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Short Message Service Surveying With Homeless Youth: Findings From a 30-Day Study of Sleeping Arrangements and Well-Being

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Abstract

Little is known about the location and consistency of sleeping arrangements among youth experiencing homelessness (YEH) and how this is linked to their well-being. This study addresses this gap using ecological momentary assessment (EMA) via short message service (SMS) surveying with 150 YEH over 30 days, to examine how various sleeping arrangements are associated with depression, marijuana use, support received, and service utilization. Results revealed that the average number of consecutive days youth stayed at any particular location varied considerably. Youth who stayed more frequently with a friend/partner or in a transitional living facility (TLF) reported fewer days of being depressed, whereas staying with a friend/partner was associated with using marijuana more frequently. Finally, youth staying with a friend/partner, stranger, or TLF reported using services on fewer days. Because sleeping arrangements change almost daily, on average, this has important public health implications for agencies finding permanent housing for YEH.

Keywords: short message service surveying, sleeping arrangements, homeless youth, well-being

Introduction

National estimates find that 700,000 youth and 3.5 million young adults experience some form of homelessness in a given year (Morton, Dworsky, & Samuels, 2017), making homelessness a major public health issue. Finding a safe place to sleep for the night is challenging. Although youth may stay at a shelter, or sleep at a friend's place, transitional living facility (TLF), or in places not intended for human habitation, these locations are temporary (Tyler, Akinyemi, & Kort-Butler, 2012). Lack of residential stability, coupled with limited support (Bao, Whitbeck, & Hoyt, 2000) and low service utilization (Tyler et al., 2012), calls into question these young people's health and well-being (Brown, Begun, Bender, Ferguson, & Thompson, 2015). Despite this, no research, to date, has examined where youth experiencing homelessness (YEH) sleep on a daily basis, the consistency (or lack thereof) of their sleeping arrangements over time, and whether this is linked to youths' wellbeing. This is particularly salient, given that youth with no other options may resort to trading sex for a place to sleep (Tyler & Johnson, 2006), and trading sex is positively linked to sexual victimization (Tyler, Hoyt, Whitbeck, & Cauce, 2001). Youth in these sleeping situations may also be vulnerable to emotional coercion and/or physical assault. Moreover, victimization is associated with depression and other negative mental health outcomes among this group of youth (Bender, Ferguson, Thompson, & Langenderfer, 2014).

To address these gaps, we used ecological momentary assessment (EMA) via short message service (SMS) surveying with YEH over 30 days to examine the consistency of where youth report sleeping, and how the consistency of those arrangements (e.g., number of days at the same location) influences youths' well-being (i.e., feeling depressed, using marijuana, receiving support, and using services). EMA allows researchers to capture data "in the moment" about an individual's current behavior and how they are feeling in their natural environment (Shiffman, Stone, & Hufford, 2008). EMA via SMS surveying verifies the timing of one behavior relative to another, allowing for temporal sequencing (Cohn, Hunter-Reel, Hagman, & Mitchell, 2011) and minimizes recall biases (Kuntsche & Labhart, 2013). Given that homeless youth are highly mobile (Tyler & Whitbeck, 2004), using

SMS to collect daily data is an effective strategy to answer research questions, where temporal ordering is important such as sleeping arrangements and well-being.

Sleeping Arrangements

Much of the research on sleeping arrangements has focused on shelter use. Carlson, Sugano, Millstein, and Auerswald (2006), for example, found that 7% of homeless youth reported shelter use in the past 3 months, whereas Tyler et al. (2012) found it to be 27% when youth were asked about shelter use for the past year. Although shelter use increases the likelihood that YEH will connect with other services (Ha, Narendorf, Santa Maria, & Bezette-Flores, 2015), a significant number of these young people do not utilize shelters, whereas others report not accessing *any* services including shelter, food programs, counseling, street outreach, and sexually transmitted infection (STI) and HIV testing in the last year (Tyler et al., 2012). Reasons for nonuse or lower general service use include feelings of stigma, lack of knowledge about services, a desire to be self-reliant (Ha et al., 2015), or negative experiences with staff members (Solorio, Milburn, Andersen, Trifskin, & Rodrigues, 2006). Although some research reports a link between shelter use and other service utilization (Ha et al., 2015), we know virtually nothing about how different sleeping arrangements vary from day to day and their link with service usage and support.

