University of Cincinnati

Date: 7/15/2016

I, Yushi Nong, hereby submit this original work as part of the requirements for the degree of Master of Design in Design.

It is entitled:
Applying Empathy Design:
Designing new crutches for college students with the strategy of empathy design

Student’s name: Yushi Nong

This work and its defense approved by:

Committee chair: Steven Doehler, M.A.
Committee member: Gerald Michaud, M.A.
Applying Empathy Design:

Designing new crutches for college students with the strategy of empathy design

A thesis submitted to the

Graduate School

of the University of Cincinnati in

partial fulfillment of the

requirements for the degree of

Master of Design

in the School of Design of the

College of Design, Architecture, Art and Planning

2016

Yushi Nong

B.S. Industrial Design, Tongji University

June 2013

Committee Chair: Steven Doehler, M.A.
Committee Advisors: Gerald Michaud, M.A.
Abstract

College students have frequent social interactions with the surrounding people and environment. When college students happen to get injured and have to use crutches, there will be emotional needs for dealing with such sudden changes in their lives. Considering the needs in an empathic perspective, we have the opportunity to develop new crutches that provide emotional care to patients. During this research, empathic design process was applied to collect patients’ real feelings about their injuries and their opinions on crutches. After interviews with users of crutches in University of Cincinnati, combined with my personal experience of using crutches on campus, two contradictory feelings emerged. College users wanted to express the message that they could control themselves independently with crutches. Meanwhile, a kind of helpless anger exists in their minds as well. To mediate this contradiction, a new concept of crutch design was expected to not only deliver an optimistic attitude, but also give users confidence to face their injuries and the subsequent issues. Testing the prototypes showed positive feedback from subjects. Adding emotional care on crutch design generates extra value to the users.
Acknowledgments

Firstly, I would like to thank the University of Cincinnati for accepting me for my graduate degree and for the financial assistance provided during the course of my academic stay.

I would like to express my sincere gratitude towards Professor Craig Vogel, my academic advisor, for his support and encouragement to me during the course of my graduate degree. I will never forget his help when I had my injury and his support at the beginning step of my career.

I would also like to thank Professor Steven Doehler and Professor Gerald Michaud for taking time out of their busy schedules to serve as the chair and member of my defense committee.

I would also like to thank the manager of NovaCare UC, Matthew Donlin, who has been a source of great assistance to me with his expertise and suggestions during the course of this research.

Last, but not the least, I would like to thank my family and all my friends for their unconditional support and faith in me.
# Table of Contents

## Chapter 1

**Introduction**

1.1 Empathy design .................................................................................................................. 1  
1.2 Life-expert-designer .............................................................................................................. 2  
1.3 Problem statement ............................................................................................................... 4  
1.4 Problem analysis .................................................................................................................. 4

## Chapter 2

**Research and Comprehension**

2.1 Design strategy .................................................................................................................... 6  
2.2 Self-analysis ......................................................................................................................... 7  
2.3 User interview ...................................................................................................................... 9  
2.4 Translational statement of opportunities .............................................................................. 11  
2.5 Design parameters .............................................................................................................. 13

## Chapter 3

**Concept Development**

3.1 Ideation step I ...................................................................................................................... 15  
3.2 Ideation step II ..................................................................................................................... 17  
3.3 Concept selection ............................................................................................................... 18  
3.4 Testing ................................................................................................................................ 19
3.5 Concept refinement ........................................................................................................20
3.6 Conclusion .....................................................................................................................22
3.7 Vision of the concept ....................................................................................................26

Appendices ..........................................................................................................................27

Bibliography .........................................................................................................................53
Chapter 1

Introduction

1.1 Empathy design

The definition of empathy is “the ability to be aware of, understanding of, and sensitive to another person’s feelings and thoughts” (Battarbee, Suri, & Howard, IDEO, 2014). As human-centered designers, we consciously work to understand not only the criteria of objects, but also the emotional needs of our clients and their customers. These insights inform and inspire our design. Tim Brown describes empathy in design as a mental habit. It is also a fundamental cultural value that allows designers to develop concepts, products, services, strategies, and systems that are both innovative and responsive to actual needs of users and demands in their minds.

Empathic product design is a prevalent method of user-centered design in today’s streamlined world of comfort, where physical needs come in second place to “the more resonant pangs of emotional malnourishment” (Chapman, 2005, p. 40) as “we are consumers of meaning and not matter”. (Chapman, 2005, p. 36) Product consumption operates on various experiential tiers, from the rational and the tangible to the profound and the abstract. It means the consumer possesses not only
the product itself, but also the meanings expressed by the features of the product like shape, material, color, etc. A subject-object dependency exists between the consumer and the product, from which generates the desire to keep the product longer. This desire is a kind of emotion related to the meanings attached to the product. These meanings, appreciated by the consumer, come from the stories, experience or feelings behind the product. “Waste is a symptom of expired emotion” (Chapman, 2005, p. 51), a kind of failed relationship that leads to the dumping of one by the other. If we increase the intensity and perceptibility of the relationship between the product and the user, we can achieve deeper and more immersive modes of prolonged user engagement, and the user can experience more spiritual benefits from the product, thus improving the unique value of the product bonding with the users.

