facilitate memory recall, the cued recall was utilized. A cued recall is a recall approach, which immerses individuals in a specific moment (Bruun et al.,

2021). The cues on memory retrieval that were offered were multiple choice questions (can be found in Appendix 1) on the brainstorming moment, which allowed participants to retrieve the specifics of the moment and give more context to the experience.

Prior to the official study, five pre-tests were conducted, involving five participants who were asked to complete the survey to ensure the adequacy of the survey questions. These pre-tests helped refine the survey and ensure the appropriateness of the scales and questions. Once the pre-tests were completed and adjustments were made, the survey was officially published with a Qualtrics anonymity URL.

Participants completed an online survey via Qualtrics platform. The participants were required to engage in a thorough reading of the provided study information and sign the informed consent form before proceeding with the survey. They were given the opportunity to seek clarification and ask any questions regarding the research. It was explicitly emphasized that participation in the study was voluntary, and participants retained the freedom to withdraw from the study at any point. The questionnaire specifically referred to the recalled brainstorming session, with items phrased in the context of either an "online brainstorm session" or an "offline/in-person brainstorm session," depending on the condition. In both conditions, participants answered general descriptive questions about the described brainstorming session. These descriptive questions included the connection, number of participants, the format, topic, and length of the session. This was done in order to gather information about the overall nature and characteristics of participants who recalled brainstorming sessions. After providing information about the sessions and answering the scales, participants were asked demographic regarding their age and gender. Each participant spent about 10 minutes completing the online survey. At the end of the survey, participants were thanked for their time, and a debriefing was provided. The survey items, informed consent, and debriefing details can be found in Appendix 1.

For this study, the variables of interest were satisfaction, engagement, and feeling heard. These variables were measured in the following manner:

Satisfaction

To measure satisfaction among participants in the brainstorming session, self-reported questions were included in the questionnaire. Satisfaction was measured consisting of twelve items on a 5-point Likert scale (1 = *totally disagree* to 5 = *totally agree*), e.g., In this online/offline brainstorm session… I was satisfied with my group's productivity. This scale included two questions adapted from Michinov's (2012) scale. All items were preceded by the phrase "In this brainstorm session…" and were tailored to refer to either an online or offline/in-person session based on the condition. The mean of satisfaction was 3.7 (*SD* = 0.90), and the scale demonstrated excellent reliability score (α = .96).

Engagement

To measure participants' engagement in the brainstorming session (online or offline), self-reported questions were included in the questionnaire. The scales of Günüç and Kuzu (2015) and Bolin and Neuman (2006) were adapted for this study, with slight modifications in phrasing to suit the context of brainstorming sessions. The engagement was measured using a scale consisting of three items on a 5-point Likert Scale (1 = *totally disagree* to 5 = *totally agree*), e.g., In this online/offline brainstorm session…I feel like I participated a great deal in the brainstorming sessions. The mean of engagement was 4.0 *(SD* = .81), and the scale demonstrated a good reliability score (α = .83).

Feeling Heard

Participants were presented with eight items in the questionnaire to evaluate feeling heard. The scale used was adapted from the feeling heard scale developed by Roos (2021), with slight modifications to make it applicable to the brainstorming context. A 5-point Likert scale consisting of eight questions was employed, ranging from 1 (totally disagree) to 5 (totally agree), e.g., In this online/offline brainstorm session… "…I felt heard by the other. The mean of feeling heard was 3.6 (*SD* = 0.68), and the scale demonstrated a good reliability score (α = .82).

Furthermore, to provide context for the findings, a descriptive analysis was conducted, which included an open-ended question. Participants were asked to describe

their last online or offline brainstorming session in at least 200 characters (Now describe the last ONLINE /OFFLINE brainstorming session you had, what was the situation?).

Analysis

To analyze the mediation analysis, Model 4 of the PROCESS macro in SPSS was utilized for the mediation analysis (Hayes, 2013). Feeling heard was used as the mediation factor, mode of brainstorming (online vs offline) was used as the dependent variable, and engagement and satisfaction were used as the independent variables. A total of 5,000 bootstrap samples were employed to estimate the indirect effect and its corresponding 95% confidence interval (CI), ensuring robust findings.

To analyze the qualitative data (open-ended question), relevant patterns and context connections were utilized to provide context and conclusions were drawn based on these patterns.

Results

To test the hypotheses, several statistical analyses were conducted. First, two independent *t*-tests were performed to investigate whether satisfaction and engagement were lower in online brainstorming as compared to offline brainstorming (Hypothesis 1 and 2). The independent *t*-test was a suitable choice as the data was divided into two conditions. Second, two mediation analyses were conducted to test whether feeling heard mediated these effects of online/offline brainstorming on satisfaction and engagement (Hypothesis 3a and 3b). Mediation analysis was the choice of statistical technique as it is used to explore the mechanisms through which independent variable affects a dependent variable by introducing a mediator. Lastly, a qualitative analysis was conducted to give context to the sessions.

