Homeless Young People and Living with Personal Digital Artifacts

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ABSTRACT

This paper reports on an investigation of how homeless young people hold themselves in relation to personal digital artifacts. Twelve participants, aged 19-29, took part in semi-structured interviews. Participants answered questions about the acquisition and disposition of personal artifacts, digital and non-digital, including mobile phones, music players, and wallets. The analysis of the interview transcripts reveals that young people often part with their digital artifacts in order to meet immediate needs, including the need to create and reciprocate goodwill. This contingent holding of personal artifacts illuminates both the ordinary and extraordinary circumstances of homelessness. The paper concludes with a discussion of constraints and implications for the design of information systems for improving the welfare of homeless young people.

Author Keywords

Homeless young people, attachment, personal digital artifacts, iPods, mobile phones, access, infrastructure

ACM Classification Keywords

K.4.2 Social Issues: Miscellaneous

General Terms

Design

INTRODUCTION

Buy, sell; Beg, borrow, steal. Humans take on and part with artifacts in a seemingly endless variety of ways. In the details of particular exchanges, and holdings, much can be seen about the human capacity to survive and prosper.

In recent years HCI has become particularly interested in how people hold themselves with respect to personal digital devices. One vein of research and design has investigated how pleasurability can go hand and hand with usability and utility to improve the "user experience" [25]. Under this perspective, an overall success metric, to put it roughly, is the strength of response to such statements as "I can't live without my…." In Ghana, Africa, for example, cell phones are highly desirable, despite high ownership costs, placing mobile communication in tension with basic needs, including food [20]. Here, the key problem is perhaps to discover knowledge for how to create supremely desirable experiences and to foresee what is at stake, for persons, societies, and economies, if they are in fact realized.

In another telling example, research has shown that young people form strong attachments to music, with preferences for musical genre influencing the formation of self-identity, and other aspects of psychosocial development [1]. These findings give weight to the importance of research into the attachment for digital media and systems for creating and sharing collections [19,25].

Questions of attachment have also been framed by non-use [17]. Even in the face of prevailing social forces, some people of sufficient economic means resist adopting some technologies. In extensive field work, for example, some of the factors of non-use have been investigated at ecovillages [13]. A far-reaching finding of this work has been that deliberations concerning environmental and social sustainability related to digital technology are fraught with difficulties, evidently quite unlike making rational choices about sustainable shelter, food, and transportation. In other HCI research, it has been observed that interaction design is systemically linked with environmental sustainability, with ensoulment and attachment to digital devices – and the experiences they enable – being one central concern [5,14].

In this paper we add to this body of knowledge for human-device attachment. Specifically, we report on how the circumstances of homelessness condition young people's ability to hold digital devices and media. To anticipate what is to come, consider this participant's response to the question: *How many MP3 players have you had?*

> If you count the one that I got at the resume class, three, but technically that's not mine because I gave it to my girlfriend. So I've only owned two MP3 players. One was the little…you can buy for $8 now at the store… It took a AA or AAA battery to run. I found that and 'cause I had it for so long I decided to load it up and give it a try. And then, my 120 GB iPod, which is my pride and joy. It's MIA right

now…Yeah, I had to pawn it. I had to get phone minutes and all sorts of wonderful fun stuff, bus fare, cigarettes, personal hygiene... Yeah, it was, like, three or four days ago…So, I'll get it back. I'm not worried about it… Every time I bring it in they say, "Wow, you have a lot of stuff on there." And that's my basis for, I've put so much money and time into it. I've so much media on it that they would never give me a decent price for it that I would never sell it, I'll just put it on a hold for a minute so I can pay a bill. [Don]

BACKGROUND
Technology and Homelessness
In the 1990s, at the time that information technology was rapidly diffusing into the U.S. middleclass, researchers asked questions about how information technology might improve the welfare of low-income families [18]. One project, for example, considered the creation of "social capital" through networked information exchanged on desktop computers at home in a low-income community [15]. Researchers, more recently, have been investigating how mobile phones can improve the quality of life of people living in relative poverty and the homeless [12,20].

Our own work has investigated the use of digital and non-digital information systems for improving the welfare of homeless young people [8,23,24]. We have observed that homeless young people eagerly adopt digital media and mobile phones [23]. Additionally, ethnographic [10] and survey [16] research, has recently reported similar results, suggesting that the adoption of digital media and devices to be widespread with sweeping implications for how homelessness is considered, mitigated, and corrected. These research findings lead to a key question: How can information systems help young people leave homelessness and not lead to further stigmatization?

Homeless Young People: Definitional Notes
Here we are not able to fully examine how the concept of "homeless youth" has been theorized in the literature or operationalized in empirical research. That said, there is a large literature on homeless youth [6,9,10,16], which shows young people generally to be present-focused, often to suffer from the effects of trauma caused by neglect or abuse early in life, and often to be distrustful of adults. At the same time, like all young people, homeless young people vigorously seek out and learn from new experiences, sometimes risky ones, and develop their identities [10].

Largely based on our collaborator's view, in this work we use the term "homeless young people" to refer to both *adolescence* (age 13 –19) and *emerging adulthood*, which has been taken to extend nearly to age 30 [21]. This lengthy, complex period of development lies beyond childhood but before young adulthood. For "homelessness," we oppose a monolithic view where the term is defined by attribute, perhaps, for example, by the absence of shelter. Rather, we support a processional view where homelessness often becomes tied to one's identity and how one perceives the world. It is related to past and ongoing circumstances, particularly concerned with how basic needs are obtained

[6]. Thus, even people with shelter may consider themselves homeless if still involved with street life, if still reliant on service agencies, among other reasons.

