

The Evaluation of Beneficial Walking Elements to Identify Motivations for Walking Habit Formation

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Abstract

This study aimed to build on past findings about differences in personal walking experiences by demonstrating what elements were beneficial to participants with different walking habits. Accordingly, this study established the relationships between valued walking elements and people's motivation to walk, by dividing participants into three groups: Group W for people with a walking habit, Group HW for people who walk occasionally but not regularly, and Group NW for people who do not walk habitually. Participants walked a familiar and an unfamiliar route with a wearable device that recorded their heart-rate variability and electrodermal activity. Changes in the biometric data helped to identify the defining moments in each participant's walk. Participants discussed these moments in one-on-one interviews with a researcher to pinpoint their valued walking elements. As a result, this study classified walking elements into six themes: "Surroundings," "Social," "Exploration," "Route Plan," "Physical Exercise," and "Mental Thinking." A walking habit development model was made to show how "Route Plan" and "Exploration" were beneficial to Group NW, "Social" and "Surroundings" were beneficial to Group HW, and "Route Plan," "Mental Thinking," and "Physical Exercise" were beneficial to Group W.

Key words: Walking, Habit Formation, Benefits, Motivations, Biometric Data

1. INTRODUCTION

One of the unique features of human beings is our upright mode of locomotion and sets us apart from other animal groups. Lovejoy (1988) points out how we have always moved in this bipedal manner. This evolution of human locomotion also appears to reflect changes in brain size and subsistence behavior in humans (Gruss & Schmitt, 2015). Skoyles (2006) showed how the bipedal movement has transitioned the human brain to adapt to the coordination of this unique movement. This evolution

has also redefined the relationship that we have with our environment. We no longer only locomote to find a place to sleep or gather food as animals do. Tilley (2012) and Hallal et al. (2005) further mention how human beings are now locomoting to stimulate the brain and obtain a sense of satisfaction and happiness. In addition, we also experience various mental and physical benefits from moving such as an improvement in cardiovascular health, the release of stress, and light daily exercise, among many other benefits (Morris & Hardman, 1997).

At first, humans could only achieve this sense of sat-

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isfaction via walking. However, the rise of alternative transportation methods has made it possible to achieve similar experiences without having to walk. In other words, when human beings must locomote to accomplish some purpose, and locomotion is only a mere means, people choose options that are more comfortable alternatives to walking. Wunderlich (2008) further supports this fact by finding that people often do not consider walking as a particularly singular or insightful experience anymore. As a result, the additional mental and physical benefits people initially gained from walking are slowly fading away. Only when the purpose itself is to walk, people will choose walking as their way of locomotion. Hence, this research attempts to motivate more people to take a walk by increasing the awareness on the various beneficial walking elements that can potentially motivate people to walk more frequently.

Past research has attempted to discover more about factors of a walk that are beneficial and found that different people get motivated by different walking benefits (Davies et al., 2012). Therefore, this indicates that the benefits that people pursue from a walking experience are personal and unique.

However, most people are unaware of the underlying elements of a walk that are beneficial to them. Hence, increasing awareness on different personal walking benefits could motivate more people to take a walk. In this regard, this research aims to answer the question: How do different walking benefits increase the quality of a personal walking experience, and how could they further motivate the formation of a walking habit?

As a first step to reveal the differences between walking experiences, Hanssen et al. (2021) did a case study on subjective differences between familiar and unfamiliar walks to identify factors contributing to the quality of a walk. As a result, they identified four themes: “Social Aspects”, “Scenery”, “Nostalgia”, and “Safety”. In addition, Hanssen et al. (2021) found that “Safety” and “Nostalgia” were valued by participants with a walking habit, while participants without valued

“Scenery” and “Social Aspects”. This showed a relationship between people’s walking values and their motivation to walk. Hanssen et al. (2022) further examined this relation by proposing a Cognitive Chrono-Ethnography method related to walking habit formation. Hence, they defined different stages for walking habit formation along with the potential benefits that motivate a person to advance to the next walking habit stage. However, more research is necessary to increase the known benefits that motivate people to advance to the next walking habit stage (Hanssen et al., 2021). Consequently, this paper builds upon the previous walking habit development model by aiming to identify more walking benefits linked to walking habit formation, in an attempt to increase the motivation of people to walk.

