AALBORG UNIVERSITY
STUDENT REPORT

Title:

Using design as a tool for inquiry: How lifelogging technology support vulnerable children and young people of Greenland to express their feelings

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Abstract:

Background: Many children of Greenland struggle with severe sociological issues. When a child is exposed to neglect it is more likely to develop an unsafe attachment patteren. Many children struggle to initiate contact to a support unit due to having trouble expressing their feelings, which means that some children does not receive the right amount of help. Related studies of life logging technologies support users reflection upon emotions through questionnaires, bio sensors, diary studies, images and facial expressions.
Methods: I used the Research through Design method to understand the needs of children and young people of Greenland to express their feelings through my design as a tool for inquiry. I conducted two focus group interviews with a class at GUX Nuuk.
Results: Using thematic analysis I derived a total of six themes based on the childrens needs when expressing their feelings. I learned that privacy, the possibility to share representations of feelings, writing emotions and to personally associate with their representation of feelings was important for the participants.
Conclusion: By using my design as a tool for inquiry I can conclude that the needs of children and young people of Greenland are not fulfilled through related studies making the prototype 'Pheel' a successfully design supporting my target group in ways that are not seen before.

Summary

Udsatte børn og unge i Grønland kæmper med alvorlige sociopsykologiske problemer, der gennem mit tidligere semester projekt kom til udtryk gennem Conni Gregersens arbejde med udsatte børn og unge i Grønland. Udsættes et barn for omsorgssvigt i barndommen er det nærmest uundgåeligt ikke at udvikle et utrygs tilknytningsmønster, hvilket kan medvirke til, at barnet ikke rækker ud i behovet om hjælp. I min tidligere undersøgelse lærte jeg at udsatte børn og unge kæmper med at sætte ord på deres følelser.

Min rapport har til hensigt at undersøge hvilke behov udsatte børn og unge i Grønland har i henhold til at sætte ord på deres følelser og hvordan 'lifelogging' teknologi kan understøtte disse behov, så de kan reflektere over deres følelser og dermed opnå den hjælp de behøver.

I første omgang undersøgte jeg relateret studier der anvender en adapteret tilgang af Experienced Sampling Method, hvilket udmunder i en afdækning af fire tilgangsvinkler til 'lifelogging' teknologier der understøtte brugerens selv reflektion. Dette er henholdvis gennem brugen af forskellige tilpassede spørgeskemaer, fysiske sensorer, dagbogs studier og billeder.

Jeg anvendte Research through Design som min metodiske tilgang til undersøgelsen. Her inkluderede jeg en klasse fra GUX Nuuk i to fokusgruppe interviews, hvor jeg brugte mine designs som et værktøj til at opnå en dybere forståelse for deres behov for at sætte ord på deres følelser. Dette resulterede i en afgrundet forståelse for børnenes behov og det var muligt at udlede i alt seks temaer der afdækker dette.

Jeg diskuterer væsenlige dele af deltagernes behov for at være private, at dele repræsentationer der viser udvikling samt at have en personlig association til deres repræsentationer af følelser. Jeg sidestiller disse behov til relateret studier, der gør det muligt at implicere at udsatte børn og unge i Grønlands behov ikke bliver mødt. Dertil reflekterer jeg over mit studies design implikationer, begrænsninger og fremtidige muligheder. Jeg konkluderer, at jeg gennem udviklingen af den endelig prototype 'Pheel' møder udsatte børn og unge i Grønlands behov for at sætte ord på deres følelser og dermed bidrager med nye løsninger i et indtil videre uberørt problem felt.

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1 Introduction

Many vulnerable children of Greenland suffer from severe sociopsychological issues due to neglect among others (Pedersen, et al., 2012). Children being exposed to neglect are likely to develop an unsafe attachment pattern which can prevent them in initiating contact to a support unit. One of the reasons to this, is that the children struggle to express their feelings which can result in them not dealing with their feelings as well as not knowing where and who to reach out for help (Thrysøe, 2022). To explain the children's struggle to initiate contact to a support unit psychologist Conni Gregersen identifies four types of neglect that can lead to personal changes in the child if being exposed to it (Gregersen, 2010). They are named emotional neglect, psychological abuse, physical abuse, and sexual abuse which Gregersen links to unsafe attachment patterns (Gregersen, 2010). A child being exposed to neglect will most likely develop an unsafe attachment pattern. The three unsafe attachment patterns are unsafe avoidant, unsafe ambivalent and disorganized attachment pattern (Hagelquist, 2022). The development of an unsafe attachment pattern can be associated to why vulnerable children in Greenland struggle to initiate contact to a support unit such as the Greenlandic hotline Tusaannga. In my earlier paper I derived eight themes related to this problem area and one includes the vulnerable children's difficulties to express their feelings when in need of help. The children's struggle to reflect upon their feelings can impact how they deal with their feelings as it can result in them not initiating contact in need of help or having trouble expressing themselves when initiating contact. This leads to vulnerable children not receiving the help they need. Looking into solutions to support people to reflect upon their feelings through technology several solutions relate to this problem area. The challenge of expressing one's emotions is a topic that is also present among other people. Anxiety in different shapes is present in children when initiating contact to a support unit as a fear of being noticed or anxious to what consequences it might have (Thrysøe, 2022). Technology has been used on anxiety patients to help them track episodes and support self-reflection (Elsborg, et al., 2020). These anxiety episodes were tracked through a wristband worn by the patient and were visualized through data supporting the patients' recollection of the episodes. This resulted in an increased understanding of the disorder as well as the associated physical reactions that follow (Elsborg, et al., 2020).The term self-reflection also applies when lifelogging participants experiences and behavior in natural settings (Bruun, et al., 2019). This study was completed with a wearable camera placed around the participant's neck and each time the participant experienced intense emotional reaction the camera takes a photo (Bruun, et al., 2019). Looking through these photos after each day supported the participants to reflect upon their experiences through the day and it was possible for them to recall in detail what caused their intense emotions (Bruun, et al., 2019). This engaged participants to reflect upon

themselves which also is present in the technology named Affective Diary, a digital diary that examines the power of the conventional diary where body sensors and use of a mobile phone support the users bodily experience (Ståhl, et al., 2009). Using the Affective Diary through a period enabled the users to remember and reflect upon their past. Furthermore, two users found patterns in their reactions and through learning about themselves they were able to alter their own behavior (Ståhl, et al., 2009). Through different lifelogging technologies it is possible for people to reflect upon their feelings. I have not been able to identify digital solutions that support my problem area.