Object Careers and Biographies
Anthropologists have observed that much can be learned about a culture by investigating the circulation of its objects [2]. Given an object: Where did it come from? How was it exchanged? How was it cared for? What are its use value and its economic value? In short, by considering objects to have "biographies" – some deemed more typical or better than others – a good deal can be learned about how a society operates and what it values. One theory that comes out of this perspective is that objects, in most if not all cultures, move through a process of "singularization" [11]. In this view, an object can first be seen as a "commodity." Then, by various personal and social processes, it can be transformed into a unique "singular" object, a digital photo album, a home, a family heirloom, a priceless work of art. Conversely, a singularized object can be commoditized, for example, remade into cash (e.g. pawning an iPod) or aged into rubbish (e.g., an obsolete computer).

Building from a different foundation [7], concerned in part with the creation and maintenance of identity, HCI has recently begun to examine how attachments become constituted with digital artifacts [13,22,25]. In general, this work seems to involve presuppositions concerning consumerism (e.g., a disposition towards purchasing things), economic means (e.g., income for discretionary spending), shelter (e.g., the "consumers" are housed in a space where objects can be stored) and familial structure (e.g., children are in touch with parents and grandparents). These are often reasonable presuppositions. However, when they do not hold, or when they are relaxed, as is the case in such communities as the Old Order Amish, ecovillages, and homeless encampments, what happens to the nature of human-object attachment, identity formation, and object biographies? We conjecture that such social configurations influence how objects are taken on, held, and parted with, with substantial implications for design.

RESEARCH SETTING
The New Tech for Youth Sessions
This work was conducted in a drop-in for homeless young people, located in urban Seattle, Washington, in a neighborhood known as the University District (U-District). Since 1993, the drop-in has offered services to homeless young people, and those transitioning out of homelessness. Recently, it has offered an 8-session, 4-week life-skills class, called *New Tech for Youth Sessions* (NTYS). In this class [8], young people develop their skills for searching and applying for jobs and work-related opportunities. As students progress through the class, they receive incentives, including a thumb drive for storing digital files and, at the last class, an 8 GB iPod and $15.00 iTunes gift card.

The iPods: Working with Tensions

Using the iPod as an incentive for completing the NTYS class raises three tensions: (1) *Might the iPod be an instrument for leaving homelessness or frivolous?* On the one hand, the iPod offers an opportunity for developing technological skills. On the other, while technology skills for iPods and iTunes might transfer to specific activities related to escaping homelessness (e.g., online searching) they are in themselves non-instrumental; (2) *Is the iPod economically justifiable or a luxury?* On the one hand, the iPod is symbolic of the mainstream, giving youth access to ordinary experiences, such as walking down the street wearing a fashionable electronic device. On the other, it can be perceived as a luxury, not fitting for people who lack basic needs; and (3) *Is the iPod commensurate with the educational effort?* On the one hand, earning the iPod may encourage feelings of accomplishment and self-worth. Certainly, an iPod is a special reward for young people who normally receive used or discarded goods. On the other, completing the 8-session NTYS class may be seen as insufficiently demanding.

Research Question

What do young people do with their iPods? If we knew, we would be better positioned to understand the tensions just described. Put broadly, therefore, the major question is twofold: How do the circumstances of poverty, on the one hand, condition the acquisition, ownership, and disposition of personal digital devices? On the other, by asking questions about personal digital devices, how they are acquired, how they are tethered to infrastructure and institutions, and so forth what can we learn about the circumstances of homelessness? We address these questions not to seek a definitive position on the iPod tensions; rather, we seek to understand what is at stake in such tensions.

METHOD
Participants

Twelve young people, four women and eight men, aged between 19 and 29 years participated in this study (*Mdn* = 21.5 years). All participants had completed an NTYS class offering, and make up a sample that covers about 17% of the population of youth that have taken a class.

To be recruited, four conditions needed to be met. The participant needed to have: (1) Been known by the staff at the drop-in and invited to join a class; (2) Successfully completed the class; (3) Remained in touch with a life-skills coordinator; and (4) Been willing to visit the U-District.

Hence, this sample is unlikely to be representative of Seattle's homeless youth. Many of Seattle's homeless young people, for example, are not in contact with the drop-in. Of those that are, some might not have been invited to participate in NTYS classes because, for example, of very limited socialization skills. Moreover, the 12 participants do not represent a random sample of NTYS graduates. Some youth, for example, having made significant progress in escaping homelessness may decline to visit the U-District.

Procedure

Participants were interviewed by the authors according to a semi-structured protocol of two phases. In the first phase, participants answered a series of closed- and open-ended questions, focused primarily on the ownership and use of mobile phones, MP3 players, wallets, and government-issued I.D.s. We chose these artifacts because they are of similar importance, commonly owned, small and usually kept on the body. In addition, we expected the rate of replacement to be higher for the two digital artifacts, since phones and MP3 players are more fragile, have value as a commodity, are subject to obsolescence, and are more easily replaced than identification. In the second phase, participants were prompted to draw a timeline and talk out the key events related to their iPods.

Depending on participants' inclinations to talk, especially about the timeline, the interviews ranged between 15–60 minutes (*Mdn* = 35.5 minutes). The interview rapport was strong, partly we think, because all participants knew at least one of the authors from the NTYS classes, where we were volunteer instructors, and because the interviews took place in a familiar location. All participants gave oral assent, with 10 participants also agreeing to audio recording. We took notes for the 2 participants who did not agree to recording. The audio recordings were transcribed, resulting in a corpus of 62,087 words (n = 10; *M* = 6,209; *SD* = 2,901). By preference, each participant received either a gift card or an iPod wall charger, each worth $5.00.