To gain a deeper understanding of the nature of the brainstorming sessions described in the study, the survey included additional general descriptive information questions that focused on specific details of both online and offline sessions. These questions aimed to gather more information about the nature and dynamics of the sessions. In the case of online brainstorming, it is important to note that the predominant mode used by participants was

video calls, as reported by 41 participants (70.68%). Additionally, 11 participants (18.97%) mentioned the use of Miro, an online brainstorming tool (The Visual Collaboration Platform for Every Team | Miro, n.d.). This tool seems to be emerging for use in facilitating online brainstorming. It includes brainstorming methods and provides easy-to-use assistance. Moreover, internet connectivity in the online condition was also assessed, with 65.5% of participants reporting good internet connectivity, while 27.6% described their internet as "somewhat" good. On the other hand, in the offline condition, participants reported a positive social interaction rate of 77.6%. In terms of the group size, more than three individuals took part in online brainstorming sessions for 65.5% of the participants, compared to 58.6% who reported the same for offline sessions. Furthermore, online brainstorming sessions typically lasted between 45-60 minutes, accounting for 39.5% of the sessions. These sessions primarily focused on education (43.14%) and work (49.02%). On the other hand, offline brainstorming sessions also typically lasted between 45-60 minutes, accounting for 30.51% of the sessions. Similarly, they primarily focused on education (40.68%) and work (38.98%).

Qualitative Analysis

The qualitative data was collected, and the analysis aimed to obtain a comprehensive understanding of participant's perspectives, opinions, and experiences related to their online and offline brainstorming sessions. Participants were asked an open-ended question regarding their brainstorming experience. For instance, participant 94 described their offline brainstorming: "*The last brainstorm session I had included a list of ideas as well as a concept/mind map. From there ai continue to develop my ideas on the mind map as I am a very visual person"*. Similarly, participant 2 stated that for online brainstorming: "*I had a brainstorm session with my team regarding a problem situation. The idea was to brainstorm suggestions for solutions. For this we used Miro"*.

Overall, the responses provided by participants predominantly adopted a neutral stance, emphasizing the description of the session's context, activities, and outcomes. Participant 46, for example, stated "*Brainstorm at work, how to make more members"*,

while participant 49 mentioned "*It was about putting ideas together",* describing their activities during the session.

Moreover, participant 110 reported that "*The last offline brainstorm session entailed changes to an online course we are developing. We are 3 colleagues who are responsible for make these changes. We used our laptops and a whiteboard for our brainstorm session. The whiteboard was used to structure the new online course's modules*".

Interestingly, participants tended to provide extensive descriptions of their offline experiences compared to their online experiences. Notably, when describing their online experiences, participants often adopted a structured approach similar to the process of brainstorming itself. They discussed elements such as the tools employed during the session and the adherence to specific brainstorming guide rules. Participant 39, for instance, mentioned activities including "*At a professional training day. * Purge * Divergent activity with passing on post-it's * Clustering activity * Dotmocracy * HOW/NOW/WOW grid * quick discussion*". Conversely, when recounting offline sessions, participants focused more on the session's context and their personal involvement. Participant 98 stated that "*Situation with experts and students in an offline setting. Five people attending the workshop, experts in human enhancement and technology. Working with post its and pictures. I was one of the experts".* It is important to acknowledge that these qualitative findings offer suggestive insight into participant's experiences during online and offline brainstorming session.

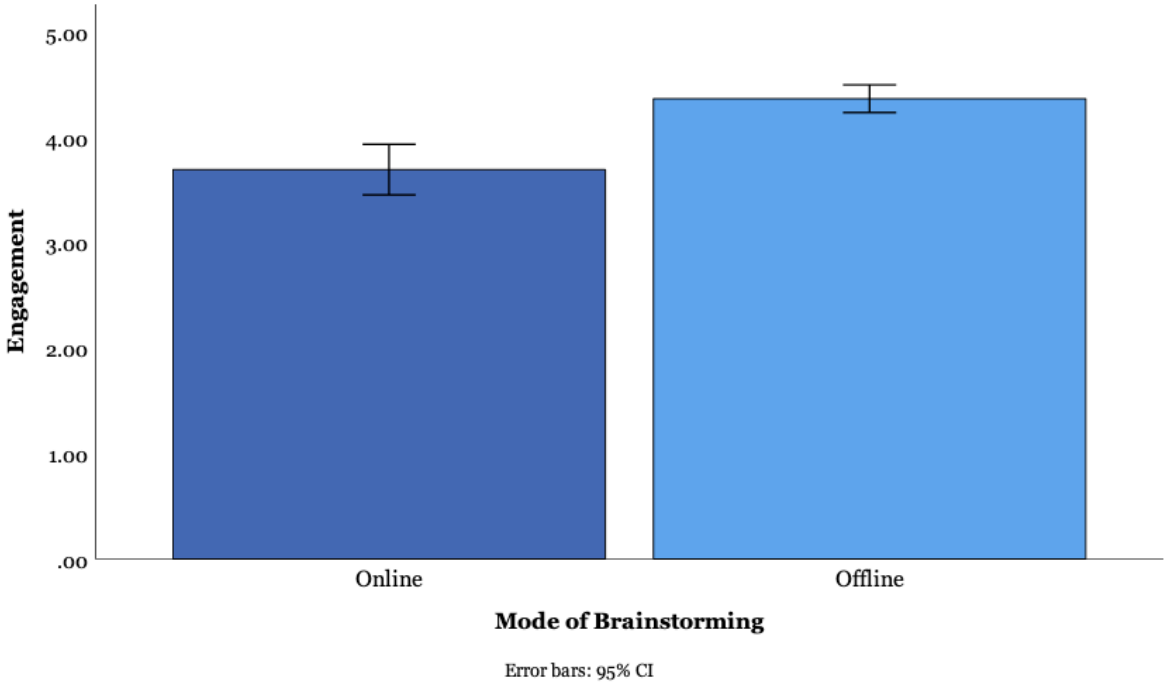
Engagement

To test hypothesis 1, whether people feel less engaged in online brainstorming compared to offline brainstorming, an independent *t*-test was conducted. The data was found to be normally distributed for both online engagement (z-score *skewness* = -1.71, z-score *kurtosis* = -0.30) and offline engagement (z-score *skewness* = - 0.88, z-score *kurtosis* = -1.38). On average, online engagement (M = 3.70, SD = .91) was lower than offline engagement (M = 4.37, SD = -1.38). This difference was significant ($Mdif$ = -.672, t (114) = -4.91, p <.001), indicating a large-sized effect (d = .91). These findings provide support for