As industrial designers, we are required to have the ability to understand the target users’ feelings, and we need to be able to translate these feelings to the users’ unmet needs. Those needs are crucial to create emotional durable products that give the users unprecedented experience and build new spiritual bonds between the users and the products. Those efforts can result in increasing the inherent value of a product

1.2 Life-expert-designer

Life-expert-users play an important role in the empathic design process. A life-expert-user to a certain daily task is the person who has the validated skills and
experience to finish the task with suitable products. He or she has better understanding of the task than other people. Life-expert-users know what the problems are. They may attempt to solve the problems, improve the level of comfort or adjust the methods of usage. These activities provide helpful experiences to designers for future phases. In order to develop empathy, a designer needs to be able to observe a life-expert-user’s interactions with the surroundings without interfering the subject and even briefly artificially role-play the life-expert-user. Role-playing places a designer actively into the life-expert-user role and the designer temporarily views the world through a life-expert-user’s eyes to engage, experience and understand the frustrations and challenges. That’s where designers learn the empathy of the users.

The reason I call myself a life-expert-designer is because I was on crutches for four months after my leg was broken in my first year in UC (University of Cincinnati). This experience provided me with a very unique perspective to get to know how to walk through every area of the college landscape on crutches. As a real user of crutches, I went through a complete medical procedure and I took the subsequent therapy treatment on campus, meanwhile, I was having my academic life in a complete handicapped routine. I embraced the fluctuant changes of emotions as the injury got along with time. I might lose the perspective of being a third party to observe a life-expert-user. Instead, I became the life-expert-user with consistently intentional and conscious observation from a designer. I have longer time and
closer perspective to observe the tasks of crutch using. Thus I consider myself a life-expert-designer.

1.3 Problem Statement

College students have frequent social interactions with surrounding people and environment. Once they get injured to start to live on crutches, there will be emotional needs when dealing with the changed interactions in their daily life. By looking at this issue with empathic design thinking, we have the opportunity of the crutch design to improve the experiences of using crutches with more confidence, independence and comfort within the college environment.

1.4 Problem Analysis

![Figure 1. The portrait of myself with makeup on crutches on Halloween](image)
When I was on crutches, I tried to record every change in my daily life, especially the activities I was not able to do due to the injury. Figure 1 shows the portrait of myself with makeup on crutches on Halloween. Although I was not suitable for walking around too much at that time, I still joined a Halloween party by playing a dressed zombie. Crutches became bummers to my costuming work because it reminded people of that I was having a real injury and I needed to be taken care of. However, I came up with an idea that I made use of my medical gears. I wrapped my arm with bandage and smeared some fake blood on the crutches, which turned me into a hospital zombie. It worked! People who didn’t know me thought it was a creative costume, and I also noticed that my friends stopped paying overly attention on my injured leg, they expressed the message that they believed I was feeling better. To myself, I felt more confident and less stress due to my injury. Crutches that used to be barriers to college students to fully enjoy the party turned into a fun factor of the party, and it unexpectedly brought positive influence to the patient’s mood. After that day, I started to consider digging deeper of what behind this observation. That was how I had this thesis topic.
Chapter 2

Research and Comprehension

2.1 Design Strategy

Empathy design research “relies upon the belief that a deeper understanding of users’ needs is critical for a designer to respond with more effective product outcomes. “(McDonagh & Thomas, 2010)

The key information I needed to develop a new crutch was how the users actually felt about the experiences of using crutches.

Figure 2. The designing process based on empathic design research
Figure 2 shows the general designing process based on the empathic design research (McDonagh & Thomas, 2010). Referring to this process, I planned a practical version for the crutch design as shown in Figure 3.

![Diagram showing the empathic design process]

**Figure 3.** The practical version empathic designing process for crutch design

### 2.2 Self-Analysis

The first part of the user data collecting was analyzing myself. Because I broke a bone in my ankle, I went through a six-month procedure of recovery, including treatment and physical therapy.

I received a pair of crutches from the nurse at the emergency room. At the moment I put my weight on crutches, the first thought came to my mind was “I can move
again!” After the injury, I suddenly could not move anymore, and my normal life came to a pause. I was on the wheelchair and could only be moved around by someone else. I had to ask for a lot of favors from people around. However, crutches helped my life resume instantly, though conditional.

Apparently, I needed to adjust my daily routine because of the injury. During the whole period of being on crutches, I always tried to bother other people as little as I could.

<table>
<thead>
<tr>
<th>Getting out of the bed</th>
<th>Approach the crutches</th>
<th>Put on the clothes-protections, pants, shorts, socks...</th>
</tr>
</thead>
<tbody>
<tr>
<td>In the bathroom</td>
<td>Sit on the toilet</td>
<td>Taking a shower, Brush the teeth, don't slip down, support to stand up</td>
</tr>
<tr>
<td>Breakfast</td>
<td>Operating a knife, a burner, a refrigerator</td>
<td>Preparing lunch and dinner</td>
</tr>
<tr>
<td>Getting out of the apartment</td>
<td>Stairs, slopes, doors, don't have enough strength</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Transportation</th>
<th>From apartment to transportation spot</th>
<th>Bus, a friend's car, walk with crutches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Navigating in school</td>
<td>From building to building or from room to room</td>
<td>Hills, stairs, crowds, strength</td>
</tr>
<tr>
<td>Bathroom in school</td>
<td>Urinal, toilet, don't block other people, don't slip down</td>
<td></td>
</tr>
<tr>
<td>Lunch in school</td>
<td>How to get food, who do you go with, enough food options, meet crowds</td>
<td></td>
</tr>
<tr>
<td>Dinner in school</td>
<td>How to get to the store, who do you go with, navigating in aisles, don't block other people, don't fall down</td>
<td></td>
</tr>
<tr>
<td>Grocery shopping</td>
<td>Transportation, Meet with crowd in narrow space, don't trouble too much</td>
<td></td>
</tr>
<tr>
<td></td>
<td>have fun</td>
<td></td>
</tr>
<tr>
<td>Party</td>
<td>Transportation, Meet with crowd in aisles, how to fit</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 4.** My daily routine adjusted for crutches

Figure 4 is a list of the adjusted daily routine with crutches. It’s obvious to see that, as a patient, the more I tried to do by myself the more independent and confident I would feel. On the other hand, the more energy it would cost, the easier I would feel fatigued because of the lack of enough energy and spirit to finish all the tasks.
Contradiction

Figure 5. The contradiction between will and fact

Figure 5 shows a contradiction between my subjective will and the external objective fact. This led to my hypothesis that other rookie crutch users would also experience the contradictory feelings at the early step.