In both phases, we probed for specific information on the acquisition, maintenance, sharing, and disposition of personal artifacts. We actively avoided discussion of non-related topics, such as illegal activities and health conditions. When Irene, for example, mentioned past drug use we guided the interview towards her use of cell phones. On the other hand, illustrating the delicate balance we sought, when Greg told us that his friend lost Greg's iPod in

1. Access. Gaining access to infrastructure; Types (wireless, electricity, etc.); Skills and practical knowledge for; Folk theories; Locations; Surveillance; Constraints and limitations; Perceptions of quality

2. Circumstances of Homelessness. Living conditions; Domestic life; Sleeping places; Obtaining basic needs; Working; Play and leisure; Substance use; Conflict; Pawn shops; Institutions; Type of I.D.

3. Digital Collections. Managing digital collections; Size and types of collections; Storage and hardware; Uploading and sharing files; Maintenance; Migration; Skills and practical knowledge for

4. Friends, Family and Community. Maintaining relationships; Connections and bonds; Expressions of community; Social exchanges; Possession and ownership; Sharing resources

5. Music. Listening experiences; Locations; Devices; Perceptions and feelings about music; Names of bands and artists

6. Personal Artifacts. Types (digital devices, etc.); Experiences; Skills and practical knowledge for; Folk theories; Perceptions of quality

7. Popular Culture. References to T.V. programs, movies, video games, ring tones, etc.; Technologies; Digital media

Table 1: Topics identified after listening to the interviews.

a dumpster filled with cardboard, we *did* pose questions about how dumpsters can be used as sleeping places.

Data Analysis: Considerations and Approach

To become analytically oriented to the data, we listened to the 10 audio recordings and reviewed the notes. When a participant talked about a challenge, discussed technology use, or gave a telling account of street life we paused the recording, discussed the material, and proposed a label for the topic and a covering theme. As we progressed through the material we identified seven broad themes for organizing the topics (see Table 1).

Rather than conducting a systematic coding of the transcripts, we decided to use a narrative approach. Emphasizing the person, we chose to present each participant's stories and data as short *précis*. Thus, we sought to create "portraits," which are personal, in the young people's own voices. Addressing the research questions, we privileged material that focused on the management of digital media and the connections between devices and infrastructure (#1, #3, and #6 in Table 1). We sought, furthermore, a diversity of material. In aggregate, the 12 participant portraits cover, at least to some reasonable degree, the topics in Table 1.

FINDINGS
Musical Interests

Although not a specific topic in the interview instrument, participants talked about diverse musical interests and demonstrated a striking fluency with musical genre, artists, and bands. Therefore, working from the transcripts, we identified the names of all artists and musical genres. Intending to give both a gestalt and the particular interests of participants, Table 2 shows these data.

♂**Al**: Rhythm & Blues* ◦ Underground Hip Hop ◦ Prozac ◦ Project: Deadman[HC] ◦ Rihanna* ◦ Lea Quezada*. ♂**Bob**: Gangsta Rap ◦ Death Metal ◦ Dying Fetus[HC] ◦ Slayer ◦ Insane Clown Posse[HC] ◦ Twiztid[HC] ◦ Mickey Avalon ◦ Black Nasty ◦ Lloyd "Feel so right." ♂**Clay**: Russian/Czechoslovakian music. ♂**Don**: 300 movies, 500 CDs, 15,000 tracks. ♂**Ed**: Techno* ◦ Emo* ◦ Alternative* ◦ Machine Music* ◦ Psychopathic Records[HC] ◦ Tool ◦ Manson. ♀**Fran**: Journey ◦ Foreigner. ♂**Greg**: Ramones ◦ Charged GBH[HC] ◦ Sex Pistols ◦ Fleetwood Mac ◦ The Spits ◦ Buzzcocks ◦ Joy Division ◦ Fear ◦ Cro-Mags[HC] ◦ SamHan. ♂**Hank**: Jimmy Hendrix ◦ Pink Floyd ◦ AC/DC ◦ Alice in Chains ◦ Slayer ◦ Motorhead ◦ Sound Garden ◦ Sublime ◦ Rob Zombie ◦ Velvet Revolver. ♀**Irene**: Say Anything ◦ Patti Smith ◦ The Shins ◦ Bright Eyes ◦ The Moody Blues ◦ Led Zeppelin ◦ The Cure ◦ Pink Floyd ◦ Sinead O'Connor ◦ Blue October ◦ Bob Dylan ◦ Neil Young. ♀**Jazz**: Afroman "Colt 45" ◦ Queen "Bohemian Rhapsody," "Bicycle Race." ♀**Kay**: Black-Eyed Peas "Boom Boom Pow" ◦ 3Oh!3 "Don't Trust Me." ♂**Larry**: Harry Potter (Soundtrack).

Table 2: Music mentioned by each participant, genres underlined and songs placed in quotes. * indicates a dislike. [HC] indicates hardcore or horrorcore.

Online Access

We tabulated the data on the acquisition and disposition of digital and non-digital artifacts. Table 3 shows these data in disaggregated form, allowing, on a close reading, an examination of each participant's data as well as the distribution across all participants. Concerning online access, participants reported spending between 15 minutes and 38 hours per week online (*Mdn* = 2 hours), for email, social networking, online learning, watching videos, playing games, and similar activities.