hypothesis 1, suggesting that *People feel less satisfied during online brainstorming compared to an offline brainstorming session*. Figure 1 illustrates these findings.

Figure 1

Simple Bar Mean of Engagement on by Online vs Offline Brainstorming

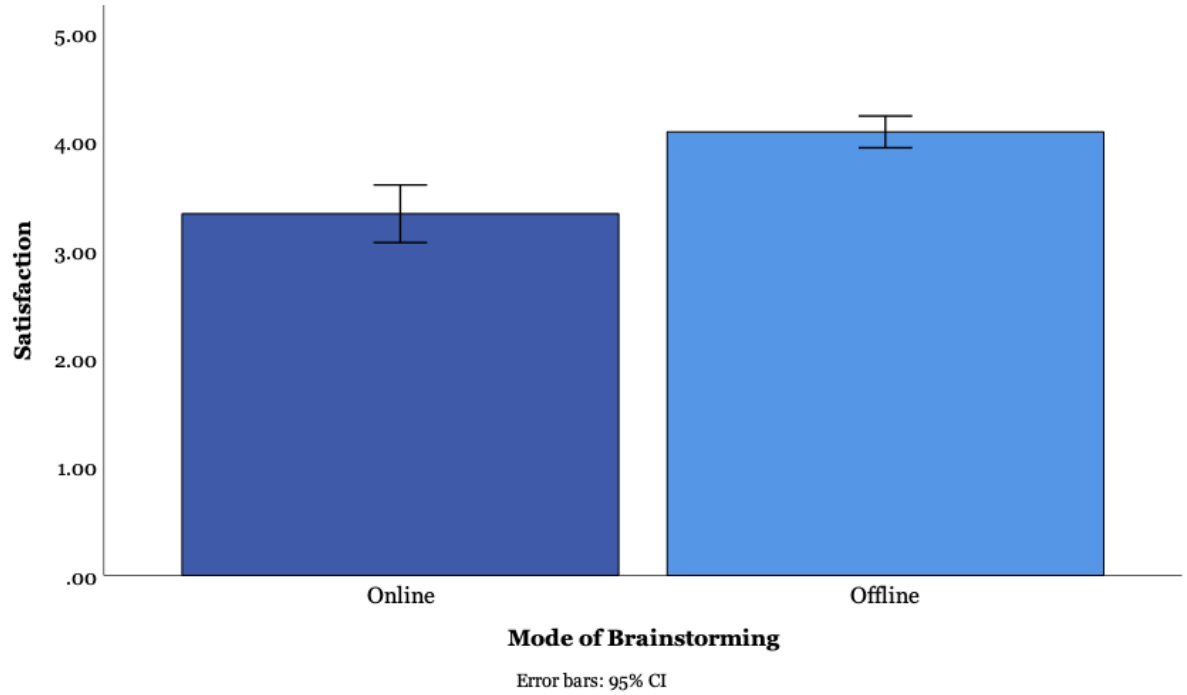


Satisfaction

To test hypothesis 2, which states that people feel less satisfied during online brainstorming compared to offline brainstorming, an independent t-test was conducted. The data for both online satisfaction and offline satisfaction were found to be normally distributed, (z-score *skewness* = -1.38, z-score *kurtosis* = -1.36), and offline satisfaction (z-score *skewness* = -1.30, z-score *kurtosis* = -0.11). On average, satisfaction was lower online (M = 3.33, SD = 1.01) than offline (M = 4.09, SD = .56). This difference was significant ($Mdif$ = -.755, t (114) = -4.99, p <.001), indicating a large-sized effect (d = .93). Therefore, based on this data, hypothesis 2 is supported, suggesting that *People feel less satisfied during online brainstorming compared to offline brainstorming*. Figure 2 illustrates these findings.

Figure 2

Simple Bar Mean of Satisfaction by Online vs Offline Brainstorming



Mediation Analysis

To explore the data and provide an overview of the variables, the variables' means, standard deviations, and intercorrelations were calculated and presented in Table 1. The correlations between the variables were also examined to understand the relationships among them. The correlation analysis revealed that feeling heard, satisfaction, and engagement are all strongly positively correlated. Since the correlation results were high, an assumption of collinearity was checked. The results from the multicollinearity check indicated that multicollinearity was not a concern (Satisfaction, Tolerance = .387, VIF = 2.584; Engagement, Tolerance = .387, VIF = 2.584).