2.3 User Interview

With the hypothesis raised from the self-analysis, I started to plan interviewing other college crutch users. I wanted to (a) see if they have the same feelings (b) know if there is any other common feeling, and (c) know if any specific issue emerges in terms of living a college life with crutches.

It was not hard to find crutch users within UC’s campus. Before I made appointments with my subjects, I designed a question sheet with Steve (Professor Steven Doehler) and Gerry’s (Professor Gerald Michaud) help. When I was listing the questions on the sheet, I initially hoped to lead the subjects to talk more about their personal feelings and emotional experience, rather than the comments of the functionalities of crutches. But Steve pointed out that since crutch was a portable
product, we must consider the usability too. Then I had my question sheet (File 1).

During the interview, when the subjects mentioned issues related to functionality, I would dig deeper to find out their emotional reactions to those issues. We would meet their emotional needs by improving the functionality. We would also come up with ideas directly dealing with those emotional needs. For example, when I asked Cody the question “What troubles you most when you are on crutches”, he mentioned door opening. Moreover, he told me a story that on the other day he slipped down in a bathroom while opening the door, and it took him five minutes to stand up. He used the word “Angry” to describe his feeling in that helpless situation. That was very important information to my research.
2.4 Translational statement of opportunities

Figure 6. The self-reported body maps showing areas where subjects felt sensations increased (warm colors) or decreased (cool colors) for a given emotion. (Proceedings of the National Academies of Sciences, 2013)

Apparently, the fluctuation of patients’ feelings mostly came from the physical disturbances caused by the injuries. Inspired by the “Self-reported body maps” (Figure 6), I believed I could find some of the emotional maps in my case. So, during the interview, when the subjects mentioned certain activities that disturbed them, I asked an additional question: how did you feel when you were doing… Of course, I
got the feedback, but I thought if I can apply some body monitoring metrics, such as temperature, blood pressure and so on in the “self-reported body maps” research, we could get more validated results of the subjects’ real emotional reactions in the given situations.

After I transcribed the voice records of the interviews (file 2), I started to code those transcripts. By coding the records, I abstracted the information from the conversations and put it into two main categories: actions and feelings. Then I configured the mapping relationships between those categories. (Figure 7)

![Figure 7. The action-feeling mapping chart](image-url)
Contradiction

**It’s not a big deal**

- “Nothing much”
- “Not that bad”
- “I didn’t need to…”
- “I kind of already knew how to use them”
- “I wasn’t afraid”
- “I’m not a patient”

**It’s painful**

- “It’s really painful”
- “It’s a kind of pain”

**Figure 8.** Patients during the interviews expressed two seemingly feelings about the injuries they had or they were having.

The summary of the interview results (Figure 8) supported my hypothesis of an existing contradiction at the beginning. I decided to take the contradiction as my design opportunity to do further study.

**2.5 Design parameters**

By analyzing my personal experience and the interview results, I tried to nail down several certain issues of crutch using to define my design parameters.

From the functional perspective, door opening was the most mentioned problem by the subjects. Another issue was that doctors and therapists always reminded
patients to keep the injured leg elevated, but a suitable place to elevate the injured leg was not always available in the classroom or other public environment. Those inconvenient scenarios were where helpless, unconfident or hesitant sentiments came from. Moreover, even the current crutch itself could bring negative influence to a patient’s mood. “It sucks.” said by Kimoni Fitz, a sophomore football player in UC, while taking physical therapy. He was pointing at a pair of ordinary crutches. “I feel embarrassed on crutches when passersby look at me” said by Peishan Qu, a graduate student in the School of Planning, DAAP. Therefore, from the empathic perspective, not only the lack of necessary function led to less satisfactory of crutches, but also aesthetic looking of crutches led to users’ negative perception of crutches.

There were always more issues than we thought before the research. It was also true for this crutch project. I finally narrowed down my focus to four design goals: better door opening, leg elevating, expressing patients’ confidence and making patients feel independent.
Chapter 3

Concept Development

3.1 Ideation step I

I split the ideation phase into two steps. Step I was focusing on the first two goals to improve the functionality with a new structure. Step II was focusing on the other two with empathic considerations.

Figure 9. The functional prototypes dealing with door opening and leg elevating
Figure 9 shows a series of attempts focusing on possible structures of the crutch to help door opening and leg elevating. An auxiliary pipe frame was the main idea. Since I opened several kinds of doors for over hundreds of times within the campus with crutches, I found that the fire resistant door in Figure 10 required the most effort to open. The fire resistant door could protect people from fire, however, because this kind of heavy door bounced back when I opened it, it pushed me back to the opposite direction. The user could lose balance while opening the door.