Ownership of Personal Artifacts

All 12 participants reported that they have owned at least one mobile phone (*M* = 10; *SD* = 14.4), MP3 player (*M* = 4.4; *SD* = 3.3) and wallet (*M* = 10.2; *SD* = 9.4). In addition, at the time of the interview, all participants reported that

Participant Name	Age	Online		Mobile phone			MP3 player			Wallet			I.D.		iPod	
		Hrs	No.	A	No.	Age	A	No.	Age	A	No.	Age	A	Age	Fate	Age
Al	29	¼	2	22	50	½	28	few	–	5	20	¼	3	11	Sold ♦	1 ½
Bob	28	5	7	21	20	¼	25	11	–	7	30	24	16	¼	Lost	¼
Clay	27	5	7	22	2	7	24	4	7	16	8	3	23	48	Traded	6
Don	26	5	4	16	6	21	24	3	12	13	4	10	15	108	Gifted ♦	¼
Ed	23	2	4	17	20	–	22	2	¼	5	20	36	17	¼	Sold	1
♀ Fran	22	38	15	18	1	–	21	1	12	18	1	48	16	84	Owns	12
Greg	21	2	2	16	3	4	18	4	–	10	3	48	18	36	Lost ♦	8
Hank	21	2	2	15	2	–	19	10	¾	13	10	24	19	24	Owns	1
♀ Irene	20	2	3	14	3	–	20	3	6	16	2	½	13	96	Gifted ♦	6
♀ Jazz	20	½	2	20	1	3	18	few	–	3	17	12	18	24	Sold ♦	1
♀ Kay	19	28	7	16	10	¼	17	3	24	12	2	–	18	12	Sold ♦	8
Larry	19	2	5	16	2	30	15	3	17	8	5	72	17	36	Lost	¼
Mean artifact ages *(SDs)*				8.3 (*11.2*)			8.0 (*8.1*)			25.3 (*23.4*)			40.0 (*37.0*)			3.2 (*2.3*)

Table 3: Summary of self-report responses concerning the ownership of personal digital and non-digital artifacts, showing participants' estimated age of first acquisition (A), the estimated number of artifacts owned (No.), and the length of "ownership" in months (Age). Also shown are the current ages of the 12 participants, the reported number of hours spent online (Hrs) and the frequency of access per week (No.). The symbol "–" indicates that an artifact was not owned at the time of the interview. The final column shows the fate of the iPods and the age, in months, at which point the iPod was sold, lost, gifted, or traded. The symbol ♦ refers to a fate that is related to the creation of "goodwill" (see text for details).

they had government-issued I.D. Table 3 shows the mean ages in months and the standard deviations of the artifacts, ranging from 8.0 to 40.0 months. Based on one-tailed Wilcoxon signed-rank tests, we find that I.D.s are significantly older than MP3 players (W = 151.0, p = 0.029) and mobile phones (W = 154.0, p = 0.017), and that wallets are significantly older than mobile phones (W = 131.0, p = 0.045) but not MP3 Players (W = 125.5, p = 0.107).

To estimate artifact turnover we computed ratios of the number of reported phones owned in a participant's lifetime by the number of years that he or she has owned phones. At the high end, Al reports that he has owned 50 different phones in roughly 8 years (current age: 29 years; first phone: 22), for a ratio of 50:8 (6.25/year). At the low end, Fran claims 1 phone in 5 years, for a ratio of 1:5 (0.2/year). Making these calculations for all participants, we see median rates of replacement for wallets, mobile phones, and MP3 players respectively 0.542 (n = 12), 0.523 (n = 10), and 1.0 (n = 12). By Wilcoxon signed-rank tests, we find a difference between wallets and MP3 players (W=105, p=0.016) but not mobile phones (W=133, p=.170).

What Happened to the iPods?
As reported in Table 3, 2 of the 12 participants continued to own their iPods, with the other iPods being sold (n = 4), lost (n = 3), gifted (n = 2), or traded (n = 1). On average, participants reported that they held on to the iPods for about 3 months after the NTYS class (n = 10; M = 3.2; SD = 2.3).

Portraits of Homeless Young People
We now turn to the portraits, beginning with accounts that touch upon the circumstances of homelessness in general.

Clay: The First Time I Realized that I was Homeless
Clay dresses well, speaks vividly, is upbeat, but also suffers from a serious, common illness that makes living on the street dangerous. When asked about losing a wallet, he said:

> …when I first got out here on the streets two years ago, some girl named M was the one that showed me around, and I had a couple bucks left, I was like, "Wanna go watch a movie?" So we went… [Then] we went to the Convention Center because I needed to use the restroom… I didn't think I looked too ragged, but I guess the security guard recognized her as someone that was homeless… I was like, in the restroom, and I actually had a security guard come and go like, "What are you doing in there, hurry up!"… That was the first time I felt like I was homeless.

He told of being agitated by the security guard, leaving the toilet in a hurry, without his wallet.

Clay's iPod. Clay traded for a battery-operated MP3 player, saying: "I traded that for something that I just needed to put batteries in. Because if you're around here, you can get batteries, but you can't get a laptop to recharge."

