Using Cell Phones for Data Collection: Benefits, Outcomes, and Intervention Possibilities with Homeless Youth

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Abstract

While many homeless youth use cell phones to stay socially connected, and maintaining positive social ties can contribute to pathways out of homelessness, little is known about how using cell phones for data collection can improve these young people's lives. We conducted baseline and follow-up interviews with 150 homeless youth as well as provided them with a cell phone for 30 days to gather daily data using short message service (SMS) surveying. This paper examines youths' opinions about study participation and how they used the cell phone. Results revealed that youth liked participating in the study because the SMS texting portion, for example, made them feel that someone still cared about them, prompted them to self-reflect on their life, and allowed them to make a difference (e.g. educating the public about homelessness). Despite numerous benefits of study participation, improvements that youth discussed for future studies included changing the format of our text questions to allow for explanations and the use of higher quality phones. In terms of study phone usage, youth reported using the phone to schedule appointments, contact employers, and to keep in touch with family and friends. Finally, we highlight ways in which cell phones via SMS could be used with homeless youth to provide informational resources along with educational and employment opportunities, all of which are important intervention strategies in improving life situations for this population.

Keywords

Cell Phones; Homeless Youth; Intervention Tool; Short Message Service (SMS)

1. Introduction

Recent estimates show that as many as 2.5 million children in the United States experience homelessness on a yearly basis (National Center on Family Homelessness, 2014). Many of

these young people run away or are pushed out of their homes due to family conflict, abuse, and neglect (Tyler & Cauce, 2002), and then experience further deleterious outcomes while on the street, including victimization (Tyler, Whitbeck, Hoyt, & Cauce, 2004), substance misuse (Hadland et al., 2011) and poor mental health (Brown, Begun, Bender, Ferguson, & Thompson, 2015). Moreover, homeless youth who spend more time on their own report decreased family support (Bao, Whitbeck, & Hoyt, 2000). Though social support is integral to enhancing homeless youth's sense of well-being (Barczyk, Thompson, & Rew, 2014), it is difficult for them to stay in touch with family and friends, especially for those who do not own a working cell phone. For homeless young people who often feel lonely and depressed (Brown et al., 2015), having daily social contact via short message service (SMS; i.e. using text questions to gather data from respondents), may provide these young people with a sense of belonging and connectedness to the larger culture, something that homelessness commonly prevents. If homeless youth can stay in contact with family and friends from home, they are typically less likely to become embedded in street life (Johnson, Whitbeck, & Hoyt, 2005), which increases their likelihood of transitioning off of the streets (Auerswald & Eyre, 2002).

Because homeless youth are a transient population (Tyler & Whitbeck, 2004), and also have been found to be very "tech savvy" (Rice, Lee, & Taitt, 2011a), providing this population with a cell phone would be a way to stay in touch with these young people, gain insight into their daily lives, and provide youth with a sense of belonging. Prosocial connectedness can potentially help homeless youth cope with the stressors of street life by bolstering resilience (Dang, 2014), as well as enabling them to access resources that promote their physical, emotional, and financial well-being (Chew Ng, Muth, & Auerswald, 2013). Presently, however, there are clear gaps in the literature for understanding benefits and possibilities of cell phone data collection for homeless youth. As such, we conducted baseline and follow-up interviews with 150 homeless youth as well as provided them with a cell phone for 30 days to gather daily data using short message service (SMS) surveying. We believe this is the first study to date to use SMS to collect daily data from homeless youth. Stemming from this larger study, the purpose of this microanalysis is to examine youths' opinions about study participation and what they used the cell phone for during the course of the study. Inquiry into homeless young people's views on their individual impact as participants of research helps to position these marginalized youth as active contributors in shaping interventions aimed at their well-being. Finally, we discuss the practical implications of cell phone ownership among homeless youth and provide several suggestions for how a cell phone could be used as an intervention tool with this population.

2. Literature review

2.1 Cell phone ownership among homeless youth

Studies examining cell phone use among homeless populations have found surprisingly high rates of ownership. For example, a study of East Coast homeless youth found that 78% of their sample owned a cell phone and half of these youth received the phone as a gift, whereas 44% purchased the phone themselves (Jennings et al., 2016). Among a sample of West Coast homeless youth, Rice and colleagues (2011a) found that 62% of young people

owned a cell phone and of these, 40% reported having a working phone. Similarly, rates of mobile phone ownership among homeless youth in Colorado revealed that approximately 47% of these young people owned a phone (Harpin, Davis, Low, & Gilroy, 2016). In terms of phone payment plans, 38% of all youth reported having a monthly contract for their phone, 23% purchased minutes for their phone as needed, and the remainder of youth did not own a cell phone (Rice et al., 2011a).