Table 1

Means, Standard Deviations and Pearson Correlation Matrix for Continuous Variable (n= 116)

Variable	M	SD	1	2	3
1. Satisfaction	3.36	0.67	-	.734*	.815*
2. Engagement	4.03	0.81	.734*	-	.738*
3. Feeling Heard	3.72	0.96	.815*	.738*	-

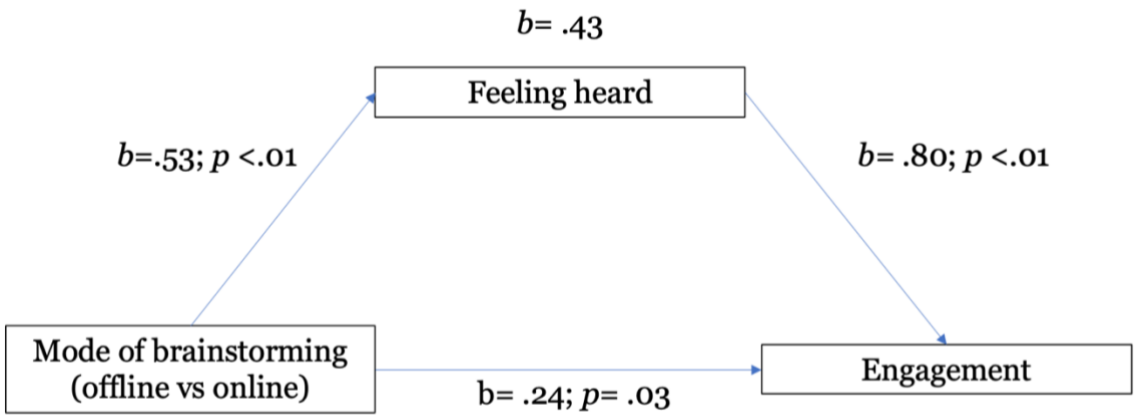
Note. *Correlation is significant at the 0.01 level (2-tailed).

Hypothesis 3a stated that feeling heard will mediate the effects of mode (online vs offline) of brainstorming on engagement. The results of the mediation analysis revealed a significant direct effect of the (online vs offline) mode of brainstorming (IV) on the engagement (DV), b = .24, t (114) = 2.23, p = .03. Additionally, the direct effect of the mode of brainstorming on feeling heard was also found to be significant, b = .53, t (114) = 4.58, p <.01. Moreover, a significant direct effect of feeling heard on engagement was observed, b = .80, t (114) = 9.90, p <.01. Results showed that the indirect effect of the mode of brainstorming on engagement through the mediator feeling heard was significant, b = .43, SE = 0.11, 95% CI [.2168, .6723], indicating a mediation effect. These results indicate that the mediator did mediate the relationship between the mode of brainstorming and engagement.

Therefore, **hypothesis 3a**, proposing that *feeling heard did mediate the effects of mode (online vs offline) of brainstorming on engagement,* was supported by the data. Figure 3 demonstrates these findings.

Figure 3

Mediation Analysis Mode of Brainstorming on Engagement by Feeling Heard.

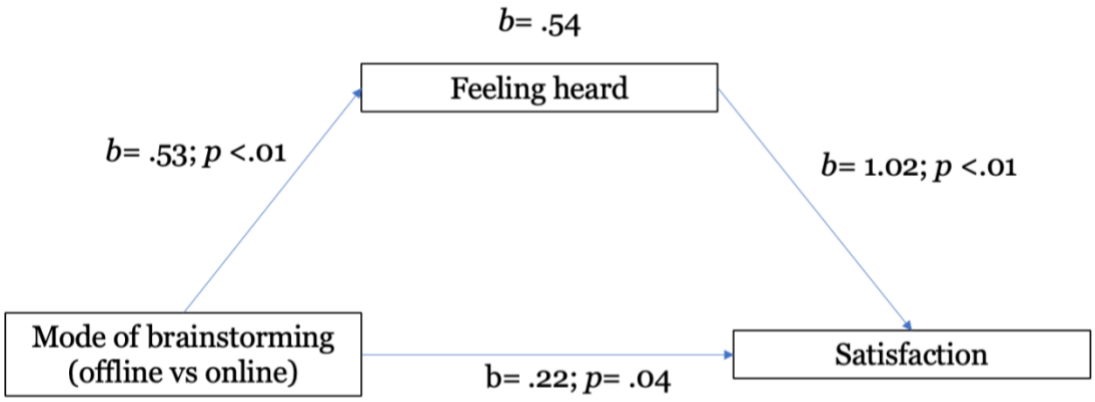


Hypothesis 3b stated that feeling heard will mediate the effects of mode (online vs offline) of brainstorming on satisfaction. The results of the mediation analysis revealed a significant direct effect of the (online vs offline) mode of brainstorming (IV) on the satisfaction (DV), b = .22, t (114) = 2.07, p = .04. Additionally, the direct effect of the mode of brainstorming on feeling heard was also found to be significant, b = .53, t (114) = 4.58, p <.01. Moreover, a significant direct effect of feeling heard on satisfaction was observed, b = 1.02, t (114) = 13.18, p <.01. Results showed that the indirect effect of the mode of brainstorming on satisfaction through the mediator feeling heard was significant, b = 0.54, SE = 0.13, 95% CI [.2979, .7966], indicating a mediation effect. These results indicate that the mediator did mediate the relationship between the mode of brainstorming and satisfaction.

Therefore, **hypothesis 3b**, proposing that *feeling heard did mediate the effects of mode (online vs offline) of brainstorming on satisfaction,* was supported by the data. Figure 4 demonstrates these findings.