Hank: Non-Use and Utopia in Nature
Hank told us that he has limited eyesight, particularly in his left eye, due to chemotherapy in his late teens. He had owned a laptop in the past, and now uses computers at service agencies and public libraries, accessing the Internet for 1-2 hours per day. Hank was very knowledgeable about sources of free WiFi throughout the neighborhood. However, despite his domain expertise, Hank was disillusioned with technology in general and concerned about its effects on human beings:

> My opinion on computers is…it's all bad. I don't really like technology… It seems kind of redundant. We don't need it…We've got computers and all that stuff just because we got lazy… Think of how many trees it took to build one house. If we didn't build the house, we'd have so many more trees… This whole area would be covered in trees… And it would be… a much nicer and healthier place. I'd like to make my own country or something, you know?…Where we wouldn't have no big huge skyscrapers… We'd have tents, and we'd have some food around us. Yeah.

Hank's iPod. Hank had received his iPod just three weeks before his interview, and was concerned about its fragility. Although in the past he traded iPods for necessities, like a heavy jacket, he said, "I'm not going to trade this one."

Larry: Negotiating Home and Homelessness
Larry is 19, has some form of autism spectrum disorder, and loves to ride the bus. Larry talks about his father and sister at length and with great affection. He is not allowed to stay home by himself, so he relies on libraries and service agencies to provide places to go during the day. However, he told us that he had recently been banned from a library for breaking "a reasonable rule" about appropriate use of the Internet. Reflecting on this, he talked about what it feels like to be watched while using public computers:

> In respects, they aren't directly watching you. …they won't be looking directly at your screen… but off in the distance they're watching you.

Finally, just as Larry's access to home is restricted, his technology use is strongly mediated by his father, who, for example, will not allow Larry Internet access at home.

Larry's iPod. From our notes, Larry said he was attending a service agency program with other young people when his iPod disappeared. He was unsure if it had been stolen or if it had inadvertently been thrown into the trash.

Bob: Managing Digital Media
Despite his large, strong body, Bob said that he was robbed at gunpoint several weeks prior to the interview, losing his wallet and I.D. He reported that he owned an iPhone, without a working SIM card, so he thinks of it as a "fancy iPod." He also has a prepaid phone which he treats "… pretty much like a calling card where I can keep my numbers on it, throw it away when I'm done."

At several points in the interview Bob describes difficulties associated with storing music. He says "I've put a bunch of CDs on my buddy's computer just in case I get an iPod." He describes, too, an earlier time when he stored music on a laptop that he owned, but ran into difficulty synchronizing the media on the laptop with an iPod, saying:

What happened to all my music? Like I couldn't even go into the information and read "About iPod" and says 6667 songs on here, 30 movies, like 2000 pictures…. I had to replug it and re-wipe and put it all back on again … And it kept crashing my computer and I just broke my iPod… Somehow I finally got it to restart and sync the music up. [Then, it stopped working and] I picked up my MacBook and ripped it in half like a phone book… That was very frustrating. There went my iPod and my MacBook.

We see in this account something of the ongoing difficulty of managing media collections on fragile, unstable storage infrastructure. Even with a stable infrastructure, Bob might be unwilling to access it in public places, saying:

I don't really like going places to use computers…. it's just uncomfortable to have nine cameras staring at you like "What are you doing with this computer?" I can't check my MySpace without just checking my MySpace. I gotta be like recorded eight different directions like some kind of, I don't know, like you're already in jail or something.

Bob's iPod. In a colorful story, Bob said: "My ex-girlfriend set me on fire and threw me down a hill, and it came out of my pocket and I never found it again. …she threw me down the hill that we were drinking on."

Don: Collecting and Sharing Digital Media
Don, who we first met in the introduction, is in stable housing and attends community college, after many years on the street. He is a digital music collector, storing music on his computer and evidently sharing it widely with friends. He claims to have a collection of 300 movies, 500 CDs, and 15,000 tracks. Don, moreover, likes to find album covers and put them side-by-side his songs. He described using a library's computers to find album art and transferring it to an old home computer with a thumb drive.

♦*Don's iPod.* Don tells of giving the iPod to his girlfriend, but suggests a kind of joint ownership:

Sometimes when I'm at the house and I'm bored, I might pull it out and play Klondike real fast. But for the most part it's not mine and if I had it in my possession and was using it like it was mine, I'd be more tempted to when I needed money really quick to go and throw it in the pawn shop.

Ed: Supported by Friends
Judging by the thickness of his glasses and how he talks about his sight, Ed may be legally blind. Recently released from jail, he accesses computers at friend's houses, and he also likes to read, carrying books around in his backpack:

Like, I read anywhere from like Stephen King to *Siddhartha* or whatever. *Celestine Prophesy*, sh*t like that. Whatever's good that makes it past 100 pages.

Ed reports that he has owned over 30 CD players, and many CDs which he calls his "bibles… 'Cause I live by my music." Asked about carrying CDs, he said "it's easier just to carry an iPod." Still, about loading music onto the iPod, he said "I've never done it myself. I've just had people do it for me. 'Cause, I don't know how to." Ed volunteered that Don has been the source of music and assistance.

Ed's iPod. Ed reported that he sold his original iPod, in order to buy alcohol, indicated by a bottle he drew on his timeline and a very matter-of-fact statement. Ed did, however, have an iPod:

My friend had, she had like a 16 gig [iPod], and then she got this one [an iPod earned by participating in a NTYS class] …and since I'd just got out [of jail] she sold me this one so I could have my own iPod.

Ending the interview, Ed, in an expression of self-efficacy and with a twinkle in his eye toward acquainting us with "hardcore" music, took out a set of very small portable speakers from his pocket, set them up, attached his iPod to them, and shared a favorite music video, by *Twiztid*.