2. LITERATURE REVIEW

2.1. Benefits and Motivation

Past research revealed some factors that motivate a person to walk, such as exercise or appreciation of aesthetic elements (Manaugh & El-Geneidy, 2013). When people think about walking, these elements can motivate and trigger a person to walk. This study refers to these as walking motivations.

Past researchers, such as Wolf & Wohlfart (2014), researched walking benefits and found a difference in the elements that benefit walkers, hikers, and runners, such as experiencing nature or relaxation. This study refers to these as walking benefits, which relate to elements that satisfy a person after a walk.

This study recognized that the benefits people felt in their previous walks can motivate a person to take a walk in the future. However, few studies have attempted to examine the relationship between walking benefits and motivations. Hence, this study evaluated various individual walking experiences to explore how different walking benefits motivate a person to walk.

2.2. Walking Habit Formation

Lally & Gardner (2013) described that a specific behavior needs to be performed repeatedly in a constant context for a habit to develop. To do so, they defined four stages one needs to progress through. Within the identified stages, first, a person needs to decide to act in order to form a habit. In the context of walking, a person can decide to act because of walking motivations. Second, the decision to act must be realized and translated into action. Third, the behavior must be repeated. In the context of walking, the obtainable walking benefits can make a person walk more frequently. Fourth, the new action must be repeated in a manner that causes automaticity development. It stands to reason that it is crucial to recognize the decision-making process to understand how walking motivations and benefits can lead to walking habit formation.

In this regard, Alfonzo (2005) studied people's decision-making process and showed that quality experiences of previous walks with comfort, feasibility, pleasurable, accessibility, and safety could motivate one to take more walks in the future.

2.3. Measuring Decision-Making Process

“Two minds” oversee human decision-making (Evans & Frankish, 2009). The “experiential processing system” oriented toward immediate action, and the “rational processing system” oriented toward future action (Kitajima et al., 2012). People's walking behavior mostly result from immediate actions controlled by the former. Hence, a qualitative approach was essential to understand people's walking behavior.

Kitajima (2020) introduced Cognitive Chrono- Ethnography (CCE) to explore the qualitative nature of the decision-making process through ethnographical field observation (step 1) to identify behaviors related to an activity (step 2). Study parameters are identified through model-based simulation (step 3) and used to find participants who suit the criteria

(step 4). Next, a CCE study is conducted (step 5) where participant's activity is recorded without effecting their usual behavior. The results are used for refinement of the mapping (step 6) and parameters (step 7).

Kitajima et al. (2010) clarified visiting behaviors of 9 loyal baseball fans via CCE. They selected loyal fans based on web questionnaires and interviews and asked them to watch three baseball games while their view, heartrate and speech was recorded. One week after each game, interviews were conducted. Each participant did 4 interviews, which created a fan history from 5 years ago until the present, showing how they staged-up to becoming a loyal fan. A similar CCE approach could be used to clarify how a person with a walking habit reaches a stage where they repeatedly take time out of their day for walking.

3. METHODOLOGY

3.1. Participants

Hanssen et al. (2021) observed people's walking behavior and found differences between participants who had a habit of walking and those who did not (Hanssen et al., 2021). Therefore, this research conducted a CCE study where participants were categorized into three groups. Group W for participants who considered to have a walking habit (3 participants). Group HW for participants who walked sometimes but not regularly (12 participants). Group NW for participants who did not consider themselves to have a walking habit (9 participants). Each participant was divided into the corresponding group based on their answer in the one-on-one interview.

Each participant walked two routes: first, a familiar route (A), and afterward, an unfamiliar route (B), as shown in Table 1. All routes (A & B) were located within the University of Tsukuba campus, with the familiar route (A) consisting of the main pedestrian roads. Four other routes were planned for the second unfamiliar route (B) and participants were instructed to choose the

Table 1. The conditions tested in the experiment

Group	Route A (Familiar)	Route B (Unfamiliar)
W	Condition W-A	Condition W-B
HW	Condition HW-A	Condition HW-B
NW	Condition NW-A	Condition NW-B

route mostly unfamiliar to them (B).

Experiments were conducted on different days because of the feasibility. Nevertheless, all experiments were conducted in similar sunny weather conditions to prevent a biased effect.