2.2 Technology use among the homeless

Use of technology including Internet, email, computer, and social media has also been examined among the homeless. In their study of homeless young adults, Pollio et al. found that 46% of respondents reported daily technology usage, while 93% used technology at least weekly (Pollio, Batey, Bender, Ferguson, & Thompson, 2013). Homeless young people most often used technology to communicate with friends and family (Pollio et al., 2013; Rice et al., 2011a), while fewer young adults used it for entertainment and education (Pollio et al., 2013). Moreover, cell phones are used by homeless youth and/or homeless adults to contact caseworkers or agency staff personnel (Rice et al., 2011a), as well as potential and/or current employers (Eyrich-Garg, 2010; Rice et al., 2011a). Rice and colleagues note that cell phones themselves are a cheap resource that increases homeless youth's access to resources such as housing and employment, as well as sources of support.

2.3 Technology and intervention among the homeless

Rice and colleagues examined homeless youths' connections to home-based social relationships accessed through social networking technology, such as the Internet and cell phone texting, and found this to be associated with reduced alcohol consumption (Rice, Milburn, & Monro, 2011b) and improvements in homeless youths' sexual health (Rice, Monro, Barman-Adhikari, & Young, 2010). Relatedly, a study of homeless youths' mobile phone behaviors and their openness to using mobile health (mHealth) technologies, including health-related phone applications, revealed that youth had a high interest in using mHealth information, especially concerning HIV and STIs, as well as mental health and pregnancy prevention (among young women) (Jennings et al., 2016). The authors also noted, however, that due to financial constraints, maintaining phone connectivity was a challenge for this population and indicated that strategies promoting phone functionality for mHealth would be needed in order to address youth's intermittent phone access (Jennings et al., 2016). Overall, these findings suggest that social networking technology holds great potential as an intervention tool for homeless youth.

In general, research has shown that a large percentage of homeless young people are consistent users of various forms of technology (Pollio et al., 2013) and that certain segments of the homeless population own cell phones (Rice et al., 2011a), although many homeless youth often have intermittent access (Jennings et al., 2016). Despite these findings, prior research to date has not used cell phones as a data collection strategy with homeless youth. As such, we used SMS via cell phones to collect data from homeless youth to gain significant insight into their daily lives and to examine outcomes of having a cell phone over a 30-day period.

2.4. Research questions

The current study addresses the following three research questions: What did youth like most about participating in the study? What might we do differently next time? How did youth use the cell phone? These questions not only offer insight into the youths' daily experiences of having a cell phone, but also provide important information for researchers conducting this type of inquiry with this population. Moreover, we offer insight into how SMS via cell phones could be used as an intervention tool to improve the life circumstances of this highly vulnerable population.

3. Design and methods

3.1 Sample and data collection

Data for this study are from the Homeless Youth and Young Adult Texting Project, a pilot study designed to examine risk factors for substance use and identify both personal and environmental protective factors among homeless youth. Additionally, this study was designed to field test short message service (SMS) surveying to ascertain its utility and feasibility with this population. From August 2014 through October 2015, 150 homeless youth and young adults (henceforth referred to as youth) were interviewed in two Midwestern cities. Of the 150 respondents interviewed at baseline, 112 or 76% completed a follow-up interview. The university Institutional Review Board (IRB) approved this study.

Four part-time interviewers conducted the interviews, the majority of which were done in shelter conference rooms, with fewer completed at a public library and outside in a park if weather permitted. Interviewers included trained agency staff, and both authors, all of whom had completed the Collaborative IRB Training Initiative course for the protection of human subjects in research. Interviewers screened for eligibility, which required young people to be between the ages of 16 and 22 years and considered homeless or runaways on the night prior to the screening. *Homeless* includes those who lack *permanent* housing such as having spent the previous night with a stranger, in a shelter or public place, on the street, staying with friends (e.g. couch surfing), staying in a transitional facility, or other places not intended as a domicile (National Center for Homeless Education, 2010). *Runaway* refers to those under age 18 who have spent the previous night away from home without parental permission (Ennett, Bailey, & Federman, 1999). Less than 3% of youth we approached for an interview refused to participate or were ineligible. Participating agencies offered various services such as emergency shelter care, food programs, transitional living services, and street outreach.