Al: Trading the iPod for Food, Living with Friends
Al lives in a squat. He says that "I don't really get indoors too often," so he will ask friends to check his email at the library or bring in his cell phone to be charged. When we asked how many MP3 players he's owned, he responded "I don't even know… I used to do a lot of really dumb drugs so I sold a lot of those." Now 29, he says that he got his first MP3 player when he was 28:

I had CD players up until that point… Oh, I've had hundreds of those. Lose'em. Break'em… Once you break the lens the whole system's crap. Glorified paper weight then. 'Cause I've dropped iPods and MP3 players on the ground and they'll last a few more drops than… a CD player would.

♦*Al's iPod.* Al said he: "was staying with friends and nobody had no money. There was literally no food in the house. So I just. 'Alright [iPod] bye, bye.'" Pawning the iPod so he and his friends could eat is not likely to be inconsequential. Not only does his voice suggest sadness, later he says "I like listening to music from the time I wake until the time I go to bed. Helps keep me calm."

Fran: "I Love my iPod," LimeWire Fries Computers
Fran told us that she has a collection of 35 sunglasses. Fran once owned a mobile phone when she was 18, about 4 years ago. However, after 3 months, she cancelled the plan on the phone and gave it to a friend because "I kept buying ringtones and video games for it and stuff. And my bill was like $300 more than it should have been [per month]."

Fran currently owns a laptop computer that she uses every day. She sold her previous computer to a pawn shop after it was affected by computer viruses:

I don't use LimeWire on my new computer. I use it on my roommate's computer, because she already had LimeWire and she's like 'Whatever. It's going to fry anyway.' But there were viruses on it [the previous computer] before the LimeWire. I was just like 'Whatever. This computer sucks. Might as well fry it some more'… It's my sister's computer and she gave it to me, … all messed up and I thought I could fix it, but I couldn't, so I just destroyed it more.

However, when Fran took the computer to a pawn shop to sell it, "it worked for the 5 minutes that they tested it… So I just got really lucky somehow and they got screwed."

Fran's iPod. Fran still owned her iPod and had loaded, lost and then reloaded her music collection on it. Fran had blown out two pairs of earphones, "from playing the music too loud," especially in the morning when she "listen[s] to [her] music really loud…to wake [her] up." At the end of the interview, when we asked Fran if she had anything she would like to add, she simply stated, "I love my iPod."

Kay: Living with a Lockbox

Kay is enrolled in classes and was due at work after her interview. She is 19 years old, mother of an infant, and currently lives in an apartment with Fran. She keeps valuable items in a lockbox because:

> We have homeless people who come over to the house a lot and… they're my friends… but they like to take things, so I keep everything of value locked up. 'Cause, I had a piggy bank for my daughter full of like $600 in cash and change and someone emptied it.

Kay was skeptical that any of the participants would still have their iPods, saying:

> I know these kids… like when I was homeless, like I'd get iPods. Sometimes, like they wouldn't be like my iPods, but I would get iPods. And like, you know, I could have kept them, but I'd sell them, and carry around my little Discman, 'cause music is music, no matter where it's coming from. And when you're homeless, and have things of value, you'd rather have the money than the valuable thing.

♦*Kay's iPod.* Kay reported that she was happy to use another player that she had and that the iPod was just sitting in her lockbox. When one of her friends, Ed, returned from jail, she reports that she sold him the iPod so that he could listen to music, an activity that he was not able to do while incarcerated.

Greg: Music, Friends and Dumpsters

Greg loves music: "I think it kind of distracts me from the world. I put the earphones on and tune 'them' out." Greg owns his own keyboard, and has access to a piano in the transitional shelter where he is currently living. He also has a friend who had recently formed a band and is "a really good bass player."

♦ *Greg's iPod.* Greg, taken from notes, said: "I lent it out to my buddy…. He had it. He put it into the corner of a dumpster. I lent it out but he was feeling down and low. He loves music like I do. He was intoxicated. He didn't have any place to stay and it was raining." He spoke eloquently, expressing concern for his friend, and without bitterness for the lost iPod, which had over 1,000 songs.

Irene: Not Homeless Right Now

> One of my favorite things to do, because Seattle meteorologists never, I mean, they have a challenge, I'll admit it. But they're not exactly spot on all the time. So I'll go onto NOAA and I'll look at all their satellite imagery and see if I can't come up with a better, more accurate forecast than the weather man. Which usually I can.

Irene lives with her mom "in a tiny little room" and is hoping to not become homeless again. Growing up they had a computer that "was mostly just used for music and pictures, at that time, nothing else." Now, the computer is at her sister's place because her sister has room for it, and Irene says "… between me and my mom, my sister, we must have had like 2000 CDs. Like a lot."

She says that she can get power for her Zune player, which she likes better than iPods because she believes it is more compatible with Microsoft desktops, at grocery stores and gas stations. About getting power she said:

> A lot of times I lie and say it's a phone. I'm like, yeah "I need to charge my cell phone really quick." You know, and then they're more kind, like "I just need to charge my music," they're like, "Go away." [Electronics store], the library, there's lots of places especially in the U-District that you can get…free power… There's a couple places in between buildings and churches that I know of, too. So, just depends on your appearance, like if you look homeless, they're not gonna let you do it. But if you look like you're just like some random person that's like, "Oh, emergency" then they'll let you do it. It's all about how you approach them.

♦ *Irene's iPod.* Irene reports that she gave the iPod to her mother who loves it and takes it everywhere, that they learned to use iTunes together, and that the iPod is loaded with songs, saying: "She was like, 'I never thought I'd ever have something like this. I feel so cool.'"