Figure 10. A crutch user trying to open the heavy fire resistant door
Because of the position of the bar handle on the door, top ones in Figure 10 show that normally a crutch user needed to push the bar handle with the wrist. It was not a comfortable or efficient way to push a heavy weight, and it was even painful. With the extra handle on the crutch, user can use the whole arm to deliver force, especially the strong part – elbow.

3.2 Ideation step II

![Figure 11](image_url). Skating board and cast signature as the inspirations for ideation step II

Two design goals in this step were expressing patients’ confidence and making patients feel happier. They were abstract goals, so I did a research on my target users – college students. I referred to objects that expressed college students’ confidence and activities college students did to support their friends. Two inspiring
things emerged, skating board and cast signatures. (Figure 11) Skating board has been a symbol of young people for a long time, and it implies the fact that who owns a skating board is an energetic person, the least possible person to be regarded as a patient, yet a cool reason to get injured. Cast signature is a straight way to express your encouragement to a friend. It makes a fun gift for people who get injured.

3.3 Concept selection

![Figure 12](image)

**Figure 12.** Combining two prototypes together was the final goal of this design step (Source of the polygon pattern: http://papers.co/vb10-wallpaper-green-blue-patterns)

Figure 12 shows the prototypes of the functional parts and empathic parts. My final goal was to combine them together, Steve and I discussed about how to attach the handle on the surface of the new crutch. Gerry inspired me to make it customized. I confirmed my final concept with their help.
3.4 Testing

Testing was a very important phase in this design process. Because the new concept was based on my personal hypothesis and the consolidation of the interview results, subjects approved the design goals, I needed to make sure if the solution matched the goals. Since making a high fidelity usable model was a big challenge at that time, suggested by Steve, I decided to test with two separate prototypes: prototype of functionality and prototype of empathy reflection.

There were two groups of people participated the test, one group were people who never used crutches before, the other group were people who used crutches in last six months. As for people who were using crutches, I brought the prototype in front of them, let them try it and asked how they felt. For the testing groups, they used the functional prototype by themselves and they observed me using the prototype with empathic feature, I also showed them the photos of themselves using the prototype. I took video records during the whole process (Figure 13), and asked them to finish a question sheet (File 3).
Figure 13. Testing: subjects opened the heavy fire resistant door with the prototypes

3.5 Concept refinement

According to the feedback of the test (File 4), it was not surprising that most of the feedbacks were around the extra handle. It hooked on the bar handle of the fire resistant door during the test, subjects suggested to change it with a piece of metal board. Concerns also focused on if the handle would occupy extra space that disturbed users’ movements. Since the new concept had a larger volume compared to the ordinary crutch, there was advice about making the bottom shape narrower to slim down the balky body. Matt (Matthew Donlin), the manager of NovaCare, UC Center, gave me the concern of weight control.
This concern led to the idea of inserting weight sensor at the bottom to give feedback of weight control (Figure 14). Then I approached the refined concept (Figure 15).

**Figure 14.** The sensor at the bottom gives feedback to guide the patient to do weight control with crutches
Figure 15. The refined concept, an “L” shape board replaces the handle to avoid being hooked by the door handle.

3.6 Conclusion

Generally, people thought positive about the new crutch. “Before people might ask where did you get injured, now people may ask where did you get those crutches.” Said by Matt.
Let’s look back at the four design goals:

1. Better door opening,
2. Leg elevating,
3. Expressing patients’ confidence
4. Making patients feel independent.

As Cody mentioned in his interview (File 2), door opening was the main reason that made him feel awkward on crutches. Feedback of this issue resonated with other subjects. According to the testing video and comments, for a subject who never use crutch before were not able to tell immediately if the new handle worked. After a quick training of basic tips of crutch using, they could find a better experience of door opening from the new crutch. After replacing the frame of pipes with a whole piece of material, reflections showed subjects could apply the whole arm on door opening. For a subject who was a former crutch user, she approved that the handle was a meaningful auxiliary. Positive response was validated to the challenge of door opening.
Leg elevating was an issue mentioned both by doctors and therapists but were not emphasized enough. Combining with my personal experience, it was true. The concept to elevate the leg (Figure 16) was accepted easily by the subjects, especially for the former crutch user, Peishan Qu and the therapist, Matthew Donlin. Even without the door opening function, the extra handle was also worth to be attached on the crutch. This function gives users a practical solution to follow doctors’ instruction: keep your leg elevated!

Subjects all mentioned more or less that they noticed more concerns from strangers when they were on crutches. Peishan Qu used to mention a feeling of embarrassment while using crutches because of their medical product features.
With the new appearance, subjects could straightly feel that the crutch was a cool thing, which led them to have more confidence to be seen using it. “People with high-profile personality would choose this crutch.” Moreover, positive attitude to further treatment was a bonus effect. “I feel they are less medical and clinical”, “I guess more independence is because the crutches have more functions”. When I asked about the feeling of independence, subjects explained the factors that influenced their experience. A fashion designer in the defense presentation expressed to be inspired by the graphic on crutches. She encouraged me to invite more fashion designers to participate in creating more splendid patterns for the crutch. This feedback indeed pointed out that people regarded this concept more or less as a kind of attractive product rather than a medical appliance.

In summary, as a group with the emotional fluctuation above average level, patients on crutches are easily influenced by the related medical activities. However, an ordinary crutch in current market does not pay attention to the emotional care to patients. This new concept does deliver a positive emotional care to crutch users giving them optimistic expectation of recovery and confidence to interact with public as a handicapped.