This project aims to examine how lifelogging technology can support vulnerable children of Greenland to express their feelings. Additionally, alter children to reflect upon themselves and become aware of the associated problems that can be related to this, so they can receive the help they need. This resulted in the following problem formulation, this project aspires to answer:

How can lifelogging technology support vulnerable children of Greenland to express their feelings?

2 Related Work

In this section I outline related articles on how technology through different approaches can support people to reflect upon their feelings. Using an adapted approach of the Experienced Sampling Method (ESM), lifelogging technology that support self-reflection has been tested in forms of questionnaires, bio sensors, diaries, and images and facial expressions. The varieties of lifelogging technologies have been evaluated on both healthy and unhealthy people.

2.1 Questionnaires

Using questionnaires to support people to reflect upon emotions is a common approach within the term lifelogging. Several papers have tested questionnaires on people with both physical and psychological disabilities with the purpose of supporting them in their recollection of their day or memories as well as to assist them in expressing needs or emotions. Anxiety patients have experienced a positive result using the Cued-Recall Debriefing method (CRD) (Elsborg, et al., 2020). The CRD method is an approach that enhances people to recall emotions after an event has occurred (Bruun, et al., 2015). To support the anxiety patients this approach was used to back up the reconstruction of the patient's day through cues and data filled out on a sheet developed with inspiration from Daily Reconstruction Method (Elsborg, et al., 2020). The patients filled out these sheets at the end of each if extreme peaks were detected throughout the day. They were asked to provide information about what happened, where it happened and details about them being alone or with others and lastly, how they felt at timestamp. As a result, it was possible for one patient to detect patterns in her anxiety episodes which increased an understanding of the disorder (Elsborg, et al., 2020). Self-reflection is known to support users to track their activities and get insight through the data collected over time. One paper design and implement a self-reflection application named EmoReflect that aims to support users in engaging in conducting more self-report (Ghosh, et al., 2020). 20 university students participated in the field study of a six-week duration. When using the application, the user is informed to choose the EmoReflect keyboard and when they switch from applications, they receive a survey questionnaire regarding their emotional status. Based on the user's keyboard interactions, tracked through the user's self-reports of emotions, the application gives the user feedback through the interface through a Q&A (Ghosh, et al., 2020). This feedback makes it possible for the user to reflect upon their typing behavior when being sad or happy and detect if they type differently when being sad compared to being scared. Another paper follows the traditional way of applying questionnaires to support lifelogging through technology when questioning users, a year after testing the mobile-based system that combined with Augmented Reality support reminiscence of

memories and reflection upon these (Sakib, et al., 2022). This made it possible to test the systems functionality afterwards and to confirm the plausibility of recalling users' memories (Sakib, et al., 2022). The ability to reflect upon emotions through technologies has also been tested on children with serious emotional behavior issues (Loke, et al., 2021). In cooperation with therapists the framework Safety, Connection and Reflection is developed and guide future design of technologies to support reflective experiences for Social Emotional Learning (SEL) in children (Loke, et al., 2021). Psychological and wellbeing needs as social safety, trust and relatedness should be fulfilled prior to presenting an opportunity for the child to reflect. The framework is supported by a schedule list that breaks down the framework into further considerations of the child's progress, scaffolding actions, and resources available to the therapist (Loke, et al., 2021). When these are applicable it is possible for future designs to support the child into a reflection phase upon self-regulating their emotions (Loke, et al., 2021).

2.2 Physical sensors to track emotional fluctations

Using bio sensors in lifelogging technologies is a frequently used approach to track users' emotional status. Many related studies aim to support users to reflect upon their emotions tracked by the physical sensor. A sensory wristband has been tried on both healthy and unhealthy people. When lifelogging in the wild the wristband has been used with a wearable camera and has engaged participants to recall specific details on daily experiences and reflect upon them (Bruun, et al., 2019). The GSR sensor placed on participants wrists detects when they experience emotional excitement and the camera takes a photo of the front surroundings of the participant (Bruun, et al., 2019). A PC application assists in visualizing the 10 most existing emotional reactions detected on the E4 web server (Bruun, et al., 2019). The use of these tools was supported by the participants writing notes to the photos at the end of the day which contributes in them being able reflect upon their day and re-call details of situations that the participants has forgotten about (Bruun, et al., 2019). The wristband has also been used on anxiety patients to monitor their episodes and support them to reflect upon their episodes through visualizations of the GSR data (Elsborg, et al., 2020). To assist the patients, it was possible for to press a button on the sensor as a cue of an anticipated attack. Though the use of a biosensor caused one patient to feel monitored, one patient was able to reflect upon her anxiety in a new way and to notice patterns in her anxiety attacks that led her to change her perception when experiencing an attack (Elsborg, et al., 2020).

A third type of physiological sensor is used in the development and usage of The Affective Diary (Ståhl, et al., 2009). In the development of the diary the body sensor was tested on participants to support the development of anthropomorphic figures as representations of user's real-world practices and understanding. The sensor data helped to influence shape and color of the figures which offers a way to

illustrate bodily experiences and movement of the user. The color of the figures represents user's arousal measured by GSR where blue represents the least amount of energy and the red contains the most energy (Ståhl, et al., 2009). To map the user's data throughout the day the abstract figures was chosen instead of using the standard graph from the sensors and is mapped out along a timeline visualized on the PC (Ståhl, et al., 2009). Through the use of these figures along with a camera and tables PC is was possible for the participants to reflect upon their day and detect patterns in their experiences (Ståhl, et al., 2009).