3.2. Experimental Procedures

Each participant walked both routes (A&B) by themselves, as the presence of a researcher influenced the participant's walking behavior in a past study (Hanssen et al., 2021). Upon arrival at the experimental site, participants remained in a waiting room where a researcher first instructed them about the experimental procedures. A map of the first route (A) was given to participants, along with images of the turning points in the route. For ethnographical field observation, researchers observed how the participant was walking through a phone connected via video call in real-time. Participants wore a vest with the phone placed in the left chest pouch, as shown in Fig. 1.



Fig. 1. Participants were attached with sensors for biometric data (left wrist), camera for video footage (chest), phone for communication (left shoulder)

Moreover, two sets of devices were attached to the participant beforehand to record the activity. Firstly, sensors were attached to the wrist to measure biometric data. Secondly, a video camera was connected with a chest mount to record video footage (Fig. 1).

Once the instruction finished, the participant walked the first familiar route (A) of around 1.5km. Having completed the walk, the participant returned to the waiting room. One researcher interviewed them to clarify the important moments of the walk. Once they were ready, they were instructed to walk the second unfamiliar route (B). In like manner, the participants had a map with images of the route. Furthermore, the video camera attached to participants via a chest mount recorded the activity. Participants walked the mostly unfamiliar routes (B) of around 1.5km. After the participant returned, another similar one-on-one interview was conducted with additional questions to compare routes A and B.

3.3. Activity Recording

This research used the wearable device called 'My Daily Badge' by researchers Onchi et al. (2021) to record participants' physiological patterns during the walk. 'My Daily Badge' is a wearable bio-instrument to track habitual behaviors. The flexible nature of this device enabled this research to capture biometric data while participants were moving around. Fig. 2 shows how the device could record inertial motion (IM), elec-



Fig. 2. My Daily Badge was used to capture the biometric data via a heart-rate sensor, GSR sensor, and inertial movement (Onchi et al., 2021)

trodermal activity (EDA), and heart rate variability (HRV) through its sensors.

Following Kitajima's (2020) CCE methodology, the biometric data and the video footage, captured via the video camera (Fig. 1), of the walk were showcased to the participants in an one-on-one interview. As a result, chronological development of the individual's memory relevant to the activity could be clarified and further elaborated on by participants.

3.4. One-on-one Interviews

Two 10-minute one-on-one interviews were done after routes A and B. Participant's walking experience was reproduced in chronological order by showcasing the captured video footage, biometric data, and a map illustrating the route that the participant walked.

During the interview, participants were asked about their activity, their decision-making process and their satisfaction. Additional questions were asked about their walking habit in their daily life, the walk's interesting moments, participants' walking preferences, and the good and bad parts of the walk.

3.5. Thematic Analysis

Once walking becomes a person's habit, walking behavior develops in the "experiential processing system". This system concerns unconscious immediate actions; therefore, habitual walking behavior is mostly done unconsciously. Hence, participants do not know the reasons behind all their actions. Therefore, for the refinement of the originally identified human behaviors by Hanssen et al. (2021) regarding the values "Scenery", "Social", "Nostalgic", and "Safety" between people with and without a habit, the interview answers were transcribed and analyzed using thematic analysis to relate participants' walking habit with their benefits, and clarify the events that triggered the feeling of benefits.

Thematic Analysis (TA) is a method for identifying,

and analyzing patterns of a dataset (Braun and Clarke, 2006). This research used TA on the interview answers of participants. Researchers familiarized themselves with the interview answers (step 1) and marked interesting answers (step 2). Then, similar interesting answers were grouped into themes (step 3) and further reviewed (step 4). Finally, each theme was named (step 5), and the results were summarized (step 6). In this manner, CCE and TA are both qualitative methods, but CCE enabled this research to highlight unconscious moments, which TA could further categorize.

4. METHODOLOGY

4.1. Thematic Analysis

During the interview, participants were asked to list where and what benefits they got from their walk by looking at the route's map. Moreover, they could view parts of the captured video footage to recall their experience. Interview answers were marked and written down by the interviewer (TA steps 1 and 2). Some participants only mentioned one benefits while some listed up to seven. This study these referred to these as "values" of a walk and summarized them in Table 2.

The mentioned values were then grouped and named into themes (TA steps 2, 3, 4, and 5). In order to prevent a biased effect and eliminate arbitrariness, three researchers reviewed the themes and defined six themes together: "Surrounding", "Exploration", "Physical Exercise", "Mental Thinking", "Social" and "Route Plan". The theme that each value was categorized under were summarized (TA step 6) and are shown in Table 2.