Because some of the respondents were minors, we applied for and received a waiver of parental consent from the IRB. A waiver of parental consent is a more appropriate scientific approach with this population because many of the youth in this study would be considered mature minors. These youth have already made early transitions to adult behaviors and, in some cases, independence. With the waiver of parental consent, all study participants who were minors were treated as mature enough to provide assent. Interviewers obtained written informed consent/assent from respondents and told them that their responses would remain confidential and that participation was voluntary.

Youth were informed that the study had three parts and if they agreed to participate, they would need to complete (a) a baseline, structured interview, (b) the short message service (SMS) surveying portion, and (c) a follow-up structured interview. The first interview lasted approximately 45 minutes and participants received a $20 gift card for completing this interview. Upon completing the baseline interview, participants were given a disposable cell phone (activated for 28–30 days) and told that they would receive 11 texts per day over the next 28–30 days. All text questions were sent from an automated system. Interviewers showed participants how to operate the phone, charge it, and then they reviewed sample text questions with youth. Participants were instructed to contact their interviewer if they encountered problems with texting or with the phone.

Typically, three to four days prior to the end of their texting period, youth were sent a text to tell them how many days of texting were left and to set up a time for the in-person, follow-up interview. Participants who responded to every text question (i.e. 11 texts per day) over the length of their phone activation period were paid $50 cash (prorated at $0.14 per response), and those who responded to at least 85% of texts also received a bonus $10 gift card. The follow-up in-person interview lasted about 20 minutes and youth were given a $10 gift card for completing this interview.

The ages of participants ranged from 16 to 22 years ($M = 19.4$ years). One-half of our sample was female (51%) and 22% of respondents identified as lesbian, gay, or bisexual (LGB). In terms of race/ethnicity 41.3% were White, 26% Black or African American, 10% Hispanic or Latino, 4% American Indian or Alaskan Native, 13.3% were bi-racial and 5.3% reported being multi-racial. The average age at which youth first left home was 14.8 years ($SD = 3.30$). Youth reported running away from home between one and 35 times, with an average of 4.9 times ($SD = 6.32$). The most frequently reported reason for leaving home was family conflict, reported by 34.4% of youth. While 27.4% of youth had been away from home for a total of six months or less, 21.9% of youth had been away from home for more than four years. The average amount of time away from home was 31.5 months or about 2 ½ years ($SD = 32.27$).

3.2. Data analysis

Preliminary analysis involved reading each set of open-ended responses to gain a deeper sense of the data as a whole. We examined three open-ended questions that were asked during the follow-up, face-to-face survey: Please tell me what you liked most about participating in this research project, please tell me what you think we should do differently next time, and what did you use the cell phone for?

After reading through the open-ended responses, we utilized a general inductive approach to evaluate the data (Thomas, 2006), along with the strategy of initial open coding to determine overarching themes within each open-ended question (Charmaz, 2014). Because the data were unidimensional, the broad approach of inductive initial coding was sufficient to capture the breadth of participants' responses. This combined approach allowed us to condense the entirety of the data into summary format and to establish connections between our research questions and the data. We first established our codebook in Microsoft Excel after response transcriptions were completed from hand-written notes compiled during the follow-up, face-

to-face interview. Using this inductive, initial coding strategy, our paper became organized around three main themes that matched our qualitative codebook's category labels (Thomas, 2006) and allowed us to draw conclusions from the data (Miles & Huberman, 1994). The first theme encompassed *benefits of study participation* and included six subthemes. The second and third themes included *suggested changes for future studies*, and *how youth used the cell phone*, each of which encompassed three subthemes. Finally, we uploaded the Microsoft Excel data into the full data set in SPSS to run statistical frequencies on responses and major themes and subthemes.

We assessed validity by building evidence for a theme or category from several individuals (Creswell & Plano Clark, 2011). For intercoder agreement, we developed an initial coding strategy, guided by reading through the open-ended responses as a whole, and then collaboratively established a final coding scheme that was used for data analysis. We identified whether the authors assigned the same or different codes between text passages (Ritchie, Lewis, Nicholls, & Ormston, 2013). Both authors coded all responses, and in cases in which the intercoder agreement between the authors was low or discrepancies existed (less than 5% of the time), we obtained consensus through reevaluating our coding and categories in collaborative meetings. Percentage agreement was used to assess intercoder reliability based on the small number of subthemes that were coded for the "presence/absence" of the theme (i.e., liked most about participating and what to change in the future; Boyatzis, 1998). We have exceptionally strong reliability given that our 95% level of agreement in coding is much higher than the 70% or greater score that is recommended for qualitative research (Boyatzis, 1998).