Another paper introduces an eyewear device to detect emotions on the person wearing it. The device named EMOShip consists of a camera and a sensor which along with LED light to illuminate the iris, it is possible for the device through an eye-tracking method to detect potential attention events (Zhao, et al., 2022). EMOShip can detect the wearer's emotional status and it provides an understanding of the causes of emotions as it is possible to associate the semantic attributes of visual attention to varying emotional states (Zhao, et al., 2022). Through the use of this sensor it is possible for the user to get insight to one's emotional status and possibly detect emotions related to arousal. As a contrast to eyewear detecting technology, there has been proof of a Foot Tracker to successfully support lifelogging. This Foot Tracker consists of a camera, location data based on an individual spending more than 5 minutes in a 50 meters radius and social data from texts and calls received and made during the day (Gouveia, et al., 2013). Using this tracker showed that participants are supported in their ability to reflect upon and recall activities throughout the day as well as experiences (Gouveia, et al., 2013). This approach of lifelogging is supported by diary studies and applicable in other related studies.

2.3 Diary studies

When designing lifelogging tools many studies benefit from conventional diary keeping. The development of The Affective Diary takes a starting point in this approach. The Affective Diary logs the participants movement and arousal through-out the day and through a timeline of human-like figures, representing the user, the user can alter the representation by changing the posture of the figures or scribbling diary notes to support self-reflection of the day (Ståhl, et al., 2009). The use of The Affective Diary as shown the possibility for the users to detect patterns between their figures and their own experience which caused two users to attempt to alter their behavior (Ståhl, et al., 2009). The use of conventional diary keeping supporting lifelogging is present several other related papers. The development of the Footprint Tracker is based on diary studies and examines how it can be supported by lifelogging (Gouveia, et al., 2013). Participants carried the tracker for six hours and at the beginning of the next day they took part in a recall session reviewing their previous day as a series of episodes. They were asked to write a description of event to discover if they were able to recall an event (Gouveia, et al.,

2013). The results showed that diary studies combined with lifelogging technology support recall and reflection upon user's recent events (Gouveia, et al., 2013). Another paper examines how new designs can back up the retrieval of memory impairment in people struggling with depression (Qu, et al., 2019). One relevant finding was how a diary approach in regard to lifelogging technologies support the experience of positive memories in people with depression. This opens to a discussion of how novel interfaces can strengthen the reliving of positive memories (Qu, et al., 2019). Using such an expressive interface can contribute to the strengthening of the felt-life quality when retrieving a person's positive memory which can turn into positive self-identity and support the self-reflection of those memories (Qu, et al., 2019). An opposite approach to the diary concept within lifelogging tools is image-based lifelogging. A study presents a system that collects users images based on their emotional status (Bum, et al., 2021). These photos make it possible for the user to generate a diary based on data provided from the photos which supports the user's ability to recall emotions through-out the day and contributes to the possibility of lifelogging from a user's emotional perspective (Bum, et al., 2021). The application In the Moment, used when lifelogging in the wild, are also inspired by conventional diary and displays the photos taken when wearing the camera to support the user's reflection of the day (Bruun, et al., 2019).

2.4 Detecting emotions based on users' images and facial expressions

Lifelogging tools are in some cases supported with a camera taking photos for the users to support self-reflection through-out the day. This is done when lifelogging in the wild (Bruun, et al., 2019) and as a part of the material participants use when fulfilling the Affective Diary (Ståhl, et al., 2009). A study presents image-based lifelogging, a system that derives users' own photos from their phones and arranges them based on their emotional status (Bum, et al., 2021). This is done through the Representative Emotional Data Extraction Scheme (REDES) that selects representative photos based on the users' emotions registered from their facial expressions (Bum, et al., 2021). Another paper also uses facial expressions to detect emotions but through the front camera on a smartphone. Through collecting facial expressions along with app usage data, a person-dependent classifier was build that made it possible to predict emotions with an accuracy of 33 % when using facial expressions and with 66% when combining facial expressions with current app usage (Kosch, et al., 2020). It is possible through these results to reflect on one's emotions state and provide emotional awareness for the user. Augmented Reality is blooming and can also be related to lifelogging tools. A paper introduces AR-based lifelogging through a mobile-based system used to reminisce memories where users store images with related details based on location (Sakib, et al., 2022). Using geo-location-based AR stored images are augmented into pre-existing reality when the user returns to the location. It is proven to help with reminiscence of memories

when using the system (Sakib, et al., 2022). Lifelogging with images and facial expression has also been tried on children between the age of three and six. The purpose of the artifact named The SEL Transition Wheel is to support children to emotionally regulate and label their emotions (Stangl, et al., 2017). This product is a handheld transportable artifact with four features; ergonomic design that the child can fit in their lap, a mirror and pictures of faces representing different emotions so it is possible for the child to recognize facial expressions and compare them to emotions, audio and light to support the reflection, movable parts that makes it possible for the child to scroll, pull, slide and flip objects and lastly the feature of customized design that invites the caregivers to switch emotion images cards and reel of activities (Stangl, et al., 2017). This artifact creates interaction for children and makes it possible for children to reflect upon their emotions with the possibility of self-regulation (Stangl, et al., 2017).

When investigating related studies of how lifelogging technology support users to reflect upon their emotions, I found that researchers use a variety of adapted ESM approaches. Lifelogging technologies has been tested using questionnaires and different types of physical sensors, as well as in combination with the conventional diary keeping and lastly, proved through images and facial expressions. Comparing the four types of life logging technology to my problem area, the needs of children and young people in Greenland is not considered in related studies, leaving the area of technology supporting Greenlandic children untouched.

3 Methods

The method avenue for this project is based on the Research through Design Method. My investigation seeks to understand the needs of children and young people of Greenland to express their feelings through my design as a tool for inquiry. This chapter describes this approach from the beginning to the final design product.

3.1 Research through Design

Research through design (Rtd) is a relatively new approach that distinguishes from the more traditional method where the research phase is initial and followed by the design. Rtd is characterized as a method where the research and design phase are merged in a way that assists the researcher in "conducting studies to learn specific information about the situation for which the design is made" (Stappers, et al.). Apart from this, the method is used to try out hitherto nonexistent ways of practices in the process of generating knowledge about the 'end users´ which makes it possible for the researcher to make the users interact with products never seen before. Introducing new products makes new aspects observable and can be seen to provoke a discussion (Stappers, et al.). Using Rtd is a well-known approach to navigate between the real-world and the design towards "building the best bridge between the product and its usership" (Stappers, et al.).