4.2. Biometric Data

Participants' biometric data (HRV & EDA) were gathered with a succession rate of 70.83%. The device could not record the biometric data of specific experi-

Table 2. The walking elements identified to be valued by each participant during either the familiar route (A) or unfamiliar route (B)

Subject	Value 1	Value 2	Value 3	Value 4	Value 5	Value 6	Value 7
1 (HW)	Sunny*	Seeing pigeon*	Seeing buddha statue*	Seeing playground*	Seeing School*	Seeing lake*	Seeing trees*
2 (NW)	New things †						
3 (NW)	New things †	Weather*	Feeling environment*				
4 (NW)	Safety §§	Air quality*	Scent*	Weather*			
5 (NW)	Peaceful Atmosphere*	Safety §§					
6 (HW)	Less people ††	Scenery*	Tempo and music §§	Adventure †			
7 (HW)	Mental Thinking**	Scenery*					
8 (HW)	Scenery*	Sunny*	Time §§	Less people ††			
9 (HW)	Natural view*	New shops †	Less people ††	Explore †	Season*	Flowers*	
10 (W)	Physical §	Oxygen §	Thinking while exercising**	Road condition §§			
11 (NW)	Landmarks*	Familiarity †	Purpose §§	Fun shops*			
12 (NW)	Sunny*	Greenery*	Peaceful and silent*				
13 (HW)	Safety §§	Scenery*	No cars §§				
14 (HW)	Mentality **	Weather*					
15 (W)	Pedestrian road §§	Plants*	Season*				
16 (NW)	Relaxing**						
17 (HW)	Others ††	Nature*	Scenery*	No noise*	Explore †		
18 (W)	Purpose §§	Solitude ††	Nature*	Silence*	See others ††	Continuity §§	
19 (HW)	Time §§	Freedom §§	With someone ††	Purpose §§	Plan §§		
20 (HW)	With someone ††	Walkability §§	Scenery*				
21 (HW)	Scenery changes*	Newness †	Nature*	Walkability §§			
22 (NW)	Physical benefits §	Purpose §§					
23 (NW)	Familiarity †	Adventure †	Time §§				
24 (HW)	Weather*	New things †					

* Surrounding

† Exploration

§ Physical Exercise

** Mental Thinking

†† Social

§§ Route Plan

ments due to unforeseen circumstances. Hence, Fig. 3 only shows the successfully recorded biometric data (HRV in red; EDA in blue) during the familiar and unfamiliar route of 9 participants; 3 participants in group W, 3 participants in group HW, 3 participants in group NW. The familiar parts within each route are marked with pink, and the unfamiliar parts with blue. Moreover, the moments where participants turned right or left are marked with the icon arrow. Moments where participants changed their walking rhythm are marked with

a purple circle. In consequence, this resulted in a clear overview of each participant's walk.

5. DISCUSSION

5.1. Episodes

The purpose of recording biometric data in CCE is to clarify the chronological development of participants'