4. Results

4.1 Benefits of study participation and cell phone contact

Responses to the first theme of what youth liked most about participating in this research can be summarized with six subthemes (see Table 1). Below we present how many respondents endorsed each subtheme. Additionally, some participants gave more than one response whereas some youth did not answer this question. The first subtheme was *incentives* (e.g. cash, gift cards, and using the phone), which was the reason reported most frequently by youth. In fact, incentives were endorsed by 29 youth as a benefit of study participation. In addition to the obvious benefits of receiving cash endorsed by 13 youth, 14 young people also enjoyed having the phone for numerous reasons we discuss below whereas two individuals reported the benefit of both the phone and the cash. Simply put, some youth liked the freedom of having a phone and being able to contact people whenever they liked.

A second subtheme that emerged from study participant responses was that our daily text questions allowed youth the opportunity for *self-reflection*, which included examining their current life situation more closely and contemplating their future goals. For example, one youth said: "It [the study] made me really think about drugs and drug use." Another youth reported that the "effect it [the study] put on me to make me think about what I'm doing and how I live." Self-reflection was mentioned by 24 youth, indicating that their participation led them to meaningfully contemplate their unique circumstance.

Thirdly, *making a difference* was mentioned by 20 youth. Despite the fact that most of these young people had been away from home for a significant amount of time, had extremely limited resources, and reported numerous stressful events, they were still eager to help. That is, youth felt that through providing information, they were educating the public about homelessness and what they experience on a daily basis and thus, they were making a difference. This idea resonated strongly with some study youth and made them feel that they were important, contributing members of society. Specifically, one youth stressed how important it was "that I could help someone by just being me" and "that my opinion mattered and helped." These statements suggest that at least for some youth, they felt that they had a purpose and that their opinion mattered.

Some youth thoroughly appreciated the *simplicity* of participating in the study, as well as the attention, or *social benefits* they received from their friends related to their enrollment in the study. This fourth subtheme was endorsed by 18 youth as a benefit of participation. Some youth mentioned that they liked the convenient schedule of the texts and the repetition of questions. Also, they thought texting was easier than calling. As one youth put it, "It was just answer questions and be done with it. Just throwing a text and that's it" or as another youth stated, "it [the question] got straight to the point."

The fifth subtheme, *perceptions of care and concern*, underscored the fact that youth liked having someone regularly check up on them and they enjoyed being asked about how their day was going and what they did during the day. In other words, the daily texts made them feel that someone still cared about them. The subtheme of *perceptions of care and concern* was endorsed by 17 homeless youth as a benefit of study participation.

The final subtheme was *being productive*. Youth enjoyed the fact that being part of our study gave them something to do during the day and they looked forward to receiving our texts. Some youth said that receiving the text questions gave their life structure and it gave them a reason to stay awake during the day. Though this theme was endorsed by the fewest number of study youth (N = 10), it is important to note that at least some youth reported a feeling of "being productive every day" and this is what they appreciated most about study participation. Overall, the feedback from youth suggests that they enjoyed the study experience of SMS (see Table 1 for selected quotes).

4.2 Youths' suggested changes for future studies

We also asked youth to tell us what we should change in the future if we were to replicate this study. Their feedback for this second theme centered on the following three subthemes: (1) *change nothing* (i.e. leave the study as is), (2) *equipment-related* (e.g. the cell phone itself), and (3) *question-related* (e.g. text question format; see Table 2). In terms of the first subtheme, there were 53 youth who said to change nothing. These youth said that the study was "good," "just right," and "it was fine to me." Similarly, some youth had very positive views of the study, such as "everything was good," "pretty good study," and "was great."

In terms of *equipment-related*, 36 youth endorsed this theme as something to change for future studies. In fact, eight youth advised us that we should be using smartphones, or cell phones with computer-like functionality. For example, "Get better phones. Touch screen

would make texting easier" and "use phones with touch screens so no pocket-dialing; easier to navigate." Though the majority of youth did not personally own a working cell phone, many were proficient in using smartphones with touchscreen features, but sometimes struggled with using the functions of the study phones, which included full touch-button keyboards. Relatedly, some youth who owned a cell phone preferred to use their own personal phone in a future study because their own phone was easier to navigate. Finally, some youth wanted to have more calling minutes on the phones and two youth reported wanting to keep the study phone.