Jazz: Using the iPod to Create Street Credibility

Jazz, a 20 year old woman, says that "All the songs I like I have memorized," and says that she does not listen to music so much. She mentioned that she has been banned from a local pawnshop. Without stable shelter, she talked about the difficulty of getting electricity, saying:

> I'm homeless! People are very stingy with their electric…. Somebody catches you charging your phone on an outlet on the outside of a building, they will yell at you until you leave.

While Jazz claimed to have had one phone in her lifetime, at the interview, she actually showed us *two* phones of the same brand and model. When we asked why she had two, she explained that one was her phone; unfortunately, it was broken but the service plan was still active. The other phone belonged to a friend; while it functioned, its service plan had expired. She then demonstrated how the SIM card could be taken out of the first phone and inserted into the second, thereby making a working phone. This act of tinkering appeared to be a source of pride.

♦ *Jazz's iPod.* In Jazz's telling, about one month after receiving the iPod, she met a person selling a dog. Taking up the opportunity, she had a friend sell her iPod at the pawnshop, and used the money to buy the dog. She, then, gave the dog to a friend.

DISCUSSION
Taking On, Holding, and Parting with Artifacts

Recall the two estimates of replacement rates of personal artifacts presented in the results: (1) The reported age of the most recently held artifact; and (2) The ratio of the reported number of artifacts of a particular kind owned by the

reported number of years of owning the artifact. Given their importance, their low economical value, and their durability we expected that young people would hold onto their wallets for longer periods of time than the digital artifacts. With the small number of data points, missing data, and high variance in the data we do not find decisive evidence for this hypothesis. That said, recall that it does appear to be the case that young people in this study do hold onto their I.D.s for longer periods of time than digital artifacts (about 40 vs. 8 months), although, even so, two of the participants had replaced their I.D.s within two weeks of the interview. Part of the reason for this difference may be that I.D.s are not always held by a person; often, they are left with a case manager or reliable person for safekeeping.

Overall the data show that while participants move through mobile phones quite quickly, with median replacement rates for mobile phones and MP3 players respectively 23.0 and 11.0 months, these rates may not be too different from most people in society. For comparison, we do not know of any publicly available data on phone replacement rates, broken down by demographics. Nevertheless, a reasonable baseline might be: Owners of 2-year service plans upgrade their phones at least every 2 years and prepaid phone owners more often (Bob, recall, said of a prepaid phone "it's pretty much like a calling card"). In addition, the replacement rates for mobile phones and MP3 players appear similar to the *desired* replacement rates of college freshmen [5].

Participants often challenged our understanding for the meaning of such words as "possession" and "ownership." Recall Jazz, for example, who showed us two phones in the interview but claimed to own one phone. Whether Jazz owned one phone or two seems in doubt, perhaps hinging on technical definitions of sharing and possession. Al and Kay as well as other participants made a distinction between phones and MP3 players that were theirs and those they would "sell" or "get." Finally, recall that Don felt joint ownership for the 8 GB iPod, the one he gave to his girlfriend, expressed by his unwillingness to pawn it.

Although we did not ask about pawnshops, 8 participants mentioned them. Don's account is particularly telling for it shows how a singularized object ("my 120 GB iPod, which is my pride and joy… I've put so much money and time into it") can be turned into a commodity. In fact, Don said that he put his iPod into a pawnshop five or six times a year, sometimes paying $5 to keep the loan going. In another example, Kay said "[Once] I got stranded in Seattle. And so like I had this $300 iPod. And I was just like, well, I can just sell it and then buy it back tomorrow." While pawnshops may provide other functions (a safekeeping function), the data suggest that participants used them to convert their possessions into cash. Pawnshops, in theoretical terms, are instrumental for turning singularized objects into commodities.

Creating and Reciprocating Goodwill

In six cases (marked by the ♦), young people parted with their iPods and in the process generated some kind of goodwill. Why would Jazz buy a dog and give it to a friend? While she would not specifically tell us, a key informant suggested that it was a brilliant street move for creating credibility, for being known for giving a cool dog to a well-known person in the community. In one case, the iPod was given up to meet immediate needs of a group (Al). In other cases, they were given or sold to a close friend or family member (Don, Greg, Irene, and Kay). Goodwill appears to be quite strongly implicated in these exchanges.

Metrics of social capital, and its underlying theoretical commitments, have been used to examine the nature of homelessness and specifically to predict the risk of becoming homeless [3]. It seems likely that in some instances the iPods were used to create social capital, essential for survival on the street [10]. However, at present, we cannot offer specific evidence on if, and how, the iPods were used to create social capital. Nevertheless, if creating and reciprocating goodwill is indeed common, this process seems to contribute to the contingent nature of holding on to personal objects.

Infrastructure, Access, and Practical Knowledge

Participants revealed many challenges associated with gaining access to infrastructure. Libraries, for example, while often used to gain internet access, were also seen to be controlling and places of surveillance (Bob, Larry). Participants revealed much practical knowledge for gaining access to infrastructure in the U-District. This knowledge is both social and technical (e.g., Irene getting "emergency" power at shops and Hank knowing the locations of free wireless access). However, by being tethered to infrastructure, young people can become vulnerable. For instance, a young person may need to trespass in order to gain access to electricity, to access a social networking site, to communicate with a family member, to ask for help. But, trespassing can have severe consequences for homeless people [4]. Finally, Clay decoupled from infrastructure by trading his iPod for a battery-operated MP3 player.