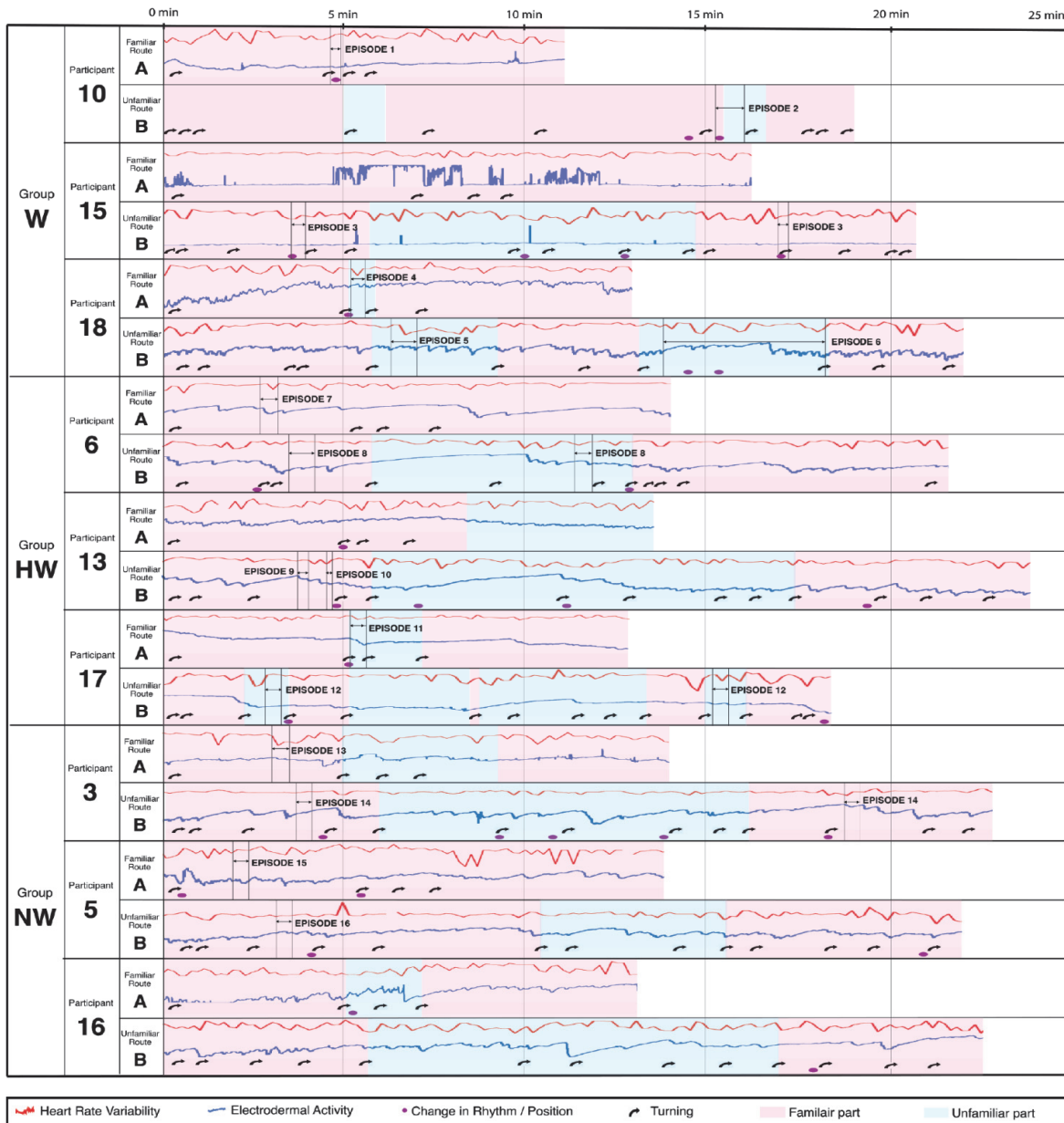


Fig. 3. Human-labelled tags to identify walking behavior, together with biometric data (GSR & HRV)

activities during the interviews. However, it was not yet feasible to do the data analysis in real-time at the time of this research. Therefore, the interview depended on the captured video footage and participant observation. Nevertheless, the biometric data visualized the changes that occurred in “episodes”.

During the one-on-one interviews, participants mentioned the special moments of their walk. These were labeled as episodes (Fig. 3). In group W, episode 1 indicates the experience of participant 10 while walking downstairs. The participant mentioned that it impacted

her walk negatively because the mud down the stairway was challenging to walk on. Episode 2 also indicates a moment that negatively affected participant 10’s experience. The poor road conditions made her focus too much on her feet, making it difficult to think while walking. Episode 3 refers to two moments when participant 15 crossed a road where she felt less safe. In episode 4, the stairway mentioned in episode 1 broke the rhythm of participant 18 and impacted the walk. Episode 5 is a moment mentioned by participant 18, who enjoyed the view of people playing baseball. Similarly, in epi-

sode 6, the participant walked an unfamiliar route and saw a new view of a canopy of trees, positively impacting his experience.

In group HW, episode 7 marks a moment of participant 6 where she remembered a negative experience that happened to her on this part of the route. In episode 8 participant 6 also remembered a past memory. However, these were positive experiences that made her feel nostalgic. In episode 9 participant 13 enjoyed the view of the trees. In episode 10, the participant found an attractive drawing on the wall of a tunnel that attracted her attention. Participant 17 encountered the same stairway mentioned in episodes 1 and 4 and said they were not nice to walk on, referred to as episode 11. Participant 17 mentioned that the drawings on the walls made the tunnel scary, referring to episode 12.