Marijuana Use and Depression

Research has found high rates of substance use among YEH (Hadland et al., 2011): 75% report lifetime alcohol and/or marijuana use (Bousman et al., 2005; Walls & Bell, 2011), whereas past 30-day prevalence rates for marijuana are 66% (Wenzel, Tucker, Golinelli, Green, & Zhou, 2010). Lim, Rice, and Rhoades (2016) found that marijuana was the drug used most frequently (73%) by homeless youth in the past 30 days. Using EMA, Santa Maria et al. found that 55% of YEH used marijuana on at least 1 day in the past month (Santa Maria et al., 2017).

Regarding depression, Brown et al. (2015) found that more than one third of their sample of homeless youth met diagnostic criteria for major depression, and 47% of homeless youth attending school

reported feeling depressed in the past year, with males significantly less likely to feel depressed compared with females (Moore, Benbenishty, Astor, & Rice, 2018). Young people combating homelessness experience numerous psychological stressors such as depression that may place them at risk of substance misuse (Hadland et al., 2011; Lim et al., 2016; Nyamathi et al., 2012). Alternatively, some research reports that some youth use substances to cope with trauma that they experienced prior to becoming homeless and/or while living on the street (Kidd & Carroll, 2007).

These high rates of substance use and depression coupled with precarious and inconsistent sleeping arrangements highlight a significant public health concern for these youth, which may lead to further adverse mental health consequences (Kidd & Carroll, 2007), prolonged substance abuse (Thompson, Bender, Ferguson, & Kim, 2015), and long-term homelessness (Auerswald & Eyre, 2002). At present, however, little is known about how various sleeping arrangements may be differentially associated with youth feeling depressed and their use of marijuana. As such, we examine the following research questions:

Research Question 1: Over a 4-week time period, how consistent is a youth's sleeping arrangement at locations including shelters, outside or in a car, with friends or partner, with strangers, or in a TLF?

Research Question 2: What is the average number of consecutive days youth stayed at each of these locations?

Research Question 3: Over a 4-week time period, does the total number of days spent sleeping in each location (i.e., outside/car, youth shelter, adult shelter, friend or partner, stranger, TLF) predict the total number of days feeling depressed, using marijuana, receiving any support, and using any services?

Method

Data are from the Homeless Youth Texting Project, a pilot study designed to examine risk and protective factors for substance use and to field test EMA via SMS to ascertain its utility and feasibility with homeless youth. A total of 150 homeless youth in two Midwestern

cities completed a baseline interview and of these, 112 youth (75%) completed the follow-up interview 30 days later. Data collection took place with rolling recruitment over approximately a 1-year time period. This study was approved by the university institutional review board.

Eligibility required youth to be between 16 and 22 years of age (ages served by participating agencies) and experiencing homelessness or a runaway. *Homeless* includes those who lack *permanent* housing such as spending the previous night in a shelter, public place, on the street, with friends, in a TLF, or other places not intended as a domicile (National Center for Homeless Education and the National Association for the Education of Homeless Children and Youth, 2017). *Runaway* includes those below age 18 who spent the previous night away from home without parental permission (Ennett, Bailey, & Federman, 1999). Participants were recruited through local agencies serving homeless youth.

Four trained and experienced interviewers conducted interviews. Interviewers approached youth at shelters, food programs, and during street outreach. Informed consent was obtained from youth, who were told that the study has three parts and if they agreed to participate, they would need to complete a baseline interview, the SMS portion, and a follow-up interview. Data reported in this article include the baseline interview and the SMS portion. The two interviews, which were conducted in shelter interview rooms, local libraries, or outside lasted 45 minutes and 15 minutes, respectively. Participants received a US$20 and a US$10 gift card to a local store for completing the baseline and follow-up interview, respectively. Less than 3% of youth (*N* = 5) refused to participate or were ineligible.