I think a comment from several subjects can show the simple effect the new crutch has done in their minds: “I would pay for it!”
3.7 Vision of the further development

Because of various limitations, there are more studies I would like to conduct with the crutches but I haven't done yet or I was unable to do:

Structure and material, current solution just shows a direction to develop the mechanical structure, by using different materials to build this crutch, more emotional factors can be revealed. There is also a need for more study on color-material-finish in terms of manufacturing.

Deeper research about emotions themselves, current concept is only capturing the opportunity from the main conflict expression of emotions, further study about emotions themselves can provide more opportunities to design aiming at enhancing user experience.

Inserting sensors to interact with intelligent devices, Internet of things is apparently an important trend of the future. Healthcare companies such as Philips are making profit from medical data, and since crutch is a medical product so wildly used but so little recorded, we can see that more interactions and data collecting from the crutches will have valuable potential in the close future.
### Appendices

**File 1:** Question sheet of the initial interview.

<table>
<thead>
<tr>
<th>Q: How are you feeling now?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q: When the doctor gave you crutches, how did you think your life would change?</td>
</tr>
<tr>
<td>Q: From both physical and emotional aspects, how did you feel about crutches at the first time you started using them?</td>
</tr>
<tr>
<td>Q: Who taught you to use crutches, was it helpful?</td>
</tr>
<tr>
<td>Q: What were the reactions from people surrounding you and how did you feel about their reactions?</td>
</tr>
<tr>
<td>Q: Daily routine + particular events</td>
</tr>
<tr>
<td>Q: Could you circle 3 words you feel strongest when you are on crutches:</td>
</tr>
<tr>
<td>Unconfident  Hesitant  Uncomfortable  Not independent</td>
</tr>
<tr>
<td>Awkward  Helpless  Bothersome  Worried  or any other sentiment?</td>
</tr>
<tr>
<td>Q: What is the relationship you think between you and crutches?</td>
</tr>
<tr>
<td>Q: What troubles you most when you are on crutches?</td>
</tr>
<tr>
<td>Q: How have you changed your crutch use from day1 to present?</td>
</tr>
</tbody>
</table>
Interview with Aaron

Q=Question, A=Answer

Q: When the doctor first gave the crutches, how did you think your life would change?

A: The doctor she didn’t give me the crutches, I mean, I texted one of my friends and I got crutches from them, they knew I was hurt, then the doctor asked me if I had crutches, so I guess, I don’t know...

Q: How did you get your crutches?

A: From my friend who had, otherwise the doctor would give me some, but I already had, I didn’t need to get them from the doctor because someone else have them.

Q: When you realized you had to be on crutches for several days, how did you think about it?

A: I didn’t know anything with crutches, it was more like as soon as I realized my leg was small, I was like can’t be active anymore.

Q: Any sentiment? Like painful, angry?

A: I get more frustration, can’t do what you normally do.
Q: Who taught you to use them?
A: Not really anybody, people recommended how I was supposed to use to walk with them, but I kind of already knew them.

So you already got some basic knowledge?
A: Yeah

Q: Did you feel any fear, not being independent?
A: No. Walking to school is annoying, but I wasn’t afraid, there was no fear
Q: Because of the armpit’s pain?
A: Yeah because the crutches were borrowed from a 5”10 person, I’m 5”8, so they were too tall, so that’s extreme painful, but it wasn’t big deal because I knew I would only be on crutches for couple days, if it had been a long term injury, I would probably get better crutches

Q: What were the reactions of people surrounding you?
A: People often gave me rides or carry stuff, so they know that I’m more independent on people.

Q: Did you feel anything from them? Or did you expect any feeling from them?
A: Most people first time they saw me they asked me how I hurt myself, most people I guess were sympathetic, like ”oh that sucks”
Q: Because you didn’t need to be on crutches for a long time, so it’s not a big deal for you, right?

A: Yeah, it was a temporary thing.

Q: Some brief daily routine on crutches?

A: Nothing changes in terms of my daily routine. Showering you have to hop around one leg, still walked to campus still did everything the same.

Q: How about walking in the building?

A: Oh, yeah, normally I would go a certain way, being on crutches, I've been taken the elevator went out a floor above went over and down, so I had to take another route.

Q: Is it kind of inconvenient?

A: Sure, having a harm leg is inconvenient, so

Q: How about some special activities, like party, shopping?

A: I couldn’t drive, I wasn’t able to do this kind of thing. I don’t know if it meant too much to what I normally do... yeah, like going to grocery store is not an option, driving somewhere is not, so there was a cook out for instance asked by someone from my lab but I couldn’t go to, because I couldn’t drive myself there.
Q: Did you have a patient feeling when you on crutches?
A: I don’t know, things took longer to understand everything on crutches, I don’t know how everything to do on crutches, it’s more the injury.

Q: Did you slip down?
A: Oh, yeah, several times. I’m not very good on crutches so... Especially they were too big for me

Q: Weren’t they adjustable?
A: The lowest stretch was 5’10.

Q: Circle three words
Uncomfortable

Q: Emotional projection?
A: I don’t know. I just think it’s annoying.

Q: You don’t like them at all?
A: They are helpful when you’re injured, you have to be on crutches when you are incapable.

Q: Did you feel it was like some gear or equipment of yourself?
A: Not really, never felt that.
Q: What’s the biggest trouble?