For the third subtheme, 23 youth reported on making changes that were *question-related.* First, four youth wanted the opportunity to explain their answers rather than having set response categories. For example, one youth said, "chance for explanation of questions," such as "how did you feel today? and let us explain" while another youth reported, "next time let us respond with our own words." These quotes indicate that the youth wanted to be able to explain "why" they were feeling a particular way (e.g., depressed) or engaging in a particular behavior (e.g., drug use). Additionally, it is possible that providing open-ended responses to our text questions would have felt more like a real conversation to youth, especially when they were feeling lonely and depressed, which is often the case with homeless youth (Brown et al., 2015). Other changes that some youth recommended for future studies included the timing of when the texts were sent (both morning and evening times), less repetition of questions, and more flexibility in response time (e.g. to work around different schedules).

Having this feedback from youth on what they liked and did not like about the study is invaluable to researchers and helps us plan and make improvements for future studies with this population. While much research has examined the experiences of homeless youth in general, few studies have explored youths' interpretations of their roles as study participants. Further inquiry into homeless young people's views on their individual impact as subjects of research helps to position these marginalized youth as active contributors in shaping interventions aimed at their well-being.

4.3 Use of study cell phone

Our final theme centered on learning about the utility of having a cell phone for 30 days, as this has potential implications for intervention with this population. In other words, what did the youth use the cell phone for? The following three subthemes emerged from this question: *instrumental use*, *emotional and social connectedness*, and *autonomy*.

In terms of *instrumental use*, youth reported that the study phone allowed them to look for employment and housing, and schedule appointments (e.g. doctor) fairly easily. The study phone also provided "peace of mind" for youth in case of an emergency. Moreover, the study cell phone was a "working phone," whereas some youth who owned a phone reported that theirs was broken or they did not have a current phone plan. A second subtheme that emerged in terms of what youth used the study phone for was *emotional and social connectedness*. The vast majority of youth described using the study phone to contact family and friends. More specifically, youth stated that the phone allowed them an opportunity to connect with people and "made them feel in touch with the world." Similarly, other youth

conveyed that it was "great to use [the] phone and feel connected for a change" and "felt like I had a link to people again." Youths' perspectives indicate that feeling connected to social circles is highly desirable and youth crave this critical link to their social worlds. Moreover, research shows that having this link to mainstream society makes transitioning off of the streets more likely (Auerswald & Eyre, 2002).

Finally, having a cell phone provided youth with a sense of independence or *autonomy* in that they did not have to rely on borrowing a phone from friends and partners every time they wanted to make a phone call or send a text. This sense of autonomy is explicated by youth in the following way: "Being able to reach people right away instead of waiting to borrow someone's phone." Having this autonomy allowed youth the freedom to use the phone when it was convenient for them rather than having to rely on someone else's schedule. Youth also felt reassured by the fact that they knew the study phone would be in working order. As one youth explained, "[I] liked having a phone all the time and could count on it" (see Table 3 for selected quotes). A strong sense of autonomy and the high value placed on individual freedom can encourage homeless youth to persevere and develop resiliency in the face of challenges stemming from street life (Thompson et al., 2016).

5. Discussion

In this paper, we set out to examine youths' opinions on study participation and what they used the cell phone for during the course of the study. Overall, our findings indicate that youth enjoyed participating in our study for various reasons. For example, answering the text questions made them feel productive, as if they were making a difference in society, and that someone cared about them. We also learned important lessons from youth in terms of what we can do differently in future studies, such as cutting down on repetition, having more open-ended options for the text questions for youth to explain their answers, and using newer phones. In terms of what youth used the cell phone for, we learned that it provided many of them with emotional and social connections, which are important for youth's mental health (Barczyk et al., 2014). Moreover, feeling autonomous due to having the cell phone was most likely beneficial for youth's well-being. Finally, feeling in control of one's life, such as scheduling appointments and making phone calls when it was convenient for them also had a positive impact on youth.

We strongly feel that cell phone ownership among homeless youth could help promote positive mental health and improve coping skills among this group of young people. For example, homeless youth in the current study used the cell phone for developing their social connectedness. Contacting home-based social relationships among homeless youth can lead to positive social support, which is integral to enhancing homeless young people's sense of well-being and resilience (Dang, 2014). Moreover, prosocial connections can help youth access resources to promote their physical, emotional and financial well-being (Chew Ng et al., 2013). Social connections to home-based social relationships accessed through social networking technology, such as the Internet and cell phone texting, are also associated with a reduction in youth's high-risk behaviors, including decreased alcohol consumption (Rice et al., 2011b) and improvements in homeless youth's sexual health (Rice et al., 2010). Thus, owning a cell phone would allow homeless youth to keep in touch with pro-social groups,

which may lead to a reduction in participating in high-risk behaviors. Moreover, cell phone ownership would increase positive social support, and subsequently may lead to increased well-being among homeless youth. Below, we outline several ways in which SMS via cell phones could be used as an intervention tool to promote well-being among homeless youth based on findings from our study.