Cell Phone Distribution

Upon completing the baseline interview, participants were given a disposable cell phone and told they would receive 11 texts per day over the next 28 to 30 days, and then would be recontacted in approximately 30 days for a follow-up interview. Blocks of texts came at 10:00 a.m., 4:00 p.m., and 9:30 p.m. Text questions were sent from an automated system that sent out text questions in the same order and at the same time each day. Responding to each text question required

participants to enter a number(s). Typically, 3 to 4 days prior to the end of their texting period, youth were sent a text informing them how many texting days were left and to set up a follow-up interview. Those who responded to every text question (11 texts per day) were paid US$50 cash (prorated at US$0.14 per response) and those who responded to at least 85% of texts also received a bonus US$10 gift card.

Response Rate for SMS Portion

On average, participants completed 18.8 days of texts but 30% of youth (N = 44) had texting data on 28 or more days. The average number of texts answered per day was 8.49 (out of a possible 11). Forty-three percent of days had answers to all 11 texts sent that day, and 69.4% of days had answers to eight or more texts. For the 147 participants who took part in the texting portion of the study, a total of 22,903 texts were received. If we assume that all participants were eligible to receive all 11 texts for all days (a conservative estimate because not all youth were eligible to receive all texts on the first day), then youth responded to 71% of the texts sent during the days they participated, on average. Other studies have found comparable response rates: Santa Maria, Padhye, Yang, Gallardo, and Businelle (2018) used EMA with homeless youth over a 21-day period with an average response rate of 62% to daily EMA surveys and 40% to random EMA surveys, whereas Freedman, Lester, McNamara, Milby, and Schumacher (2006) reported an 80% response rate over a 2-week period among homeless crack cocaine– addicted adults in treatment.

Measures

Text questions
From the text data, we used three questions from the 10:00 a.m. time block: (a) "Where did you sleep last night" (outside or car, youth shelter, adult shelter, with friend/boyfriend/girlfriend, stranger or acquaintance, or TLF)? (b) "What type of support did you receive yesterday" (emotional, help with money, safety, shelter, and none)? (c) "Which services did you use yesterday" (shelter, meals, counseling, street outreach, health, none)? Items b and c above were dichotomized, due to infrequent reports, such that youth who received any

type of support or used any type of service were coded as 1 and those who received no support and used no services were coded as 0, respectively. From the 4:00 p.m. questions, we used one item: "Today I felt depressed or lonely" (1 = yes, 0 = no). From the 9:30 p.m. questions, we also used one question: "used any of these drugs tonight" (weed, crank, meth, coke, inhalant, heroin, ecstasy, other, none). From this list of drugs, we examine only marijuana (i.e., weed) for the current analyses (1 = used marijuana, 0 = did not use marijuana), as the use of these other drugs was very infrequent. Asking these questions at different times of the day helps mitigate potential recall bias (Stone, Shiffman, Atienza, & Nebeling, 2007).

Statistical Analysis

We examined aggregate information from the texting data. We wanted to examine variation over a 4-week time period in youth's sleeping arrangements. First, we summed the number of days that youth reported sleeping in each location. Because only 30% of youth had any texting data for the full 28-day study period and only six youth reported sleeping data for at least 28 days, we then standardized the number of days reported by dividing the total number of days in each location by the total number of days for which the youth reported any sleeping information (range = 0-30, M = 14.59, SD = 8.54). This left us with n = 145 youth with sleeping data on at least 1 day. We looked at the percent of days for which each youth stayed in a given location. We examined three subsets of youth in these analyses, all youth (n = 145), youth for whom there were at least 14 days of sleeping data reported (n = 74), and youth with at least 28 days of any texting data reported (n = 44). Second, we calculated the number of consecutive days that the youth reported sleeping at each location. A youth may have slept a large percentage of days in one location, but he or she may have switched locations frequently. As such, the number of consecutive days provided us a measure of consistency.