A: Generally walking anywhere is painful. I’m not good at crutches, over time I think I would get it a lot easier. So if I don’t have to go this place, I don’t need to forward to, or if I figure out how to be taken there, probably I would want to be, that’s more convenient.
Interview with Dylan

Q: How long have you been on crutches?
A: Around 2 months

Q: Did you take PT?
A: Yeah, it's been 3 weeks

Q: Who gave you the crutches and who taught you how to use them?
A: Actually the doctor never gave me the crutches. Physical therapist brought the crutches to my hospital and spent 30min to 1 hour trying to basically teach me how to use them because I never used them before. We went up and down stairs, walk around the floors of the hospital, just kind like show me the basics

Q: What point impresses you most at that time?
A: When I was first time using crutches I thought everyone just kind of kept them in their armpit but the therapist told don't keep it in your armpit because it causes pain. He told me to keep it by your body side because if you keep them in your armpit your arm would numb. That was like a little thing she told me that kind of help a lot

Q: How did you feel about that when you first got on crutches?
A: It’s great to be out of bed moving around but then it was also kind of struggle because my house is in Clifton it’s second floor. Trying to get around on crutches was kind of a challenge at first.

Q: Did you feel tired about that?
A: It was pretty tired to get around. Especially once I decided I want to go classes, the shuttle comes right at my street around my house, so I went out of my house to take the shuttle and it drop me off right in front of the McMilan and I crutch cross the campus by the time I got to from Zimmer to the library, I’m like (hoo~hoo~), my arms are hurt leg burned.

Q: How did your daily routine change?
A: Honestly, it was really convenient because it was winter break I didn’t go out much. I kind of stayed in mainly, Netflix and Chill, what Netflix a lot, after a while, 3 or 4 weeks when my foot starts to feel normal again towards the end of break, I went out a little bit but, for the most part my daily routine are consistent missed inside because there really wasn’t much I can do for the first 2,3 weeks, you were gonna stand up like there were pain been on crutches, my foot just aches and doing anything for a long period of time like standing on crutches still hurt. My daily routine was civil limited. It’s not what I use to be, I wasn’t in anywhere active.

Q: Were there anybody taking care of you?
A: My mom worked in home. I was trying to do stuff on my own but she was there helped me if I needed anything for the first few weeks, she kind of like do a lot because getting off bed stuff was painful and the pain meds they gave me they helped but they ran out before all the pain ran away.

Q: How much do you think your mom helped?
A: For the first few weeks she helped tremendous but after weeks after the pain subsided I was able to do and I was try to do stuff on my own, my parents got mad at a few times because I was try to do way too much too early and they tried to help so...

Q: Can you imagine what it would be if you study in another city and no one help you there?
A: That would be a huge challenge. Honestly I probably wouldn’t eat hot food at all, I wouldn’t get up from bed that much if no one else around, I was on bed for the first week my mom brought food into my room. Because sitting in front of the table or sitting in normal, the blood pressure would bring hurt a lot. I couldn’t imagine someone could do that without help.

When I moved back town here, my roommate helped me a lot, like they do laundry and stuff which is really nice

Q: Do you feel being on crutches influences your daily interaction with people?
A: Yes, it does. People holding doors for you, people care stuff for you, I went to Penera Bread and got food and three or four people offered like “oh can I help you with your trade or walking around classes, people see me coming in distance people will wait and hold that door for me. I guess its courtesy it's polite because I would do the same thing to people who's on crutches. I wasn’t treated differently, it was just like people wanted to help more.

Q: How did you feel people's help?
A: Opening doors and carrying stuff for me, it was pretty much all that was done. I like it, it obviously great favor to me. I wasn’t thinking like “no don’t hold that door for me!” I thought people just try to be nice and I liked it.

Q: How about being with friends, with class?
A: They did even more. They helped me even more. It was kind of a bummer because I couldn't see them as much we were thinking about finding a house in the break but they kind of helped a lot more and understand a lot more about that. They also joke with me and make fun of me, call me cripple, they are just trying to be funny, it wasn’t like anything we know just playful and it was nice. I would take the jokes because I couldn’t hang out with my friends. We all throw on jokes.

Q: Three words that you are feeling strongest.
Awkward
Helpless
Bothersome
Worried
Unconfident
Hesitant
Uncomfortable
Not independent

A: I honestly had a lot of those feelings. Almost all of those would apply.
Interview with Keaton

Q: How are you feeling now?
A: Nothing much

Q: When the doctor gave you crutches, how did you think your life would change?
A: I was thinking how I was gonna adapt to life with crutches. Give me a word for that feeling-- inconvenient

Q: How did you feel about them? Physical and emotional (did armpit feel hurt?)
A: Physically it’s kind of painful I never had them before, I have tried different way to use them. How can I get into the building is difficult.

Q: How was crutch use explained to you? Helpful?
A: Emergency room, a nurse taught me.

Q: What were the reactions from people surrounding you? (Ask the surrounding people too)
A: Most people are trying to help me, asking me what’s up

Q: What did you feel about their reactions?
A: It’s nice for people to ask overall.
Q: Daily routine + particular events

A: Shower is a difficult part, lean in the tub. When I have my boot, I can knee in the shower. Awkward but better than before. Take my crutches against the wall, hold the sink in front of me. Hold them the whole time. Girl friend helps me. Take elevator down stairs and girl friend picks me up to the school. Open the door and wait for my girl friend. Inside the building isn’t much a problem. Park in garage and take the elevator to get into the building. Opening door from the heavier side really bothers me. They are not handicap door. A lot of time people come to help me open the door, I prefer open by myself. I put my crutches by my side. They fall down a lot. For me it’s a pain, sometimes there is a kind of perfect angle, then there were less time it would fall. At that time I didn’t go outside much. Towards the end of my time on crutches, I didn’t go shopping. That was a smallest store, that was not that bad. I went to a festival, I just sat on the bench a little farther from the festival. I crutch into crowd to get food because I think I was pretty good at handling crutches even I was on the uneven pavement. I was feeling more confident at the time

Q: Three strongest feelings you were having?