5.1 Intervention strategies

Gatherings and social events—Agencies that serve homeless youth invited us to their monthly gatherings during our data collection process so that we could announce our study and meet with potential youth participants. One of the biggest challenges agencies faced, however, was "getting the word out" to homeless youth about these events. These events included pizza parties, educational opportunities, job services, and life skills training for homeless youth. Even though these events were typically scheduled for the same day each month (e.g., third Monday of every month), the date, time, and location would sometimes change (e.g. schedule conflict) and the agencies did not have a way to contact youth to alert them of changes. Instead, agencies had to resort to "word of mouth," but this was only feasible for those youth who they interacted with in the course of their day (e.g. during street outreach). This strategy, however, turned out to be less than effective, which was evident in the minimal turnout for some events. If youth had a working, reliable cell phone, however, the agency would be able to send them text reminders about these events and any last minute changes. This would not only increase attendance, but would increase the likelihood that youth had the opportunity to attend these events and learn about useful resources, services, and training opportunities. In addition, the ability to send text messages to homeless youth would allow agencies to stay in contact with these young people and alert them to various events and also check on how youth are doing both physically and mentally. Our results, in fact, show that numerous youth enjoyed having someone "check up on them" to see how they were doing. This is only possible, however, if youth have a working cell phone.

Agency services—Related to gatherings and social events, if homeless youth had cell phones, agencies would also be able to text youth information about available services (e.g. shelter, street outreach) that would benefit youth. We interviewed a number of youth who were unaware that such services such as street outreach, shelter, food services, and transportation even existed in their city. The only way these youth learned about services was through their participation in our study. Once youth know about these services, however, we increase the likelihood that they will utilize them. SMS is an effective strategy that can be used to alert young people to various services and specific events that would be beneficial to homeless youth. SMS is a quick, efficient, and very cost effective way to stay in touch with homeless youth and keep them abreast of much needed services and resources.

Services for teenage mothers—Agencies described to us the anxiety they had concerning many homeless teenage mothers who frequently feel overburdened with caring for a newborn, which often leads to neglect and abuse. Though agencies provided teenage mothers with pamphlets and related literature on where to go for help, these printed materials are often thrown away or misplaced. Agencies could use SMS to send these young mothers updated information such as phone numbers for organizations that they could

contact for immediate assistance when they are feeling stressed and overwhelmed. Frequent text reminders via SMS could potentially lower the risk for abuse and neglect among these young families, thereby serving as a useful intervention. Moreover, if homeless teenage mothers possessed a cell phone, this would allow agencies to contact them at times in which they are highly vulnerable and having these resources at their fingertips may increase the likelihood that teenage mothers would seek help when needed. These are just a few of the ways in which SMS via cell phones could be utilized by agencies working with homeless youth. SMS is quick and cost effective, and has the potential to significantly improve services for homeless youth and subsequently, could lead to improved health and well-being among this population.

5.2 Limitations

Our study has some limitations. Given the difficulties of recruiting hard-to-reach populations, we used a convenience sample of homeless youth and therefore our findings cannot be generalized to all homeless youth. For example, homeless youth in larger metropolitan areas appear to have greater cell phone ownership (Rice et al., 2011a) than youth in our Midwestern sample. In addition, some youth may have succumbed to the social desirability bias and thus when asked about what we should change in future studies, they may not have felt comfortable telling us. However, our sense is that the majority of youth were very frank with us as is evident in the fact that many youth told us to "get better phones" for future studies.

5.3 Conclusion

The results of this innovative study show that SMS with homeless youth holds enormous potential as an intervention tool when working with this population. We know that homeless youth often feel isolated, depressed, and suffer from numerous mental health problems (Brown et al., 2015). Having a cell phone may counteract some of these negative effects by allowing homeless youth to stay connected with family and friends. In the current study, we found that youth used the cell phone to call and text family and friends, and other studies have found similar results (Rice et al., 2011a). Maintaining a connection to mainstream society is highly important for youth's mental health and well-being. If youth can stay connected to home-based social relationships, they have a greater chance of reintegrating into society as opposed to becoming embedded in risky street networks, which makes it harder for youth to exit street life (Auerswald & Eyre, 2002). In addition to the social connectedness component, having a cell phone also resulted in study youth feeling more autonomous and productive, as well as promoting their sense of civic duty in that they were helping educate the public about homelessness. These benefits, along with the intervention possibilities, make cell phone ownership among the homeless a critical goal. As such, we concur with other researchers who have suggested that providing cell phones to homeless populations could be beneficial (Eyrich-Garg, 2010) and may improve service utilization and outreach (Pollio et al., 2013).