We were also interested in how stability in sleeping arrangements was related to measures of well-being. We started with bivariate analyses. We used the percentage of the total number of days that the youth slept in each location as correlates for four well-being variables: the total number of days the youth reported feeling depressed

today (*n* = 147, *M* = 3.82, *SD* = 5.32), using marijuana today (*n* = 140, *M* = 2.33, *SD* = 4.69), receiving any support yesterday (*n* = 141, *M* = 4.73, *SD* = 6.21), and using any services yesterday (*n* = 139, *M* = 4.14, *SD* = 5.47). Respondents with no reports for these outcomes were excluded from the analyses.

Finally, we used multivariate negative binomial models to predict a count of the total number of days that the youth reported feeling depressed, using marijuana, receiving any support, and using any services, with an exposure variable of a count of the number of days with valid data for each measure. For each model, the negative binomial model fits better than a Poisson model. Thus, the models predict the rate at which feeling depressed, using marijuana, receiving any support, and using any services occurred over the study period, accounting for unequal numbers of days of reporting over the 4-week time period. The number of days sleeping at each location were our primary independent variables in these models. Models controlled for gender, sexual orientation, and age.

Results

Sample Characteristics

Demographics based on Wave 1 survey data included 150 homeless youth aged 16 to 22 years (*M* = 19.4 years). One half (51%) were female, and 22% identified as lesbian, gay, or bisexual. Youth reported running away or leaving home between 1 and 35 times (*M* = 4.9 times). The mean percent of days that youth reported feeling depressed was 28.4% (*SD* = 30.5%), using marijuana was 15.5% (*SD* = 27.2%), receiving any type of support was 34.5% (*SD* = 34.2%), and using any services was 38.7% (*SD* = 37.0%).

Average Percent of Days Spent Sleeping at Each Location

To assess the consistency with which youth sleep at a particular location, we examined (a) the percent of total days spent sleeping at each location and (b) the average number of consecutive days that youth stayed in the same place. Table 1 shows the percent of total days youth

Table 1. Average percent of days youth spent sleeping at each location

	Average percent of total days		
	All youth (%)	Youth with at least 14 days of sleeping reported (%)	Youth with at least 28 days of texting data (%)
Outside/car	13.2	9.4	3.8
Youth shelter	13.6	13.4	11.6
Adult shelter	8.4	10.6	10.2
Friend/boyfriend/girlfriend	24.4	22.3	25.1
Stranger	4.1	3.7	2.4
Transitional living facility	36.9	40.8	46.9
N	145	74	44

spent at each of the different sleeping arrangements averaged over all youth, youth with at least 14 days of sleeping reported, and youth with at least 28 days of texting data. Of all the youth with any texting data on where they slept, an average of 13.2% of the days reported were spent outside or in a car; 13.6% of the days were spent sleeping in a youth shelter; 8.4% were spent in an adult shelter; 24.4% of the days were spent with a friend, boyfriend, or girlfriend; 4.1% were spent sleeping at a stranger's place; and 36.9% of days, on average, were spent sleeping at a TLF. Column 2 (**Table 1**) shows that some percentages increase or decrease slightly for youth with at least 14 days of sleeping data (e.g., the percent of days spent sleeping outside or in a car fell to 9.4% of days). Although marginally significant, these findings suggest that those youth in the most unstable sleeping arrangement (i.e., outside or in a car) are less likely to be consistent with their texting (youth who did not report at least 14 days of sleeping data slept outside or in a car 17.2% of days compared with 9.4% of days for youth who did report 14 days of sleeping data, $t = 1.72$, $p = .09$). Thus, missing texting data on sleeping appears to be related to sleeping arrangements themselves. Column 3 presents the data for youth with at least 28 days of reported texting data, whether or not sleeping information was reported.