Unconfident

Hesitant

Uncomfortable

Not independent

Awkward

Helpless
Bothersome

Worried

Or any other sentiment?

You didn't pick unconfident is it because you have your girlfriend helping you?

A: After the first two weeks I got fairly good on crutches, I wasn't really too worried about things I can deal with on a day to day basis. When I pick hesitant I guess what I mean are obstacles but. Not independent, like Krogor is really big, she didn't want me to go. Krogor they have little scooters, yeah, I know, but I didn't really want to do that. I'd rather just crutch. Even though I wasn't completely independent, I feel it will be more independent on crutches. Using crutches are like I still get my power to control myself.

Q: When you're meeting troubles, any desire scenario in your mind?

A: I slipped a few times, there was nothing bad, my pacing was off. I started watching more about wet floor. And the rubber part got stuck in doors. Once or twice it was pulled off, then I lost my balance.

Q: Do you have any emotional projection on your crutches?

A: Mostly just happy it’s over. After a while of using it’s more like it became an extension of me at some points, like I spent time on getting used to them, but it worth the time if I have problem.

Q: Do you like something about crutches?
A: Be at some level, *I'm independent*. The fact is that you can actually walk around. Doesn’t make me feel helpless, if I’m on chair I would *feel more helpless*.

Q: What do you most dislike about crutches?

A: This room and that room and the room cross the hall, I have to go between them a lot, it’s kind of a pain you have crutches. We lock all our doors, it’s kind of like I get my keys, push the door, obviously, a lot of people would help but, when they weren’t around or they were busy, that was kind of pain. Even at that point, I think I had figured out I started *using chairs with wheels*. When I was home, I sit by using crutches

Q: How have you changed your crutch use from day1 to present?

A: *Less pain, faster*, better balance. I could go longer distance. I felt *stronger* at that time

Q: How long was the whole process?

A: I was healing *pretty quickly*. 
Interview with Cody

Q: What's your name?
A: Cody

Q: How are you feeling now?
A: My first broke didn't hurt but like this weekend it started paining, starting with that, as long as I keep it elevated it's fine but as soon as I get up to go and leave for class, all the blood rushes down to my leg, then it starts hurt, pretty bad.

Q: When the doctor gave you crutches, how did you think your life would change?
A: I thought I was just gonna... I wouldn't be gonna work out, can't do many things I wanna do, how hard to be in class.

Q: Any emotional thing?
A: I was pretty angry, it's the fact that it was a stupid way to break my leg and just thinking for the next at least a month I would be on this, maybe not crutches but at least on this (boot). Kind of limits my options what I can do.

Q: So that's why you are so angry about.
A: Yeah

Q: Also angry about can't be independent?
A: That’s also **pretty frustrating**, just getting up in the morning and do regular things and **how long it** takes now.

Q: From both physical and emotional aspects, how did you feel about crutches at the first time you started using them?

A: I guess they **were pretty crutches** because I **were never on crutches** before so, it seemed to work pretty good but **the cut** I tried **to keep myself push up** right **as much as possible** but **it still cut** on my back like here (rare area of the armpit)

Q: Who gave the crutches?

A: I got them when I **was in the emergency room at the UC medical center**.

Q: That’s where I got mine. Was the nurse who gave you those?

A: Yeah, at first they put splint on my leg like wrap it up and then the next day I went to pick an appointment and then they gave me this boot.

Q: Did the nurse teach you how to use them?

A: She didn’t **I had a pretty good...I mean pretty basic understanding**. So she asked me if I need she to tell me, I **said no**, I’ll be fine.

Q: Were you feeling a little fear or other uncomfortable things when you first time on crutches?

A: Yeah, well, I know as soon as I was leaving the emergency room I wanted to go to the bathroom but **I slipped on the floor**, so these were just like shut out the door, I
was still there in the **bathroom like 5 minutes after getting on**. But it was fine I, I feel a loss like just using them more I feel a “loser” I’m feeling **comfortable** going steps now.

Q: How long have you been on crutches?
A: One week now.

Q: What were the reactions from people surrounding you and how did you feel about their reactions?
A: They are **concern but the same time they thought pretty funny. I can see that.**

Q: Did they tell you that funny or you just feel that?
A: They told me, they told me that was pretty funny.

Q: How did you feel their reactions?
A: I don’t know. Maybe I was in their position I would see. I **mean it was a funny situation like I always play frisby, I broke my leg, now I’m on crutches.** But, uh, yeah, it’s **fine, nothing normally change.**

Q: Do you feel you are missing something with your social activity?
A: **Yeah! (A pretty quick response) I** feel that way. I all know how I feel right now, I know I know I am. One thing I didn’t know is like a lot people look at you walking by **there is a lot people looking.**
Q: Is it embarrassing?
A: Not embarrassing, it’s just like, I just notice they are looking.

Q: Daily routine + particular events
A: My bed is kind of high up, so I haven’t used that since I broke my leg. I’ve just been using the couch, it’s short I can get up easier. Yeah, I sleep on couch. That’s another thing that’s frustrating. It’s like sleeping on a couch, but, yeah, so I get up, I take a shower on one foot.

Q: How do you step in the tub?
A: I put this knee on the edge of the tub and then hold on and bring my other foot in.

Q: But it’s wet on the edge sometimes.
A: Yeah, I put my knee on the edge and use that support, you know.

Q: Is it easy to slip?
A: If fewer careful, yeah. But I’m pretty careful on my foot.