The interview material is full of examples in which young people had great difficulty managing the storage of their digital media, like many families do [19]. For most youth, digital files appeared to be scattered around on older computers that were owned by family or friends. As such, access to data, and its safekeeping, was generally enabled (or not) by other people. In short, these young people in general do not have a reliable place to hold their digital materials. Impermanence of shelter and instabilities in familial and social relations appears to create a climate of unstable data storage and data migration. In turn, holding onto data so that digital artifacts can be "singularized" is difficult, without stable places for data storage and access.

Music and Listening Experiences

The participants demonstrated fluency and strong interest in music: Ed's CDs are his bibles, Greg thinks of music as a distraction, Fran listens to music to wake and Al to calm down. Infrastructure for sharing and experiencing music, clearly seen in Don's collection, is very important to this community. While musical tastes are broad (Table 2), interest in "hardcore punk" or "horrorcore hip hop" music is noteworthy for its themes of extreme violence and suicidal ideation. Preference for such dark music has been shown to correlate to substance abuse and other risk-taking behaviors [1]. Given that homeless young people are predisposed to risky behaviors [6], further study of young people's music preferences and social activities related to music – and especially the creation of social capital useful for escaping homelessness – is clearly warranted.

Reflections on Method

This work has persuaded us that the "object biographies" approach [2] does elicit a good deal of material about life circumstances, as seen in the themes and topics of Table 1 and in the portraits. We were struck by the emotive and detailed accounts that came out of straightforward questions about the taking on, holding, and parting with personal artifacts. Specifically, we underline two fundamental themes of the portraits: (1) The lives of homeless young people are very hard, directly impacting their ability to hold onto personal digital artifacts; and (2) No two young people are alike. Indeed, we chose to present the interview material as portraits to make these vital points, and not least to present young people's distinctive voices. For a second reflection, for this community of homeless young people, this work has taught us to seek out specific details concerning the creation of goodwill through the sharing of technology and media. Here, as well as in earlier work [23], the notion of "sharing" is clearly important (e.g., gifting and recall Greg's portrait). Exactly how remains for future work. Finally, it is important to note that the quantitative data that we tabulated and analyzed are self-reported. As such, these data should be treated as estimates of uncertain reliability. That said, we believe that participants were forthcoming and candid about their use of personal devices.

CONCLUSION

The principle finding of this study is that, for homeless young people in this community, being able to use digital media is largely, or perhaps always, contingent. Two additive forces appear to bring about this way of living with digital media. For one, holding onto digital artifacts, which are valuable as commodities, is always predicated on the fulfillment of other, immediate needs. In other words, to obtain food or other basic needs, it may be necessary to give up a digital artifact. But, as we have seen, immediate needs also seem to include the exchange of goodwill, which is likely crucial for survival on the street [3]. For the second force, access to necessary infrastructure is also contingent, subject to its mere availability, but also subject to the control and surveillance by people or institutions.

These forces of contingency – namely, of holding digital artifacts and of accessing infrastructure – condition the circumstances under which digital media is experienced. It is also important to note that the tethering of digital artifacts to infrastructure can make homelessness visible, perhaps amplifying these forces. In consequence, homeless young people are likely to be placed in positions where stigma and ostracism can arise by new means, specifically because of the need for infrastructure.

Yet, these two forces of contingency are surely not unique to homeless young people; it is perhaps best assumed that they apply to everyone, no matter of socioeconomic standing. Indeed, as we have discussed in prior work [23], there is an ordinariness associated with homeless young people's stories of technology. At the same time, because of the circumstance of homelessness, these stories do become extraordinary. Fundamentally, in the taking on, holding, and parting with objects we see the ever-present challenge of obtaining basic needs. In short, if the objects we have investigated in this research do in fact have "social lives" [2] then we may well consider them to be "vulnerable," just as homeless young people can be considered vulnerable.

In these social conditions – concerning shelter, familial and social relations, and discretionary income – we can discern a way of living with digital artifacts and media. Specifically, the contingent forces that we have discussed appear to present a challenge to "ensoulment" [5] and "product attachment theory" [25]. In struggling to meet immediate needs, how does one care for an object? This challenge seems most important when products are designed to support "role transition–the design of products that support the process of discovering and inventing yourself" [25, p. 395]. Yet, paradoxically, homeless young people may benefit the most from such products.

From this perspective, we propose the following constraints for designing information systems for homeless young people: (1) Technological uses are ordinary but are conditioned by the extraordinary circumstances of homelessness; (2) Digital artifacts, by their tethering to infrastructure, can subject young people to new forms of scrutiny; (3) Young people are likely to use mobile devices and media to create and reciprocate goodwill for surviving on the street; (4) Digital artifacts might be given up spontaneously or with forethought, but interest in media, especially music, is likely to persist; and (5) Young people may seek to repeatedly singularize digital devices and then later remake them as commodities.

From these constraints, one problem framing for design is to consider how media might be enabled to persist, to be ever present in this community, as access to infrastructure and devices comes and goes. Music, movies, and personal media stored and kept safe may offer a surrogate "home," albeit perhaps temporary and by no means complete. A home, nevertheless, which is real and which holds a center of gravity amongst pervasive change, personal and social

complexity, and even ongoing chaos. Furthermore, and most importantly, the evident importance of goodwill suggests that the network of family and social relations be taken into account when designing artifacts aimed to help homeless young people develop personally and to escape homelessness. Perhaps devices, infrastructure, and services that enable youth to care for their media will position youth to better care for themselves. While this proposition does not in itself resolve the iPod tensions, which in part motivated this study, it does provide a direction for design.

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