Figure 4

Mediation Analysis Mode of Brainstorming on Satisfaction by Feeling Heard.



Discussion

This research focuses on the difference in level of engagement and satisfaction between online and offline brainstorming, and whether this difference can be explained by the sense of feeling heard. The research question was formulated as followed: *"Is there a difference in the level of engagement and satisfaction between online and offline brainstorming, and can this difference be explained by the sense of feeling heard?"*. This study employed a between-subject survey where participants had to think back to when they participated in an online or offline brainstorming experience. This research demonstrates that online brainstorming is less effective than offline brainstorming in terms of engagement and satisfaction. Additionally, the feeling of being heard can play a significant role in this context, as feeling heard is a mediator of the relationship between the mode of brainstorming, engagement, and satisfaction. This implies that it is advisable to establish an inclusive and supportive environment during brainstorming sessions. By doing so, participants will feel more comfortable and encouraged to actively listen to one another. Creating such an atmosphere facilitates the open expression of ideas and promotes a collaborative spirit among participants.

Firstly, it was hypothesized that *people feel less engaged in online brainstorming compared to offline brainstorming* (Hypothesis 1). The results have demonstrated a significant effect, indicating that online brainstorming is experienced as less engaging than offline brainstorming. This result highlights the pivotal role of engagement in the context of creativity and innovation, specifically during brainstorming sessions. Recognizing and fostering engagement among participants significantly contributes to the generation of creative and innovative ideas. Consequently, this underscores the importance of acknowledging and valuing engagement during brainstorming sessions, as active participation plays a central role in cultivating creativity, fostering innovation, and driving overall improvement. To enhance engagement in these sessions, it is crucial to demonstrate commitment by following up on the ideas generated during the session and providing frequent feedback. Such participation can potentially result in the emergence of groundbreaking concepts and solutions. Based on these results, this outcome aligns with the results of previous research, which indicated that online engagement can be challenging due to various factors (Ghazal et al., 2015; Trinder, 2016; Ng, 2020; Wang et al., 2022). Additionally, participants often feel less engaged in online meetings (Jeong & Chiu, 2020). This result reiterates the existing literature, suggesting that one difference between online and offline brainstorming lies in the level of engagement among participants, which could influence the degree of creative and innovative ideas presented (Gichohi, 2014).

Moreover, previous studies have observed this effect in controlled laboratory settings. Based on the results, this study, demonstrates that the effect remains significant even when individuals reflect on real interactions. This suggests that the outcomes associated with feeling heard, such as increased satisfaction and engagement, extend beyond controlled experimental environments and are experienced in real-world brainstorming sessions. Thus, the recall approach operates effectively even when individuals reminisce about real sessions.

Secondly, these findings confirm the second hypothesis *people feel less satisfied during online brainstorming compared to offline brainstorming* (Hypothesis 2). These

findings suggest that the level of satisfaction plays a crucial role in differentiating between online and offline brainstorming sessions, with online sessions generally resulting in decreased satisfaction compared to offline sessions. This means that, in general, participants tend to experience lower satisfaction in online settings. Based on these results, it is consistent with the existing research indicating that people may experience a decrease in satisfaction during online brainstorming (Brewer & Burgess, 2005; Kennedy & Lynch, 2016; Nijstad et al., 2006). Furthermore, studies have shown that individuals generally report lower satisfaction when using online platforms than in-person gatherings (Kalmar et al., 2022). To improve satisfaction in brainstorm sessions, it is suggested to enhance communication and foster a culture of continuous improvement. By fostering such a collaborative atmosphere, the exchange of ideas becomes more fruitful, leading to a more effective brainstorming process.

Furthermore, this study suggests that satisfaction extends beyond online meetings and is also experienced in traditional brainstorming sessions. While previous research has primarily focused on online meetings, this study specifically emphasizes the significant impact of the online environment on brainstorming sessions. Understanding the mechanics of online brainstorming sessions is crucial, as they have the potential to generate groundbreaking ideas and provide a platform for global communication. It is important to note that while brainstorming can occur within a meeting, not all meetings involve brainstorming. Brainstorming is a specific technique used to collectively generate ideas, while meetings encompass a broader range of activities (Lubart, 2006).

Lastly, the mediation analysis revealed that *feeling heard did mediate the effects of the brainstorming mode (online vs. offline) on a) engagement and b) satisfaction* (Hypothesis 3 a/b), thus supporting the third hypothesis. This means that feeling heard can indeed be an underlying factor for engagement and satisfaction in brainstorming sessions. This suggests that in order to facilitate effective brainstorming, it is crucial to ensure that all participants have an equal opportunity to be heard. This can be achieved by promoting active listening among participants and creating a supportive atmosphere where frequent feedback

is encouraged. By fostering a collaborative environment, the goal is to cultivate an atmosphere that stimulates the generation of impactful outcomes. This outcome aligns with previous research indicating that brainstorming is a highly interactive activity that requires participants to respond quickly to what others say, since individuals co-construct ideas (Rickards, 2003). This outcome of feeling heard acting as a mediator was in line with hypothesis 3a/b, considering previous research demonstrating that when individuals feel heard in conversations, they are more likely to engage and feel satisfied with the outcomes (Roos et al., 2020).