Acknowledgments

References

Auerswald CL, Eyre SL. Youth homelessness in San Francisco: A life cycle approach. Social Science & Medicine. 2002; 54:1497–1512. [PubMed: 12061484]

Bao WN, Whitbeck LB, Hoyt DR. Abuse, support, and depression among homeless and runaway adolescents. Journal of Health and Social Behavior. 2000; 41:408–420. [PubMed: 11198565]

Barczyk AN, Thompson SJ, Rew L. The impact of psychosocial factors on subjective well-being among homeless young adults. Health & Social Work. 2014; 39:172–180. [PubMed: 25095630]

Boyatzis, RE. Transforming qualitative information: Thematic analysis and code development. Thousand Oaks, CA: Sage Publications; 1998.

Brown SM, Begun S, Bender K, Ferguson KM, Thompson SJ. An exploratory factor analysis of coping styles and relationship to depression among a sample of homeless youth. Community Mental Health Journal. 2015; 51:818–827. [PubMed: 25821043]

Charmaz, K. Constructing grounded theory. Thousand Oaks, CA: Sage Publications; 2014.

Chew Ng RAC, Muth SQ, Auerswald CL. Impact of social network characteristics on shelter use among street youth in San Francisco. Journal of Adolescent Health. 2013; 53:381–386. [PubMed: 23763964]

Creswell, JW., Plano Clark, VL. Designing and conducting mixed methods research. Thousand Oaks, CA: Sage; 2011.

Dang MT. Social connectedness and self-esteem: Predictors of resilience in mental health among maltreated homeless youth. Issues in Mental Health Nursing. 2014; 35:212–219. [PubMed: 24597587]

Ennett ST, Bailey SL, Federman EB. Social network characteristics associated with risky behaviors among runaway and homeless youth. Journal of Health and Social Behavior. 1999; 40:63–78. [PubMed: 10331322]

Eyrich-Garg KM. Mobile phone technology: A new paradigm for the prevention, treatment, and research of the non-sheltered 'street' homeless? Journal of Urban Health. 2010; 87:365–380. [PubMed: 20397058]

Hadland SE, Marshal BD, Kerr T, Qi J, Montaner JS, Wood E. Depressive symptoms and patterns of drug use among street youth. Journal of Adolescent Health. 2011; 48:585–590. [PubMed: 21575818]

Harpin S, Davis J, Low H, Gilroy C. Mobile phone and social media use of homeless youth in Denver, Colorado. Journal of Community Health Nursing. 2016; 33:90–97. [PubMed: 27074405]

Jennings L, Lee N, Shore D, Strohminger N, Allison B, Conserve DF, Cheskin LJ. US minority homeless youth's access to and use of mobile phones: Implications for mHealth intervention design. Journal of Health Communication. 2016; 27:725–733. DOI: 10.1080/10810730.2015.1103331

Johnson KD, Whitbeck LB, Hoyt DR. Predictors of social network composition among homeless and runaway adolescents. Journal of Adolescence. 2005; 28:231–248. DOI: 10.1016/j.adolescence. 2005.02.005 [PubMed: 15878045]

Miles, MB., Huberman, AM. Qualitative data analysis. 2nd. London: Sage; 1994.

National Center on Family Homelessness at AIR. America's youngest outcasts: A report card on child homelessness. Waltham, MA: The National Center on Family Homelessness at American Institutes for Research; 2014. Retrieved January 4, 2016 (http://www.air.org/sites/default/files/downloads/report/Americas-Youngest-Outcasts-Child-Homelessness-Nov2014.pdf)

National Center for Homeless Education (NCHE) and the National Association for the Education of Homeless Children and Youth (NAEHCY). Definitions of homelessness for federal programs serving children, youth, and families. Oct. 2010 Retrieved January 4, 2016 (http://center.serve.org/nche/ibt/sc_eligibility.php)