In group NW, participant 4 saw police officers talking to a person. In episode 13 This impacted his walk negatively because he thought something bad had happened. In episode 14, participant 3 also encountered the tunnel mentioned in episodes 10 and 12 and noted that the tunnel was dark and uncomfortable. Episode 15 refers to a moment where participant 5 encountered many cyclists. Finally, episode 16 indicates a similar episode where participant 5 encountered a scooter driving on the pedestrian road, making him feel less safe.

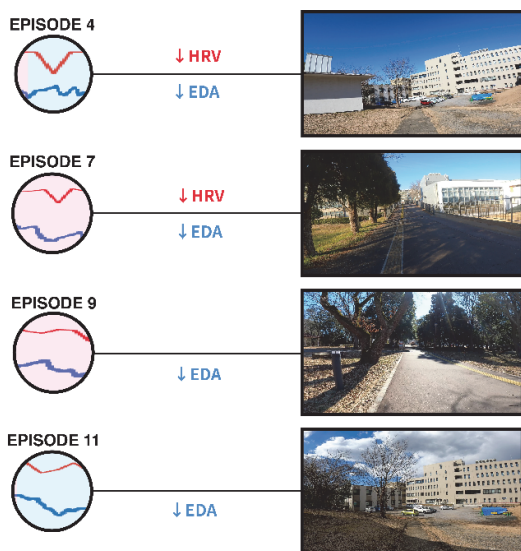


Fig. 4. Peaks in HRV and EDA during episodes

5.2. Emerging Themes per Habit Group

The percentage of participants who mentioned a value of each theme is shown in Fig. 5 to visualize the differences among the different walking habit groups. For example, 11 out of 12 participants in group HW mentioned a value of the theme “Surrounding” to benefit them, which is equal to 91.67%. On the other hand, in the case of group W and the theme “Exploration” or group HW and the theme “Physical Exercise”, no participants mentioned any values categorized under this theme, which is equal to 0%.

This study recognized that “Route Plan” was mentioned in two different manners by people with and without a walking habit. In detail, people with a walking habit benefitted from the “safety” and “road condition” of the “Route Plan”, while people with no habit valued the “purpose” or “destination” of the “Route Plan”. Consequently, this study divided “Route Plan” into “Route Plan (Safety)” and “Route Plan (Purpose)”.

As a result, Fig. 5 can help to give a more explicit assumption of the valued themes in each walking habit group based on how often the participants mentioned them. In consequence, group W benefited from the themes in the order of: “Route Plan (Safety)”, “Surrounding”, “Mental Thinking”, “Social”, “Physical Exercise”. Group HW benefited from “Surrounding”, “Social”, “Route Plan”, “Exploration”, and “Mental Thinking” Finally, group NW benefited from “Surrounding”, “Route Plan”, “Exploration”, “Mental Thinking” and “Physical Exercise”.

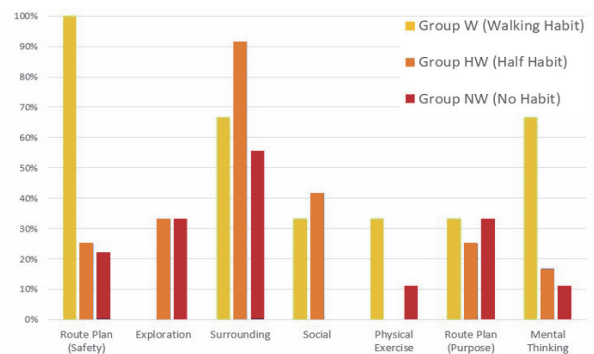


Fig. 5. Percentage of participants valuing each theme

5.3. Relation to Past Values

This study aimed to relate the identified values to walking habit formation. In this regard, the data per habit group shown in Fig. 5 helped to answer the question: How do different walking benefits increase the quality of a personal walking experience, and how could they further motivate the formation of a walking habit?

In detail, this study aimed to build an accurate walking habit development model based on a past analysis (Hanssen et al., 2021). Therefore, the relation between the previously and currently found values needed to be established. In a past study, “Social Aspects”, “Scenery”, “Nostalgia”, and “Safety” were identified as walking values that could potentially trigger a person to advance to the next walking habit stage (Hanssen et al., 2021).