Moreover, feeling heard exhibits a strong correlation with the mode of brainstorming, as evident from the mediation analysis. Notably, all variables in the study display high correlations with one another. Additionally, participants may encounter challenges in demonstrating high-quality listening and experiencing the feeling of being heard (Itzchakov et al., 2018). In light of these findings, it is suggested that fostering a sense of feeling heard can enhance the relationship between engagement, satisfaction, and the mode of brainstorming. Thus, to address the research question, there is a significant difference in the level of engagement and satisfaction between online and offline brainstorming, and this difference is explained by the sense of feeling heard. The key distinction lies in the fact that online brainstorming tends to foster lower levels of engagement and satisfaction, as individuals tend to feel less heard in such settings.

In conclusion, this study provides valuable insights into the relationship between the mode of brainstorming, feeling heard, satisfaction and engagement. The study indicates that feeling heard mediates engagement and satisfaction within the mode of brainstorming. The findings have significant practical and theoretical implications, extending beyond controlled environments and encompassing real-world brainstorming experiences. Based on these findings, this research suggests the implications of the importance of fostering a sense of being heard and promoting engagement in brainstorming sessions. To achieve this, it is recommended to provide equal opportunities for all participants to feel heard, establish a supportive environment that encourages open expression, frequent feedback, commitment

to follow up and actively promote active listening among participants. By implementing these strategies, the research indicates that the likelihood of effective communication, collaboration, and idea generation can be enhanced.

By incorporating recall sessions in the research design, it becomes evident that the factor of recall continues to exert influence when individuals reflect on real sessions. This highlights the importance of considering participants' recollections and perceptions of past experiences when examining the impact of various factors on communication and collaboration. Including recall sessions in the research, methodology allows for a deeper understanding of how individuals remember and interpret their engagement, satisfaction, and overall experience in real-life sessions. Furthermore, this research emphasizes that the investigation is not limited to online meetings but also extends to brainstorming sessions in general. This broadens the applicability of the study and underscores the relevance of its findings across diverse collaborative settings. Additionally, the research acknowledges that satisfaction and engagement tend to be lower in online brainstorming sessions compared to offline sessions. While the research does not explicitly delve into specific strategies to enhance the efficacy of online brainstorming, it does suggest that by emphasizing the dynamics of increasing the sense of being heard in both online and offline settings, satisfaction and engagement in brainstorming sessions can be improved. In other words, prioritizing strategies that promote active participation and ensure equal opportunities for all participants to contribute their ideas can potentially enhance the overall experience and outcomes of online brainstorming sessions.

Limitations and Future Research

The study acknowledges several limitations that should be considered when interpreting the results. One major limitation is that the research was based on recall and not actual conversations, which has the potential for recall bias. Participants may not accurately remember or recall their past experiences during brainstorming sessions, as the specific time of their experiences is uncertain. Memory is subjective and can be influenced by various factors such as personal bias and time. To mitigate this bias, it is advisable to incorporate

multiple data sources in future research. This could involve using complementary methods, such as direct observation or interviews, to gather more objective and detailed information about participants' experiences. Moreover, in order to assess the accuracy of recall and its temporal aspects for future implications, a descriptive question could be formulated as follows*: How long ago did the reported brainstorming session take place*. Conducting a study in a controlled environment would provide opportunities to manipulate conditions, closely observe participants, and establish cause-and-effect relationships, thereby enhancing the validity of the findings. By directly observing participants and collecting real-time data, researchers can obtain more accurate and reliable insights into the factors that influence satisfaction and engagement. This would provide richer insights into the underlying processes and dynamics of online and offline brainstorming sessions.

Lastly, another limitation is that all variables are very highly correlated. However, a multicollinearity check was conducted indicating that multicollinearity was not a concern and reliability was not affected. When all variables are highly correlated, it is challenging to isolate the independent effects of each variable or to identify the causal relationship among the variables. This limitation hinders the ability to establish a clear cause-and-effect-relationship between the variables. Additionally, if individuals do not clearly distinguish between these variables themselves, it raises questions about the meaningfulness of differentiating them in research. The use of the recall method can further exacerbate the correlations since individuals tend to associate their memories with positive or negative emotions, which can influence their ratings across different measures (Joormann et al., 2005). To address highly correlated variables, conducting a qualitative research approach can provide deeper insight into how individuals perceive and understand the relationship between these variables. Despite these limitations, the current study has important theoretical and practical implications for understanding the level of satisfaction and engagement in brainstorming. In particular, this study shed light on the effect of the sense of feeling heard on engagement and satisfaction and how can it affect the mode of brainstorming.

Furthermore, a descriptive question was posed, and formulated in a positive manner, regarding the quality of connection experienced. Both online and offline contexts were considered when inquiring about satisfaction with the internet and social connections. It is noteworthy that the positively framed nature of the question may have influenced individuals' recollection of how well they felt heard. Consequently, it is advisable for future research to either eliminate this question or rephrase it in a different manner. Such modification could potentially yield diverse scores in terms of perceived feeling heard, engagement, and overall satisfaction. However, it is important to acknowledge that the impact of this question alone does not fully explain the entirety of the effects, though it is worthy of mention.