3.2 Considerations when involving children

I was invited into a class at the local high school GUX Nuuk twice. The class consists of seven students. As a Danish researcher collecting data with Greenlandic children, I took a few ethical considerations into account. I was obligated to conduct the focus group interviews in Danish and as it is not the participants first language, I was careful regarding how I expressed myself to ensure they understood the purpose of the interview. Previously to both interviews I created document to support their understanding (Appendix 1, 2). Furthermore, I was cautious when involving the children and I ensured that they actively consented to be a part of the focus group interview as well as I reassured their anonymousness in my report. All participants were above the age of 15 which is why I did not obtain consent forms from their parents (Børnerådet, 87-150).

3.2.1 First design proposal for inquiry

I created four various design proposals consisting of both unconventional approaches as well as conventional to ensure a discussion within my focus group interview. Two of the designs implies a new

approach of combining two photos into one, a third collects the user's recorded voice and the fourth lets the user add text to a photo of the day and displays one's mood through a timeline of colors. I used Balsamiq to create the four designs which are elaborated in detail in section 4.1.

3.2.2 Introducing four designs in a focus group interview

I chose to conduct focus group interviews to support my Research though Design method as it supports the participants different perspectives through their discussions, arguments as well as their opinions and attitudes (Brinkmann, 2013). In my first focus group interview I divided the class in two, one group of two and one group of three. The four application designs were handed out to the groups so that each group got two designs in paper form as well as a semi-structured interview guide to guide their talk. Before the beginning of the interviews, I explained the overall purpose to the teacher and to the students. With assistance from their teacher, I was able to switch between each group successfully, explain the use of the applications and ask follow- up questions to understand their needs.

3.2.3 Second design proposal for inquiry

As a result of my first focus group interview, I derived four themes as described below:

- Social but not public
- No predefined routines
- Text supports reflection
- Combining photos and detect development over time

I chose to create a prototype that deals with the combination of photos and close with the four themes, I created my second design using Figma. The prototype is described in detail in section 4.4.

3.2.4 Introducing the second iteration in a focus group interview

The second focus group interview took place a week later which allowed me to iterate upon my design as described in the section above. This interview was twofold such that they in the first part of the interview was asked to try out the prototype in Figma which ended up in a talk about their needs. Secondly, they were asked to enter a webpage (Freewayml.com) that allowed them to combine two photos of their own choice and reflect upon the outcome. Lastly, I engaged in a talk with two students that showed me their combined photos and I was allowed to ask questions toward their choice of photos and reflections regarding the combined photo. This resulted in two themes which is described further in section 4.4.

3.3 Data collection across focus group interviews

During both interviews I was allowed to audio record the whole session which resulted in two recordings from the first focus group interview and one from the second. This allowed me to transcribe each audio recording and begin analyzing my raw data.

3.4 Data analysis

Using my design to engage with the students allowed me to obtain knowledge regarding their needs to express their feelings. I derived themes using inductive thematic analysis, a data-driven approach where my identified themes are heavily linked to the data (Braun, et al., 2008). This approach is also known as conventional content analysis where the researcher does not use preexisting categories but instead allows the themes to "flow from the data" (Hsieh, et al., 2005). After transcribing the audio recordings, I began reading the file to obtain an overall impression of the results, which was followed by commenting different key thoughts or concepts through quotes. This ended up in an initial coding scheme of quotes which I further divided into categories and later I developed a meaningful and smaller number of categories as the final codes (Appendix 5, 6). The process of using conventional content analysis was completed after each focus group interview and it allowed me to iterate upon my design twice.

4 The Application Design

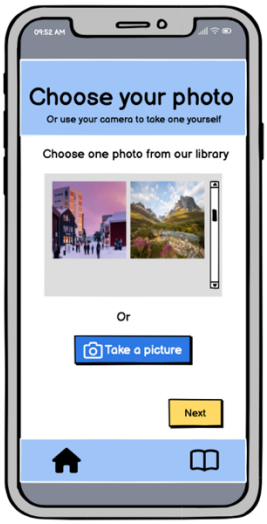
This chapter describes the three iterations of my design based on themes derived by the Research through Design method. This reassured that the children and young people of Greenland's point of view was accommodated from beginning to end.

4.1 First iteration

I created four designs partly inspired by a theme detected in my earlier investigation stating that the nature is considered calmingly to the participants (Thrysøe, 2022) as well as I through the use of the Research through Design Method created four wireframes containing various designs with the intention of learning more about the children and young people of Greenland. Throughout this section I present each design with specific examples. The designs are shown as presented to the focus group interview I appendix 8.

Pheel

This design aims to support the user to reflect upon their feelings through nature either by choosing a photo or taking one. After this, it is possible for the user add personal notes to the photo and move it around on the photo as the user finds most convenient. Through a weekly timeline it is possible for the user to get insight of one's feelings through colors representing the users state of mind based on the colors from the chosen pictures (Appendix 8). Two of the four wireframes are presented below.

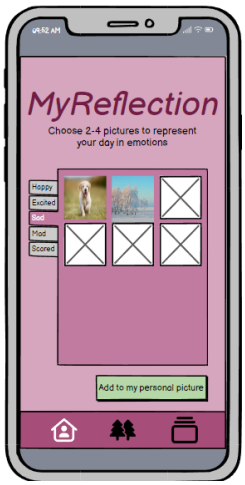


Wireframe 2: Choose your photo of the day

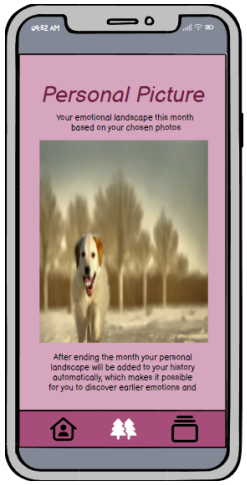
Wireframe 3: Adding text

MyReflection

This design makes it possible for the user to combine photos. The user can choose between 2 and 4 pictures sporadic throughout the day to represent their feelings. The pictures are added to a monthly landscape that combines the pictures into one and makes it possible for the user to discover emotions by staying updated on the current monthly landscape or looking back on earlier landscapes (Appendix 8).