“Safety” was also found in this study, as participants 4, 5, and 13 mentioned it directly as one of their values (Table 2). Moreover, other values related to safety were mentioned, such as “road condition”. However, even though safety can be valued in a walk, it cannot be considered a motivation or trigger for walking habit formation. People do not take a walk solely to pursue safety. Rather, it is a condition that is preferred for the overall route of the walk. This study aimed to find elements that benefit a person to a certain degree, increasing their motivation for habit formation. Hence, safety was not considered as a theme by itself, but categorized under the bigger theme of “Route Plan”.

“Nostalgia” is another trigger identified in a past study. Some participants of this study also mentioned “Nostalgia” to be important as a mental feeling. Therefore, this study recognizes “Nostalgia” as a value under the theme of “Mental Thinking.”

Hanssen et al. (2021) referred to “Scenery” as natural features of our surroundings, considered in terms of their appearance (Hanssen et al., 2021). Many participants of this study also mentioned scenery as one of their values, as shown in Fig. 3 and Table 2. However, people did not only enjoy the surrounding through the visual scenery,

but also through scent and auditory elements. Therefore, this study considers “Scenery” as part of the more prominent theme of “Surrounding”, together with other values such as “Ambient noise”, “Scent” and “Nature”.

Finally, “Social Aspects” were found in a past study, as well as this study. These are related to interactions with other people during the walk. On one end of the spectrum, participants 19 & 20 mentioned the preference to walk “With someone” for a valuable experience. On the other hand, participants 6 & 18 expressed their values for “Less people” and “Solitude”. Even though the mentioned values are the opposite, they are related to a walk’s “Social Aspects”. Hence, these were categorized under the same theme “Social”.

5.4. Walking Habit Development Model

Following the established relationship with the values of a past study, the six emerging themes were related to the walking habit stages, as shown in Fig. 6.

The values related to “Mental Thinking” and “Route Plan” benefitted people with a walking habit the most. As a result, it was assumed that “Mental Thinking” and “Route Plan” could possibly motivate people with a walking habit. Hence, both themes were assigned in the walking habit development model as potential triggers and walking motivations (Fig. 6).

However, “Route Plan” was also mentioned by 55.6% in group NW. Consequently, as mentioned previously, this study assumed that the theme “Route Plan” is also related to people without a walking habit (Fig. 6). In detail, people with a walking habit benefitted from the “safety” and “road condition” of the “Route Plan”, while people with no habit valued the “purpose” or “destination” of the “Route Plan”. Consequently, this study assumed that people with no walking habits are only motivated to walk when there is a “purpose” or “destination”. However, more research is needed to understand how “Route Plan” benefits people with and without a habit differently.

Another benefit mentioned in group W, with 33.3%,

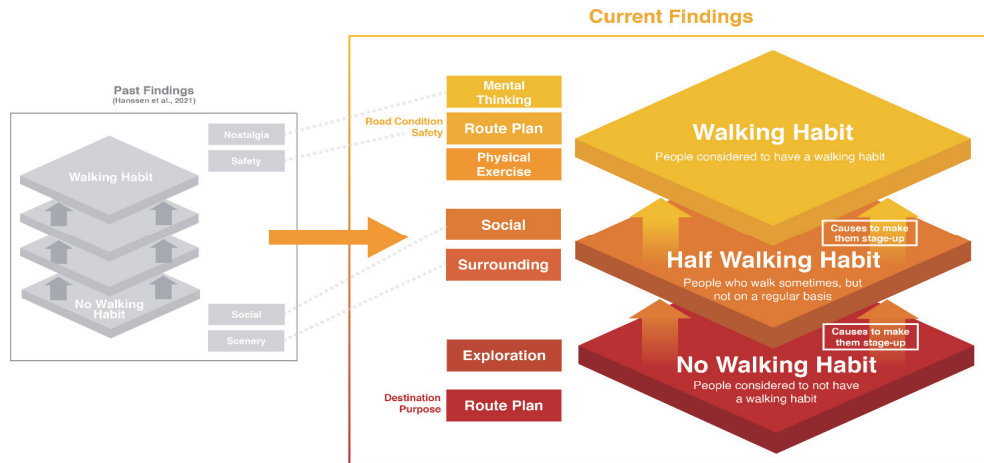


Fig. 6. The currently known stages for the formation of a walking habit and the newly found triggers between the 3 different stages, built upon the findings made by Hanssen et al. (2021)

was “Physical Exercise”. Only 10% in group NW and 0% in group HW mentioned this value. Hence, this study related “Physical Exercise” to the habit stage. In other words, this study assumed that “Physical Exercise” was a walking motivation for people with a habit.