Table 2. Average number of consecutive days staying at the same place

	All youth	Youth with at least 14 days of sleeping data	Youth with at least 28 days of data
Outside/car	2.99	3.73	2.54
Youth shelter	5.71	6.72	8.53
Adult shelter	4.36	5.23	5.28
Friend/boyfriend/girlfriend	3.81	4.52	4.78
Stranger	2.21	2.67	2.27
Transitional living facility	7.15	9.23	9.31
Total number of spells	435	266	164

Average Number of Consecutive Days Staying at the Same Place

Because these reports depend on the number of days of data that we have, we report three subsets in **Table 2**–all youth, those who reported at least 14 days of sleeping data, and youth with at least some data on 28 days. Among all youth, those who slept outside or in a car reported doing so an average of 2.99 consecutive days, 5.71 days consecutively in a youth shelter, 4.36 days consecutively in an adult shelter, 3.81 days consecutively with a friend/boyfriend/ girlfriend, 2.21 days consecutively at a stranger's place, and 7.15 days at a TLF. These findings show that homeless youth are highly mobile when it comes to sleeping arrangements, and even staying in a more stable (albeit short-term) environment (i.e., transitional living) does not exempt these youth from changing sleeping arrangements frequently.

Bivariate Correlations

Table 3 shows correlations between the percent of days sleeping in each location and the percent of days feeling depressed, using marijuana, receiving support, and using any services. Column 1 shows that youth who slept outside or in a car ($r = .23$, $p < .01$) or at an adult shelter ($r = .31$, $p < .001$) last night for a higher percentage of days also reported feeling depressed more frequently. Youth who more frequently reported not being depressed were those who slept in a TLF last evening more frequently ($r = -.25$, $p < .01$). For marijuana use

Table 3. Correlation between percent of days sleeping in each location and percent of days depressed, using marijuana, receiving support, and using any services

	% of days			
	Felt depressed today	Used marijuana today	Received any support yesterday	Used any services yesterday
% of days				
Outside/car	.23**	.27**	−.05	.09
Youth shelter	.07	−.19*	.19*	.27***
Adult shelter	.31***	−.12	.13	.33***
Friend/boyfriend/girlfriend	−.15†	.33***	.21*	.02
Stranger	.06	.11	.05	−.05
Transitional living facility	−.25**	−.26**	−.36****	−.45****

† $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$; **** $p < .0001$

(column 2), youth who slept outside or in a car ($r = .27, p < .01$) or at a friend's/boyfriend's/girlfriend's place ($r = .33, p < .001$) last evening more frequently reported current-day marijuana use more frequently. In contrast, those staying more frequently at a youth shelter ($r = −.19$, $p < .05$) or in a TLF ($r = −.26, p < .01$) reported no current-day marijuana use. Column 3 (support received) shows that those staying in a youth shelter ($r = .19, p < .05$) or staying with a friend/boyfriend/girlfriend ($r = .21, p < .05$) reported receiving any support yesterday for a higher percentage of days, whereas those in transitional living reported receiving no support ($r = −.36, p < .0001$). Finally, column 4 (services used) shows that youth staying in a youth or adult shelter more frequently ($r = .27, p < .001; r = .33, p < .001$, respectively) reported using services yesterday more frequently, whereas youth staying in TLF reported no service use ($r = −.45, p < .0001$).

Multivariate Results

Table 4 presents negative binomial models predicting the number of days that youth reported feeling depressed, using marijuana, receiving any support, and using any services. Youth who stayed more frequently with a friend/boyfriend/ girlfriend ($b = −.04, p < .01$) or in a TLF ($b = −.05, p < .001$) reported fewer days of feeling depressed (Model 1). Model 2 shows that staying more days in a youth or adult

Table 4. Negative binomial coefficients predicting the total number of days depressed, used marijuana, received any support, and used any services with total number of days spent sleeping in each location