Q: It’s ok for you?
A: Yeah, it’s working out. So the right leg is freak tired up after a while, holding whole body up.
Q: How about sitting on toilet?
A: It’s fine, *just like I got to lean back a little while, I got to farther away from that to sit down and then set this leg, I feel getting up is fine, I just use crutches to push myself up, so...*

Q: Do you feel angry when you are in the bathroom?
A: *I just general feel angry.* I got to use these. I depend on this boot.

Q: After a while using crutches, do you have any emotional projection on them?
A: *When I see someone else on crutches, I feel a connection.* I can get my head nod. It’s complete stranger. All the connection there: *yeah man, I know, it sucks.*

Q: So you feel it’s totally not cool.
A: I always thinking when *was a kid, I played around with crutches and everything, after this I don’t think I’m gonna play with crutches again. It’s serious... It’s not fun being on this.*

Q: How do you get to school?
A: *I walk*, it takes 20min or half an hour to my first class. I’ in UPA, on Kallen Street. My first class over the trailer was down there. That’s my first class, Monday, Wednesday, Friday, my first class, Tuesday, Thursday is in right next to the building so, *it’s journey.*

Q: Is there anybody walking with you?
A: No. Just me.

Q: Do you have friend who wants to help you through this?
A: They are supportive, but I'm pretty confident at this, so I'm fine.

Q: How about lunch and dinner?
A: Yeah, it's tough for preparing food, the main issue I have is normally I'll pack a lunch. From here, because it takes so long to get ready these, I have to stop packing lunch since then, I'm pretty hungry, when I move back to apartment I eat, I'm fine then, but like right now I don't eat lunch.

Q: Did you go have lunch with your friends before?
A: Yeah, we used to, but the thing is, they got to a dog and two friends eating lunch with, like they have to go back to their apartment and feed the dog at the same time.

Q: Did you use to walk with them to their apartment?
A: Yeah, I used to also go there, play with the dog, like now I can't, they live on Straight Street, a hill like that, I won't be able to get up there, It will take me a day to get up that hill. They drove me over there Wednesday night though.

Q: Do you take any transportation, like shuttle bus?
A: No, I basically just crutch everywhere.
Q: You’re tough.

A: My worry was I’m using 5 times energy than before I used.

It’s tough to get to class, I’m pretty warm out before I get to class.

Q: What’s the biggest trouble?

A: You mean things I can’t do or things with crutches?

Q: Anything.

A: Getting class is just a pain. Then not being able to go workout, stuff like that because of this.

Q: Have you considered a scooter or a knee walker?

A: Yeah I thought about that. It’s hopefully they said two weeks I should be off the crutches, so I just go ahead, hopefully in two weeks I can be off the crutches, I’ll still have to be on this for six, but I would be on pressure with this.

Q: Could you circle 3 words you feel strongest when you are on crutches:

Unconfident   Hesitant   Uncomfortable   Not independent

Awkward      Helpless      Bothersome      Worried   Or any other sentiment?

Q: Awkward?

A: You know, opening doors.
Q: You may get stuck on the door right?
A: Yeah.

Q: What do you most dislike about crutches?
A: Just like how it right up and cut you on your sides by your armpits.

Q: Do you go to some public place on crutches?
A: I have not yet, I was going to go to the football this weekend, but I don’t know how to walk with the crutches with the crowd.

Q: So you are not sure if you can make it?
A: It might just be too uncomfortable.
<table>
<thead>
<tr>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 If you saw someone using these crutches what would be your first impression?</td>
</tr>
<tr>
<td>2 What kind of person do you think would use this set of crutches?</td>
</tr>
<tr>
<td>3 Why do you think a person would choose these crutches over a traditional set?</td>
</tr>
<tr>
<td>4 Would you feel more confident using these crutches compared to a traditional set? Why or why not?</td>
</tr>
<tr>
<td>5 Would you feel independent or more independent using these crutches compared to a traditional set? Why or why not?</td>
</tr>
<tr>
<td>6 If you start your recovery with these crutches, what altitude you would have to take the following treatment? Why?</td>
</tr>
<tr>
<td>7 Would you pay extra to get this crutch? Why?</td>
</tr>
<tr>
<td>8 Is there anything you feel uncomfortable or hesitant about these crutches?</td>
</tr>
<tr>
<td>9 Any other thoughts or feelings you would like to share with about these crutches</td>
</tr>
</tbody>
</table>
File 4: Feedback of the subjects from the testing question sheet

Test of Empathy factors

1. If you saw someone using these crutches what would be your first impression?
   
   Does he/she need help?

2. What kind of person do you think would use this set of crutches?
   
   Patient(s) who's leg or foot is injured.
   Temporarily use.

3. Why do you think a person would choose these crutches over a traditional set?
   
   Better appearance, more helpful for opening a door.

4. Would you feel more confident using these crutches compared to a traditional set? Why or why not?
   
   Aesthetically, yeah, yes. It transforms a assistance tool into a cool thing. This part may interfere with arm.

5. Would you feel independent or more independent using these crutches compared to a traditional set? Why or why not?

   Yes.
6 If you start your recovery with these crutches, what altitude you would have to take the following treatment? Why?

If things gese well, I would be better very soon. I would hope this pair of crutches will make my life not so inconvenient.

7 Would you pay extra to get this crutch? Why?

Yes, it’s new design, more factional.

8 Is there anything you feel uncomfortable or hesitant about these crutches?

Attached part interfere with my arm.

9 Any other thoughts or feelings you would like to share with about these crutches?
Bibliography