Pollio DE, Batey SS, Bender K, Ferguson K, Thompson S. Technology use among emerging adult homeless in two U.S. cities. Social Work. 2013; 58:173–175. [PubMed: 23724580]

Rice E, Lee A, Taitt S. Cell phone use among homeless youth: Potential for new health interventions and research. Journal of Urban Health. 2011a; 88:1175–1182. [PubMed: 22076445]

Rice E, Milburn NG, Monro W. Social networking technology, social network composition, and reductions in substance use among homeless adolescents. Prevention Science. 2011b; 12:80–88. [PubMed: 21194011]

Rice E, Monro W, Barman-Adhikari A, Young SD. Internet use, social networking, and HIV/AIDS risk for homeless adolescents. Journal of Adolescent Health. 2010; 47:610–613. [PubMed: 21094441]

Ritchie, J.Lewis, J.Nicholls, CM., Ormston, R., editors. Qualitative research practice: A guide for social science students and researchers. Thousand Oaks, CA: Sage; 2013.

Thomas DR. A general inductive approach for analyzing qualitative evaluation data. American Journal of Evaluation. 2006; 27:237–246.

Thompson SJ, Ryan TN, Montgomery KL, Lippman ADP, Bender K, Ferguson K. Perceptions of resiliency and coping: Homeless young adults speak out. Youth & Society. 2016; 48:58–76.

Tyler KA, Cauce AM. Perpetrators of early physical and sexual abuse among homeless and runaway adolescents. Child Abuse & Neglect. 2002; 26:1261–1274. [PubMed: 12464300]

Tyler, KA., Whitbeck, LB. Lost childhoods: Risk and resiliency among runaway and homeless adolescents. In: Allen-Meares, P., Fraser, MW., editors. Intervention with Children & Adolescents: An Interdisciplinary Perspective. Boston, MA: Pearson Education; 2004. p. 378-397.

Tyler K, Whitbeck LB, Hoyt DR, Cauce AM. Risk factors for sexual victimization among male and female homeless and runaway youth. Journal of Interpersonal Violence. 2004; 19:503–520. [PubMed: 15104858]

Highlights

- We examine homeless youths' interpretations of their roles as study participants.

- Used cell phones to collect daily data using short message service (SMS).

- Participation resulted in youth feeling productive and contributing to society.

- SMS with homeless youth holds enormous potential as an intervention tool.

Table 1

What Youth Liked Most about Participating in the Study

Subthemes	*Selected Open-Ended Quotes*
Incentives	-"Having the phone. It helped me get a hold of people. Didn't have any way to reach family before. Able to reach boss about getting a job." -"Gifts cards and cash." -"We can make a little money. Nice to get information on services."
Self-reflection	-"Effect it put on me to make me think about what I'm doing and how I live." -"Gave me hope. Asked questions I did not expect to be asked." -"It made me look at the answers and think about my life."
Making a difference	-"I know that you're using this to help teens like us. I think that was cool." -"Being part of a greater picture." -"Help others learn about homelessness. Helping out to make a difference."
Simplicity and social benefits	-"Attention from friends was cool." -"Easier than I thought it would be." -"There weren't any right or wrong answers. It was fairly easy."
Perceptions of care and concern	-"Cool to have someone checking in on you." -"I feel like someone was talking to me and actually cared about me." -"I liked being asked how I was doing and where I slept and stuff."
Being productive	-"Gave me something to do. It was a good evaluator." -"Having something more scheduled and structured in daily routine." -"Gave me a reason to stay awake. Felt like I was being productive every day."

Table 2

What Youth Thought We Should Do Differently Next Time

Subthemes	Selected Open-Ended Quotes
Change nothing	-"I don't think there is anything to change." -"Nothing. It's kind of fun." -"Everything was good. Wasn't intrusive."
Equipment-related	-"Different phones." -"Easier if study was done with own phone." -"Give me the phone [to keep]."
Question-related	-"Have more responses available to explain answers." -"Next time let us respond with own words." -"Reduce the number of texts per day."

Table 3

Use of Study Cell Phone

Subthemes	Selected Open-Ended Quotes
Instrumental use	-"Helped me keep track of what I needed to do next." -"Easy to schedule things for appointments and other stuff." -"Liked phone just in case of emergencies and if I was alone."
Emotional and social connectedness	-"Made me feel in touch with the world." -"Having a way to reach people." -"Needed to keep in touch with friends and mentors."
Autonomy	-"I liked having an extra phone just in case." -"Made it easier to share my phone with my boyfriend." -"Having a free phone to use when I wanted to."