	Model 1	Model 2	Model 3	Model 4
	Number of days depressed	Number of days used marijuana	Number of days received any support	Number of days used any services
	Coefficient (SE)	Coefficient (SE)	Coefficient (SE)	Coefficient (SE)
Number of days				
Outside/car	0.03 (0.03)	0.07 (0.05)	−0.03 (0.03)	−0.03 (0.02)
Youth shelter	0.003 (0.02)	−0.11* (0.05)	0.01 (0.02)	0.01 (0.02)
Adult shelter	0.03 (0.02)	−0.07† (0.04)	0.02 (0.02)	0.03† (0.02)
Friend/boyfriend/girlfriend	−0.04** (0.01)	0.06† (0.03)	0.002 (0.01)	−0.02† (0.01)
Stranger	0.02 (0.05)	0.01 (0.11)	−0.02 (0.05)	−0.10* (0.05)
Transitional living facility	−0.05*** (0.01)	−0.05* (0.02)	−0.05*** (0.01)	−0.08*** (0.01)
Demographics				
Female	0.04 (0.19)	−0.35 (0.35)	0.01 (0.21)	−0.06 (0.18)
Heterosexual	−0.18 (0.22)	−0.52 (0.44)	−0.42 (0.22)	−0.33† (0.20)
Age	0.03 (0.06)	0.14 (0.12)	0.06 (0.06)	0.03 (0.06)
Constant	−1.55 (1.22)	−4.08 (2.47)	−1.77 (1.26)	−0.83 (1.12)
Model fit statistics				
Alpha	0.69 (0.13)	2.60 (0.54)	0.80 (0.13)	0.49 (0.10)
Likelihood ratio test for alpha	154.52***	275.39***	278.79***	108.39***
Likelihood-ratio test for model	36.00***	30.47***	24.32**	54.58***
Log-likelihood	−320.55	−224.26	−347.11	−315.86
Pseudo R^2	5.32%	6.36%	3.38%	7.95%
N	144	139	140	138

Note. Exposure variable is the number of days with valid nonzero data reported on each measure.
† $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

shelter ($b = −.11, p < .05; b = −.07, p < .10$, respectively) or in a TLF ($b = −.05, p < .05$) was associated with using marijuana on fewer days, but staying with a friend/boyfriend/girlfriend ($b = .06, p < .10$) was associated with using marijuana more often. Model 3 shows that staying in a TLF ($b = −.05, p < .001$) was associated with receiving support on fewer days. Finally, Model 4 shows that youth who reported staying more days in an adult shelter ($b = .03, p < .10$) reported using services on more days, but those who stayed with a friend/boyfriend/girlfriend ($b = −.02, p < .10$), stranger ($b = −.10, p < .05$), or TLF ($b = −.08, p < .001$) reported using services on fewer days.

Discussion

Using EMA via SMS, we examined the location and consistency of youths' daily sleeping arrangements and how sleeping locations are linked to youth feeling depressed, using marijuana, receiving support, and using services over 4 weeks. Our results show that, on average, youth change sleeping arrangements frequently, spending as few as 4 to 5 days in a youth or adult shelter, for example. Even staying in a TLF is not a panacea for these youth as their average consecutive stay in this arrangement was only 9.3 days for youth with at least 28 days of sleep texting data. Anecdotally, at least two youth in the current study ran away from transitional living, further reinforcing the temporary nature of these short-term living situations. The detailed texting data provide insights into the transitory nature of living situations that cannot be gathered through retrospective survey reports.

Our results reveal that youth whose sleeping arrangements are most precarious (i.e., outside, in a car, or with a stranger) are not receiving support and are not accessing services; thus, these young people are the most vulnerable. Without having contact with agencies, these youth are less likely to learn about available services (Ha et al., 2015). In addition, these youth may be at greatest risk of being sexually and/or physically victimized (e.g., staying outside or with a stranger), given their exposure to individuals who may take advantage of them (Tyler & Beal, 2010). Consistent with previous evidence that depressive symptoms are linked to staying in shelter and drop-in center usage (Hohman et al., 2008), feeling depressed is associated with staying at an adult shelter. Mental health concerns may be driving youth to seek out shelter services. Other research also underscores some homeless youths' dissatisfaction with shelters' strict enforcement of guidelines and regulations (Ha et al., 2015; Karabanow, Hughes, Ticknor, & Kidd, 2010; Thompson, McManus, Lantry, Windsor, & Flynn, 2006), which may also relate to poorer mental health. Our findings are consistent with earlier work, which has found that some homeless youth fail to access *any* services (Tyler et al., 2012). Although some research has examined reasons for nonservice use (Ha et al., 2015; Solorio et al., 2006), this is an area for further study.