Conclusion

Overall, there is a notable difference in the level of engagement and satisfaction between online and offline brainstorming, and this difference is explained by the sense of feeling heard. Specifically, engagement and satisfaction decrease in online brainstorming when compared to offline sessions, and the feeling of being heard acts as a mediator in this relationship. It is important to acknowledge the mediator effect, which highlights the complexity of the relationship between these variables and suggests the need for further research to gain deeper insights. The findings of this study hold valuable implications, particularly for the creative industry seeking to enhance satisfaction, engagement, and feeling heard during brainstorming sessions. Moreover, these findings demonstrate that this research extends beyond controlled environments and encompasses real-world brainstorming experiences. Indicating that these outcomes are not limited to online meetings but also extend to brainstorming sessions. Based on these findings, it is recommended to prioritize offline modes of brainstorming, away from digital devices or online platforms. Moreover, it is suggested to create an environment where participants feel heard and acknowledged. This entails actively valuing and considering each participant's ideas, opinions, and contributions. By fostering a heightened sense of being heard,

satisfaction and engagement among participants can be enhanced, ultimately leading to more effective brainstorming sessions.

In other words, the sense of being heard and its impact on effective brainstorming can have significant implications for both research and society long term. By emphasizing the importance of feeling heard in a brainstorming session, we can unlock the potential for enhanced creativity, innovation, and problem-solving. When individuals genuinely feel heard and valued, it cultivates an environment of trust, psychological safety, and open expression of ideas. This, in turn, can unleash creativity, foster collaboration, and result in transformative outcomes, breakthrough discoveries, and advancements that benefit society as a whole.

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Appendix

1. Questionnaire

Master Thesis - Feeling heard in Brainstorming.

Start of Block: FH

Instruction

Welcome!

Dear participant,

Thank you for taking the time to participate in this study for my MSc Communication and Information Sciences Thesis at Tilburg University. In this introduction, I will inform you more about the purpose of the research, the procedure, and the rights you have as a participant during the study. Please read the information carefully before you continue the research.

The study aims to investigate the effects in a brainstorming process. Brainstorming typically involves a group of people coming together to generate ideas and share their thoughts in an open and non-judgmental environment.

I have developed this survey, and your participation is entirely voluntary. You may withdraw from the survey at any time without facing consequences. The questionnaire will take approximately 5 minutes to complete, and your answers will be anonymously stored. Your data will be treated with the most confidentiality and will only be accessible to the teaching staff of the Tilburg University's department of Humanities and Digital Sciences and the research student involved in this study. If you have ever participated in a brainstorm session,

I would kindly like to ask you to fill out this form.

If you have any questions about this research project, feel free to contact me, m.k.wever@tilburguniversity.edu.

Page Break

Informed consent

Informed Consent

I confirm that I have read and understood the information provided in this consent form, and I agree to participate in the research study as outlined above. If you agree to participate in this survey, please select "I consent, begin the study" on the button below and click "Next"

By clicking the button below, you acknowledge:

- Your participation in the study is voluntary.
- You are above 18 years of age.
- You are aware that you may choose to terminate your participation at any time for any reason.
- You have participated in a brainstorm session.

○ I consent, begin the study (1)

○ I do not consent, I do not wish to participate (2)

End of Block: FH

Start of Block: Online Experience

OnlineBrainstorm exp A typical online brainstorming session usually involves a group of individuals gathering in a virtual space to generate ideas, share ideas and share thoughts on a specific topic.

*Please be aware once you answer a question, you cannot go back.

Online experience Now describe the last ONLINE brainstorm session you had (use at least 200 characters). What was the situation?

_____

_____

_____

_____

_____

Page Break

Experience The following questions will be about your experiences during the online brainstorming session you just described.

Page Break

form of online brain What exact form the online brainstorm took place?

- ○ Video-call (1)
- ○ Text-chat (2)
- ○ Collaborative document (3)
- ○ Other, namely (4)

_____

Page Break

Internet Was the internet connection good during this online brainstorm?

- ○ Yes (1)
- ○ A bit (2)
- ○ No (3)

Page Break

Online Participation How many other people participated in this online brainstorm?

- ○ 1 (1)
- ○ 2 (2)
- ○ 3 (3)
- ○ More than 3, namely: (4) _____

Page Break

Online Duration What was the duration of this online brainstorm?

- ○ Less than 15 minutes (1)
- ○ 15 - 30 minutes (2)
- ○ 30 - 45 minutes (3)
- ○ 45 - 60 minutes (4)
- ○ More than 60 minutes, namely: (5) _____

Page Break

Online Topic What was the online brainstorm about?

- ○ Work (1)
- ○ Vacation (2)
- ○ Education (3)
- ○ Other, namely: (4)

_____

End of Block: Online Experience

Start of Block: Online brainstorm outcomes

Recall Think back to the online brainstorm you just described and indicate to what extent you agree with each of the following statements. Note: these statements are about YOUR experiences from the session.

Online satisfaction Please indicate on a 5-point scale to what extent you agree with the following statements, in which 1 = totally disagree and 5 = totally agree.

In this online brainstorm session....	Totally disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Totally agree (5)
... I was satisfied with my productivity (1)	○	○	○	○	○
... I was satisfied with my group's productivity (2)	○	○	○	○	○
... I was unsatisfied with my group’s productivity (3)	○	○	○	○	○
...I was satisfied with my work processes (4)	○	○	○	○	○

...I was satisfied with the work processes of my group (5)	○	○	○	○	○
...I was unsatisfied with the work processes of my group (6)	○	○	○	○	○
... I was satisfied with my own performance on this task (7)	○	○	○	○	○
...I was satisfied with the group's performance on this task (8)	○	○	○	○	○

...I was unsatisfied with the group's performance on this task (9)	○	○	○	○	○
...I was satisfied with my idea's outcomes (10)	○	○	○	○	○
... I was satisfied with the group's ideas outcomes (11)	○	○	○	○	○
...I was unsatisfied with the group's ideas outcomes (12)	○	○	○	○	○

Page Break

Online engagement Please indicate on a 5-point scale to what extent you agree with the following statements, in which 1 = totally disagree and 5 = totally agree.