This study assigned the “Social” theme to the half walking habit stage as 42.7% of participants in group HW mentioned these as beneficial. Therefore, opportunities to walk with someone else were considered as a motivation to group HW.

Another theme assigned to the half walking habit stage was “Surrounding” as 91.7% of participants in group HW mentioned this theme. However, 66.7% of people with a walking habit and 55.6% with no walking habit also mentioned it. Hence, this study recognizes “Surrounding” as one of the most essential motivations for walking habit formation. Therefore, further research is necessary to break down the theme of “Surrounding” as a motivation.

Finally, “Exploration” was mentioned by 33.3% in groups HW and NW. Hence, this value was related to both the no habit and middle walking habit stage. Therefore, a walk’s exploration aspect was also considered a motivation for people to start a walk.

In conclusion, three different stages were currently recognized with six themes that motivate people to advance to the next stage (Fig. 5). Looking at the related

themes per habit stage, people in the walking habit stage tend to benefit from inner world themes, such as mental thinking and physical exercise. On the other hand, people with less of a walking habit valued outer world themes such as the surrounding or exploration.

5.5. Limitations

The biometric data analysis played a role in identifying important moments of participants’ walks, as shown in Fig. 4. However, these were not shown to participants as the analysis was done after all experiments were finished. Usually, CCE requires researchers to show the recordings to participants so that they can remember their experience. However, this was not yet feasible as the data analysis could not be done in real-time. Therefore, future work should concern the review of the biometric data analysis together with participants during the interviews.

Moreover, group W only consisted of 3 participants, which is a too small to represent people with a walking habit. Hence, the biometric data analysis was done by comparing only 3 participants of each group (Fig. 3), and the emerging themes were only compared by the percentage of participants, instead of the number (Fig. 5). Since this affects the reliability of the results, future works should concern a larger number of participants with a walking habit.

6. CONCLUSION

6.1. Motivations for Habit Formation

The elements that benefitted people with different walking habits varied greatly. In general, people were unaware of the values that benefitted them in a walk. However, the beneficial values of a walk became clearer after participants walked a familiar and unfamiliar route. The values were classified into six emerging themes: “Surrounding”, “Social”, “Exploration”, “Route Plan”, “Physical Exercise” and “Mental Thinking”.

By relating the emerging themes to the three different walking habit groups, it was possible to classify the six themes as walking motivations that motivate a person to advance to the next walking habit stage. As a result, a new walking habit development model was developed based on a past study (Hanssen et al., 2021). The model visualizes the current study’s findings and relates the emerging themes to the walking habit formation process.

6.2. Future Work

Future works should concern a more accurate representation for each walking habit level. In particular, the walking habit level (group W) was represented by a too small group of participants. Therefore, future works will categorize participants to their corresponding walking habit during the recruitment phase instead of categorizing participants after the experiment is conducted.

Certain emerging themes in the study need to be studied further to establish a more precise relationship between walking preferences and habit formation. For example, the theme “Surrounding” was mentioned by 91.7% of people in group HW but can be further divided into smaller categories such as “Visual Surrounding”, “Auditory Surrounding”, “Nature”, or “City”. In the same manner, “Route Plan” is related to the walking and no walking habit stage and needs further examination to understand how it is beneficial differently between

the two different habit stages.

In this regard, this study recognizes the potential of recording biometric data and the importance of reviewing this data with participants during the one-on-one interviews. Changes in HRV and EDA indicated the defining moments of a walk. Hence, future work could build upon the six emerging themes identified in this study through further collecting biometric data to give more feedback on the walking experience. Moreover, the identification of impactful moments depended solely on the researcher’s awareness and the participant’s memory during the one-on-one interview. The video footage helped to recall impactful moments, but a review of biometric data could further help participants to remember the critical moments. In this regard, future work can add criteria to determine which moments count as impactful moments and potentially lead to walking habit formation.

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