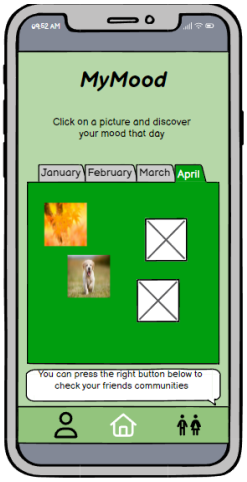
Wireframe 2: Choose a picture



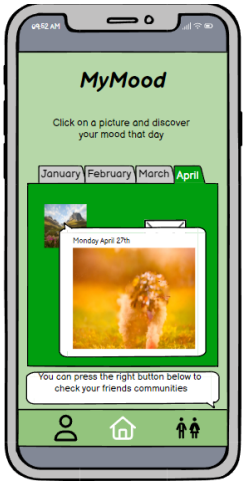
Wireframe 3: Current landscape

Moody

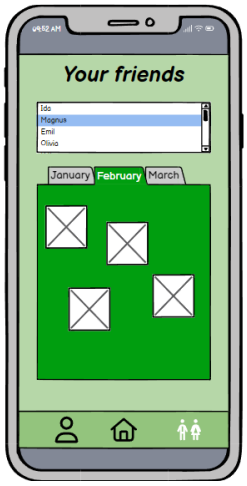
This design supports the user to reflect upon their emotional status. After agreeing to 'Check in' the user can choose 2-4 pictures to represent the user's mood each day. After the user is asked to confirm their pictures, they can add it to their 'community'. There is a community for each month consisting of different pictures representing different days. The pictures shown inside one's community is a combined picture of the pictures chosen that day. It is possible for the user to always revisit the communities through the home button. It is also possible for the user to add friends and view their pictures representing their emotions.



Wireframe 4: My earlier pictures



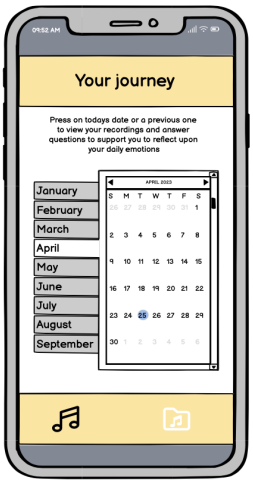
Wireframe 5: Viewing one day



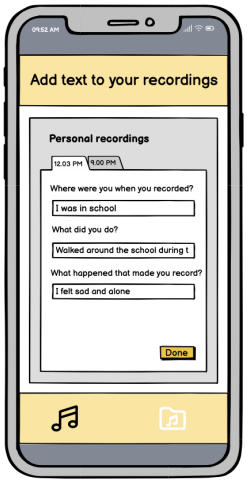
Wireframe 6: Friends

MemoJourney

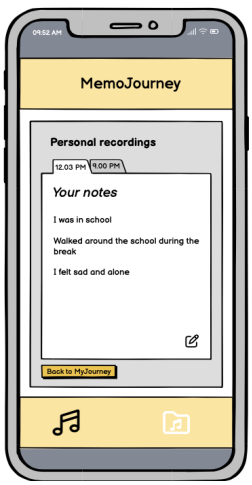
This design allows the user to record and talk about their feelings throughout the day. This is done by pressing the 'Record' button. The recording file is saved in "Your journey" which is a library that keeps track of every recording based on the month. After a day of recording, it is possible for the user to enter the library, press on the day and answer questions. This is done to support their reflection of the day. After submitting the answers, the user can still enter the recordings and notes, to listen, edit or delete notes attached to the recording as the user finds most suitable.



Wireframe 3: Recording



Wireframe 4: Answer questions



Wireframe 5: Personal notes

4.2 Results from first focus group interview

The first focus group interview resulted in four derived themes representing the needs expressed by the participants which will be outlined in the following four sections. Each citation refers to appendix 3 and 4. The participants are given pseudonyms to protect their anonymity.

Social but not public

The participants had contrasting opinions regarding privacy when expressing their feelings. When answering a question about whether they would use the designs personally Ivalu answered: "(...) I do not know whether I would use it not the one were one choses photos because it is too public if others can see it" and she elaborates further: "I think for some people it will work when other people can see how they feel but there are some disadvantages for some people if other can see it so then it must be private". These two statements showcase Ivalus' concern to be completely public when sharing her reflections as well as her opinion about how she believes some people prioritize privacy when express their feelings. Ivalu elaborated further regarding the advantages of being anonymous: "It would be an advantage if it was anonymous so one did not need to see friends' names (...)". This quote underlines the importance of anonymousness if the participants were to begin a journey of self-reflection. In group two Alex shares his opinion on how sharing ones personal creation can be beneficial: "If one through a period of time has been in a difficult situation and afterwards enters a better state of mind and has the possibility to share it because it means a lot to me" and Noah compares the two designs and states: "the other one (MemoJourney), a bad thing about that one is that there is no one who can hear it and you cannot share it with someone". Both of them agree that sharing can be convenient for the user, Alex believes that if the user detect a positive change, it could be beneficial to share, whereas Noah talks about sharing with adults so that they can help the user. Noah later adds: "It should be a possibility to share it with others, maybe hang it up in one's room and then look at each photo from each month (...)", supporting Alex's opinion and mentioning a possibility to print out one's picture (MyReflection) and keep them as a proof of a process that turned for the better. Alex and Noah believe sharing the visualizations of one's feelings with others can be an advantage whereas Ivalu is more concerned towards one's personal creations being public as she prefers it to be anonymous and private.

No predefined routines

Through each of the four designs it is possible for the user to look back at earlier material though the different types of timelines the designs carry. When being asked if they would use the design multiple times a day Ivalu answered: "I do not know about three times a day but maybe one time" and to that

Malik adds: “Three times a week”. To gain more insight of how often they would express their feelings, I asked them if it was too much every day and Ivalu elaborated further: “No but to have the possibility to enter the application and write something. It does not have to be limited to a specific amount of time but when you want”. These citations demonstrate how frequently the participants prefer to express their feelings. The frequency differs from once a day to three times a week and one participant elaborates upon the relevance of only doing it when they want, stating that personal updates should be voluntary.