Our results also show that youth staying in transitional living are less likely to report using services and receiving support. One likely

explanation is that those in transitional living are already receiving services and support via a mentor regularly and consider them part of the program, so they might not think of services or support on a daily basis. That is, once young people start receiving a service, they may no longer view it as a "need," even if they are still using that service. Given the paucity of research, learning more about how these youth view their use and access to services is worthwhile for further study.

Limitations

Our study is not without limitations. Although we have some information from youth across 2,776 youth–days, we are missing sleeping location data on 23% and missing depression reports for about 21% of these days (with no data at all for an average of 10 out of 30 days). We assume that youth's sleep and well-being patterns for the days that are missing are similar to the days collected. There are no meaningful differences in the average response rates for each block of items at the different time points (76% for the 10:00 a.m. items compared with 75% for the 4:00 p.m. and 9:30 p.m. items), there is notable heterogeneity in the item-level response rates within the time blocks. The missing data rate increases when we jointly examine the sleeping data and well-being measures on a daily level (losing up to 38% of the full number of youth–days); as such, we have aggregated the data across the study period. It is not immediately clear how to best "fill in" the missing data for these youth. Although one may be able to impute values for intermediate days that are missing only one or two daily outcomes, it is not clear whether the assumptions of missing at random will hold for youth who broke off the texting completely or on days for which we have no other information. Future work will examine text-level and day-level correlates of nonresponse, as well as procedures to address missingness.

Although SMS completion for the individual texting requests was somewhat lower than desired, our feasibility study showed that at least some of the variance in participation was related to the type of phone (e.g., having limited vs. unlimited texting) provided to the youth (Tyler & Olson, 2018), an exogenous factor not directly related to the youth's sleeping circumstances or well-being. Somewhat reassuringly, the multivariate models predicting the aggregate well-being

measures show few systematic associations with youth characteristics. Another limitation is that although youth may have reported staying at the same type of location (e.g., with a "friend, boyfriend, or girlfriend") for multiple consecutive nights, we do not know whether the actual location is the same from night to night (e.g., with the *same* friend each night). Thus, these results may overestimate stability of sleeping locations.

Public Health Implications

Overall, our study has many strengths and has implications for public health and policy. Numerous youth experience homelessness on a yearly basis (Morton et al., 2017). Most of these young people have already been exposed to trauma and abuse prior to leaving home (Tyler & Cauce, 2002), which has been linked to depression (Bender et al., 2014; Lim et al., 2016). These youth generally suffer from mental health issues (Brown et al., 2015), which can detract from their ability to function and manage daily life. This is exacerbated by the reality of experiencing homelessness, which includes daily struggles of locating services and a place to sleep for the night. This lack of residential stability, coupled with limited support (Bao et al., 2000) and low service utilization (Tyler et al., 2012), is likely to worsen the mental health of homeless youth. For example, we find that youth staying outside or in a car more frequently report feeling depressed more frequently and are more likely to use marijuana. In contrast, youth staying at a youth or adult shelter more frequently report using services more often, which may increase well-being. As such, our results suggest that outreach efforts may wish to focus on reaching youth who are sleeping in places not intended for human habitation and facilitate contact with shelter services. Moreover, because sleeping in shelters is associated with more service use, but current spaces are typically full with long waiting lists, there is a policy need for more youth shelter spaces. Overall, these results show that not only do youth have various sleeping arrangements over 30 days but also where they stay matters for their substance use, mental health, and well-being.

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