In this online brainstorm session....

	Totally disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Totally agree (5)
I feel like I participated a great deal in the brainstorm sessions (1)	○	○	○	○	○
I was active while brainstorming (2)	○	○	○	○	○
I did not participate in the brainstorm session (3)	○	○	○	○	○

Online FH Please indicate on a 5-point scale to what extent you agree with the following statements, in which 1 = totally disagree and 5 = totally agree.

In this online brainstorm session....

	Totally disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Totally agree (5)
...I felt heard by the other people (1)	○	○	○	○	○
...I could say what I really wanted to say (2)	○	○	○	○	○
...the other people were more concerned with themselves than with what I said (3)	○	○	○	○	○
...the other people listened to what I said (4)	○	○	○	○	○

...the other people tried to put themselves in my shoes (5)	○	○	○	○	○
...other people were insensitive to my thoughts and feelings (6)	○	○	○	○	○
...other people treated me with respect (7)	○	○	○	○	○
...we understood each other (8)	○	○	○	○	○

End of Block: Online brainstorm outcomes

Start of Block: Offline experience

OfflineBrainstorm ex A typical offline brainstorming session usually involves a group of individuals gathering in a room (face-to-face) to generate ideas, share ideas and share thoughts on a specific topic.

*Please be aware once you answer a question, you cannot go back.

Offline experience Now describe the last OFFLINE brainstorm session you had (use at least 200 characters). What was the situation?

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Page Break

Social connection Was the social connection good during this offline brainstorm?

- ○ Yes (1)
- ○ A bit (2)
- ○ No (3)

Page Break

participation offline How many other people participated in this offline brainstorm?

- ○ 1 (1)
- ○ 2 (2)
- ○ 3 (3)
- ○ More than 3, namely: (4)

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Page Break

Duration Offline What was the duration of this offline brainstorm?

- ○ Less than 15 minutes (1)
- ○ 15 - 30 minutes (2)
- ○ 30 - 45 minutes (3)
- ○ 45 - 60 minutes (4)
- ○ More than 60 minutes, namely: (5)

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Page Break

offline topic What was the offline brainstorm about?

- ○ Work (1)
- ○ Vacation (2)
- ○ Education (3)
- ○ Other, namely: (4)

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End of Block: Offline experience

Start of Block: Offline brainstorm outcomes

Recall Think back to the offline brainstorm you just described and indicate to what extent you agree with each of the following statements. Note: these statements are about YOUR experiences from the session.

Offline satisfaction Please indicate on a 5-point scale to what extent you agree with the following statements, in which 1 = Totally disagree and 5 = Totally agree.

In this offline brainstorm session....

	Totally disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Totally agree (5)
... I was satisfied with my productivity (1)	○	○	○	○	○
... I was satisfied with my group's productivity (2)	○	○	○	○	○
... I was unsatisfied with my group's productivity (3)	○	○	○	○	○
...I was satisfied with my work processes (4)	○	○	○	○	○

...I was satisfied with the work processes of my group (5)	○	○	○	○	○
...I was unsatisfied with the work processes of my group (6)	○	○	○	○	○
... I was satisfied with my own performance on this task (7)	○	○	○	○	○
...I was satisfied with the group's performance on this task (8)	○	○	○	○	○

...I was unsatisfied with the group's performance on this task (9)	○	○	○	○	○
...I was satisfied with my idea's outcomes (10)	○	○	○	○	○
... I was satisfied with the group's ideas outcomes (11)	○	○	○	○	○
...I was unsatisfied with the group's ideas outcomes (12)	○	○	○	○	○

Page Break

Offline engagement Please indicate on a 5-point scale to what extent you agree with the following statements, in which 1 = totally disagree and 5 = totally agree.

In this offline brainstorm session....

	Totally disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Totally agree (5)
I feel like I participated a great deal in the brainstorm sessions (1)	○	○	○	○	○
I was active while brainstorming (2)	○	○	○	○	○
I did not participate in the brainstorm session (3)	○	○	○	○	○

Page Break

Offline FH Please indicate on a 5-point scale to what extent you agree with the following statements, in which 1 = totally disagree and 5 = totally agree.

In this offline brainstorm session....

	Totally disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Totally agree (5)
...I felt heard by the other people (1)	○	○	○	○	○
...I could say what I really wanted to say (2)	○	○	○	○	○
...the other people were more concerned with themselves than with what I said (3)	○	○	○	○	○
...the other people listened to what I said (4)	○	○	○	○	○

...the other people tried to put themselves in my shoes (5)	○	○	○	○	○
...other people were insensitive to my thoughts and feelings (6)	○	○	○	○	○
...other people treated me with respect (7)	○	○	○	○	○
...we understood each other (8)	○	○	○	○	○

End of Block: Offline brainstorm outcomes

Start of Block: General Questions

Intro general Lastly, I would like to ask you some general questions.

Gender To which gender identity do you most identify?

- ○ Male (1)
- ○ Female (2)
- ○ Non-binary / third gender (3)
- ○ Prefer not to say (4)

Page Break

Age What is your age? (Can you provide your age in full numbers)

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End of Block: General Questions