Text supports reflection

The opportunity to add text and being able to write about one's feelings is a fourth essential point derived from the focus group interviews. Ivalu states: “Yes, it is a good idea to write text pieces so it is possible to get one's feelings out” and later adds: “yes yes, and then write text pieces to the photos you have chosen or taken (Pheel)”, which supports how text can be important when reflecting upon one’s feelings. She further underlines the importance of text through the use of MyAl on SnapChat: ”(...) it is possible to write to a robot that answers right away and then you can put feelings into words”, making it clear that being able to write about her feelings is a way to deal with them. This was essential for both groups and Noah mentions regarding MyReflection: “One bad thing about the application is that there is no text and a lot of photos”, which again underlines how important text is for the participants if they were to reflect upon their feelings.

Combining photos and detect development over time

Another important feature derived from the focus group interview was the possibility to combine photos into one as well as being able to look back on earlier creations as a chance to keep updated on previous feelings and follow their process over time. Alex compares MyReflection with BeReal, saying: “I can see the resemblance with BeReal and it is very good that it is possible to have pictures to look through and showing different feelings”. He further elaborates: “To combine the photos that sounds interesting to see how they end up looking”, showing and interest in how the combination of multiple photos can look. In group one Ivalu says: “(...) and then save them (the pictures) so they won't get lost and be able to look back on them”. It is important for Ivalu to have the opportunity to save her personal creations with a purpose of looking back at them. When asking group two whether they could imagine using the designs themselves, Alex elaborates: “it is something that could be used if one was in a bad situation because through these files it is possible to see ones progress of the past time and see if anything has changed for the better or worse (...)”, acknowledging that expressing feelings through pictures when being sad can be beneficial because the user can follow the progress which can support the user to reflect upon themselves.

Noah showed a positive mind about MemoJourney saying: "Then it is possible to hear how I have been the last month", underlying the importance of how the feature of being able to look back at one's earlier creations is important to the participants when reflecting upon their feelings. Ivalu shows a disbelief towards the combination of photos: "(...) it depends on who uses the application and what kind of pictures they have chosen and when you combine two photos where one is sad and the second shows that you feel happy then it is maybe a bit hard to understand the picture". Despite her small mistrust towards the combination of photos representing different feelings, Ivalu states that it depends on the chosen pictures and what kind of pictures. Noah also shares both interest and concern for the combination of photos: "if you are good at reading yourself and pictures, for example if there is a sky showing you are not well and a sun showing you feel good and if you are good at reading something like that then it is good". He believes that it takes a certain creativity to understand pictures that are combined and like Ivalu, he reflects upon pictures representing feelings and imagine how it can end up.

4.3 Second iteration

This design is adjusted based on the results from the first focus group interview. More specifically my results from first focus group interview showcases, there is an interest from the participants towards combining photos and when considering a lack of this technology in related studies describes in section 2, I chose to further investigate the children and young people of Greenland needs when expressing their feelings through photos. This is done through my second iteration of the design as a tool of inquiry. I developed my design using Figma.

Pheels

It lets the user choose a photo each day to represent feelings and combines them into one picture. The user can keep updated on the landscape but also discover earlier landscapes through the timeline. It is possible for the user to add text to each landscape to support the user's self-reflection. This prototype is private, but it is possible for the user to add friends and watch their shared landscape. Below are three windows presented and others can be accessed through appendix 9.

Window 1: Login page **Window 2: Choose photo** **Window 7: Timeline**

4.4 Results of second focus group interview

The second focus group interview resulted in two new themes regarding children and young people of Greenland's needs to express their feelings. Throughout the following sections citations, I refer to appendix 5. The participants are given pseudonyms to protect their anonymity.

Personal representations provoke feelings

When talking about the design of 'Pheels' and combining photos I learned that the participants preferred to choose personal pictures to represent their feelings. Noah explained: "It is good if you are able to fantasize with pictures so for example if you choose a dog you might relate to that dog and if the colors in the picture is light you might feel good" and Alex also adds: "if I am sad, then I would choose a picture of a gray day or something with nature where it rains and if I am happy then I would choose a sun or some light colors". These two citations suggest an insight in their need when choosing a picture to represent their feelings. They are both able to reflect upon a scenario and connect pictures to possible feelings. When trying to combine photos Noah said: "this reminds me of my childhood in Tasiilaq, the ice bears and sled dogs, I still cannot believe I have tried to shoot one", which showcases an importance for him to be able to relate to the picture he chooses. He associates the pictures with his childhood and further explains: "Imagine if I could combine a photo with me and my rifle then it could turn into a picture of me with my rifle that would be cool". This showcases how Noah further reflects upon pictures

he would choose to combine, possibly to create a photo possibly representing a part of him. He combined photos twice and his first reaction was: "this looks really scary" and after combining it for a second time he said: "I'll try like this, wow this one is very pretty" and when asked to explain further he answered: "it looks like it has spikes, and it reminds me of a hedgehog". This gives an understanding of him being satisfied with the picture when he can associate it with something. Inuk, another participant, engaged in combining photos and was also preoccupied by being satisfied by the result of the final photo, he said: "I tried before with a picture of my skis but it ended up looking like a horse, but this one with the cat is cool", and he further said: "yes but it was ugly so I tried something new", stating that it is important for him that he likes the result of the end photo. When being asked why he liked the photo he answered: "the green colors, it is my favorite color", which demonstrates a need for him to choose a picture that represents something he can relate to as he can with his favorite color. The use of colors when combining pictures is also important for the participants. Alex firstly said: "I think it should be nice pictures of nature and maybe use the colors" and he further elaborated: "It can show feelings you know", making it clear that for him to represent feelings colors is useful. Inuk shares the same point of view and states: "then colors and a bit of nature would be pretty good". Both Alex and Inuk believe that nature should be combined with colors to represent feelings and when showing me his final photo I asked curiously about the picture's significance for him and Inuk answered: "it is something calm and quiet, it is a calm color the green one". The personal aspect and colors in the pictures are important for the participants when choosing them as well as they show a need to be satisfied with the end photo. This satisfaction emanates from their possibility to relate to the photo as Noah who was pleased with the end photo when it reminded him of a hedgehog and by Inuk who it took a few attempts before he liked the combined photo. It is important for the participants to personally relate with the picture through associations of childhood memories, colors, or personal attachments.

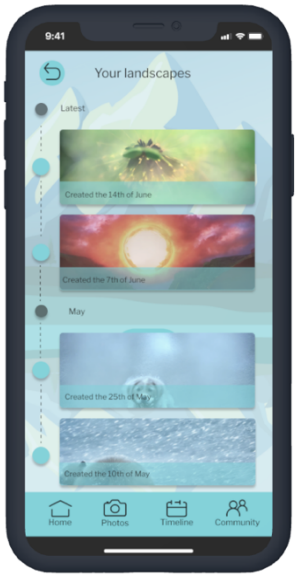
Sounds gives the pictures more meaning

When talking about pictures of nature, the participants mentioned sounds to support their needs when expressing their feelings through pictures in 'Pheels'. Noah mentions: "If I saw a picture and heard a sound it can remind me of what is it called? meditation" and after I inquired about it he continued: "Yes so if I press on this nature this sound is played". Alex further adds: "or a sound can play and tell you how you feel depending on what picture you have chosen". The participants' statements give insight into how sound can support self-reflection in them through pictures as a calming sound associated with the nature phenomenon in the picture or as a voice explaining the user's feelings based upon the chosen photo.

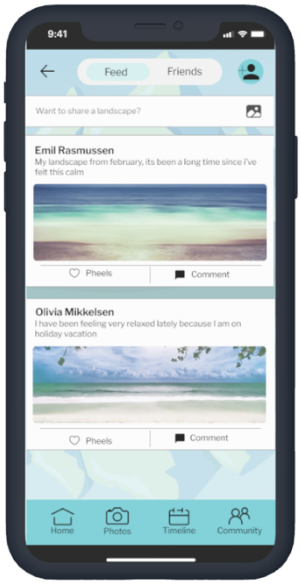
4.5 Third iteration

My final design named 'Pheel' is adjusted based on the participants' needs derived from the second focus group interview, which is elaborated on in the section above. When using 'Pheel' it is now possible for the users to decide when their landscape is done and to begin a new one by adding it to their timeline. As shown below it is possible for the user to choose a picture from the library or use the camera. When entering the library, the photos of nature representing feelings are represented. It is optional for the user to add friends and choose to post a landscape for their added friends to see. Three windows are presented below, and the rest is visible in appendix 10.

Window 6: Current landscape



Window 8: Timeline



Window 9: Feed

5 Discussion

My investigation seeks to understand the needs of children and young people of Greenland to express their feelings. Through an approach named Research through Design (Rtd) I was able to generate deeper knowledge about the participants needs during the two focus group interviews presenting my iterated designs as a tool for inquiry. This ended up in the development of 'Pheel'. In this section I discuss how my study contributes to the current research of lifelogging technology as an adapted approach of Experienced Sampling Method (ESM) and Gregersens theory of children inability to contact a support unit. I further discuss this study's design implications, limitations, and future work.

5.1 Contributions to support vulnerable children

Privacy

Using my design iterations as research ensured an understanding of the children and young people of Greenland's. Two themes were essential towards a deeper understanding of the participants needs to express feelings and support self-reflection. Through the participants discussions and reflections during my focus group interview I learned that they prioritized their privacy and anonymousness high in the context of expressing feelings. Ivalus expressed a strong opinion regarding her privacy and anonymousness when expressing her feelings and reflecting upon her day and further underlined how her choice to express her feelings could be influenced if people, she did not feel safe around had access to her personal representations of her feelings. Whereas compared to Noah and Alex who express a need to share personal creations with others through social media if they detect an emotional improvement over time (section 4.2), meaning that the participants need for privacy and anonymousness varies to an individual extent. Looking into the related studies, the need of privacy distinguishes from several lifelogging technologies elaborated on in section 2, as these technologies require a physical sensor placed on the body, either through a wrist band, food tracker or an eyewear (Bruun, et al., 2019) (Gouveia, et al., 2013) (Zhao, et al., 2022). A physical sensor can be visible for bypassing people throughout the user's day which contradicts the need for privacy and could affect the user's reaction and result of expressing their feelings. This could affect the user's authenticity and possibility of self-reflection rather than ensure it by making a lifelogging technology private and anonymous as my participants express a need for. Noah and Alex's need to share their feelings is an aspect not seen in the current lifelogging technologies. Stangl et. al propose an artifact, The SEL Transition Wheel, a handheld device with visible features used on children to regulate and label their feelings (Stangl, et al., 2017). Using this device makes

it impossible for the users to share their feelings as well as the privacy is not present like the physical sensors mentioned earlier in the section.

Personal association to self-selected representations of feelings

The second important theme I became familiar with were the participants need to personally associate with the representations of their feelings as well as it was important for them to not have predefined routines, meaning that they preferred to express their feelings when they want to by their own free will. In my second focus group interview I learned that favorite color, childhood memories or relatable personifications were elements which gave the participants a personal association toward their choice of representations of feelings to begin a journey of self-reflection (section 4.4). Furthermore, Ivalu reveals that it is unsustainable for her to represent her feelings each day and she underlines that it should be of own free will. She is backed up by Malik who suggests three times a week is realistic. The participants need to be personally attached to their representations of feelings supports their need to create representations whenever they see fit and underlines their need to stay true to their representations of feelings in the process of self-reflecting and ensure their authentically. Representing users' feelings through lifelogging technology recurs in related studies. The Affective Diary collects personal data based on the user's movement and arousal from a bio sensor detected throughout the day and the data are displayed on a timeline consisting of human-like figures to represent the stage of the user's arousal (Ståhl, et al., 2009). Predetermined representations of the users' feelings through these figures leaves behind the users personal needs to choose own representations. The user's representation of feelings is predetermined by the derived images rather than it being voluntarily up to the user to represent feelings. Despite it is possible for the user of The Affective Diary to alter the figures by changing their posture and scribbling diary notes, the user is determined to only focus the predesigned figures representing different arousal, which underlines a lack of personal association to the representations and not meeting the needs of the children and young people of Greenland. Several related studies presenting lifelogging technology, the users detected data from a sensor is transferred into a new system and through questions or other similar approaches the user is requested to reflect upon their feelings throughout the day each day. This is applicable for image-based lifelogging which derives the users' images based on their emotional status and makes it possible for the user to create a diary to support recalling emotions throughout the day (Bum, et al., 2021) as well as using AR-based lifelogging and facial expressions (Sakib, et al., 2022). Using or reviewing one's data each night to support self-reflection differs from the needs the children and young people of Greenland have towards expressing their feelings, as they consist of predefined routines. Compared to my participants need to have a personal association with the

representations of feelings and to choose their own pictures, it is implicated that the needs are not meet in the related lifelogging technologies.

5.2 Design implications

Through my investigation I have learned about the children and young people of Greenland's needs when expressing their feelings. The needs of privacy and personal association to self-selected representations of feelings can be linked to and support the work of Conni Gregersen who implied the different psychological processes that precedes for a child in a vulnerable position and possibly can prevent a child from reaching out. Through my broad investigation in my 9th semesters project, I learned that children with unsafe attachment patterns struggle to express their feelings (Thrysøe, 2022). I investigated the needs of children with unsafe attachment patterns in my 9th semesters project involving counselors of Tusaannga, 4 children from NAKUUSA and 132 children answered a survey (Thrysøe, 2022). I derived 8 themes, one of them being 'trouble expressing their feelings' which implies that vulnerable children with unsafe attachment pattens finds it difficult to express their feeling. In this paper I learned about the vulnerable childrens needs to express their feelings, using my designs as a tool for inquiry. This led me to understand how combining pictures can support the participants in expressing their feelings and I learned that privacy and personal association to self-selected representations of feelings are central needs for the children and young people of Greenland. As section 5.1 describes, these needs are not fully met in related studies suggesting new design implications that embraces the children's needs. I propose 'Pheel', a prototype that stands out from existing studies of life logging technologies supporting the children with unsafe attachment pattern to express their feelings and engage in self-reflection.

I made design adjustments based on the participants needs expressed through the focus group interviews. These needs are described in detail in section 4.2 and 4.4. In the final design 'Pheel', the user can be in control of who can see one's creation as well as it is possible for the users to voluntarily share their creations with friends. I also made sure that the user decides when their landscape is done and ready to be shared, if wished. It is possible for the user to choose their own pictures either through a library or by using their smartphone camera as well as it is possible for the user to look back at earlier landscapes to detect a development and support self-reflection. The needs to support users' representations of feelings were essential towards the development of 'Pheel', which is a prototype design embracing the needs of vulnerable children and young people of Greenland and lets the user combine photos of personal pictures into their own personal landscape and start a journey of reflecting upon feelings.

5.3 Limitations

The result of my investigation is based on themes derived from my two focus group interviews where I presented my designs in the interest of grasping the participants needs when expressing their feelings. As described in section 3.2 I involved students from a class attending the local high school in Nuuk named GUX. As my design aims to support vulnerable children and young people in Greenland, I cannot ensure that my participants from GUX are entirely representative as I cannot claim them as children with an unsafe attachment pattern. The choice to continue to work with the needs of vulnerable children and young people in Greenland to express their feelings is based on my broad investigation from my 9th semesters project. I involved children from NAKUUSA in a focus group interview, counselors working at Tusaannga and 132 children through a survey, which is the foundation of working with the theme of expressing feelings. I do not have directly access to vulnerable children as there is ethical considerations when involving children with an unsafe attachment pattern. Therefore, I was limited to the students attending the high school and cannot ensure the students are directly linked to children with unsafe attachment patterns.

5.4 Future work

My investigation opens to future opportunities regarding the development of 'Pheel'. 'Pheel' is a design of a prototype based on the derived themes of needs expressed by the participants from my two focus group interviews. As mentioned in section 5.3 I was limited to a class at GUX when involving children which is why I propose the involvement of children with an unsafe attachment pattern to ensure the participants are representative. This could be done with help from Tusaannga reaching out to the children who initiate contact or through institutions in Greenland, but it should be done cautiously, and it is important to consider the presence of a phycologist to ensure the children feel safe. Furthermore, the application would have to be implemented by developers and usability testing would be essential to ensure the applications intuitiveness. Through my focus group interviews the participants exchange ideas towards features of the application. Noah mentions that the application could cooperate with the hotline named Tusaannga and as this report initially is in the vulnerable children and young people of Greenland initiating contact to Tusaannga, it would be interesting to consider how the counselors of Tusaannga could have access to the application in a future context.

6 Conclusion

Initially, I described my thesis problem formulation as follows:

How can lifelogging technology support vulnerable children of Greenland to express their feelings?

To answer my problem formulation, I firstly explored related studies of an adapted approach of the Experience Sampling Method, and I found that lifelogging technologies supporting users' self-reflection upon emotions has been tested through questionnaires, bio sensors, diaries, and images.

I used the Research through Design method and included a class attending GUX Nuuk to understand the needs of children and young people of Greenland to express their feelings through my design as a tool for inquiry. Through two focus group interviews I learned about the participants needs to express their feelings. I derived four themes of needs using thematic analysis; social but not public, no predefined routines, text support reflection and combining photos to detect development over time. My second focus group interview resulted in two themes of the participants needs; privacy and personal representations provoke feelings. I adjusted my design based on the participants needs. My investigation resulted in a deeper understanding of the needs of children and young people of Greenland to express their feelings, which I discuss towards related studies of lifelogging technologies implicating that this area is untouched. Furthermore, my discussion reflects upon design implications, limitations, and future work.

My study investigates the needs of vulnerable children and young people of Greenland successfully and using my design as a tool for inquiry, I present 'Pheel', a prototype that supports my target group and propose new representations of feelings that are not seen before.

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