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Metric Properties of the Neighborhood Inventory for Environmental Typology (NifETy): An Environmental Assessment Tool for Measuring Indicators of Violence, Alcohol, Tobacco and Other Drug Exposures

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Abstract

Objectives—Establish metric properties of The Neighborhood Inventory for Environmental Typology (NifETy).

Methods—919 residential block faces were assessed by paired raters using the NifETy. Reliability was evaluated via inter-rater and internal consistency reliability; validity by comparing NifETy data with youth self-reported violence, alcohol and other drug exposure and crime statistics.

Results—Validity and reliability metrics were moderate to exemplary for the total scale and subscales. NifETy data correlated strongly with crime data and youth self-reported exposure.

Conclusions—The NifETy is valid and reliable. Future investigations will explore its utility in other urban centers and association to other health outcomes.

Keywords

adolescent health; neighborhood; inner-city; reliability; validity

INTRODUCTION

The Neighborhood Inventory for Environmental Typology (NifETy) instrument is a standardized inventory designed to assess the incidence and prevalence of environmental indicators theorized to be linked with youth exposure to violence, alcohol, tobacco and other drug (VATOD) activity. The NifETy was constructed to delineate the contexts in which youth live and experience VATOD exposure, the frequency and severity of exposure, and the environmental factors associated with elevated levels of exposure within neighborhoods (Furr-Holden et al., 2008).

Elevated VATOD risks among urban youth are associated with decayed neighborhoods, substandard housing, social isolation, and community violence (Browne et al., 2001; Clubb et al., 2001). Given the continued exposure of inner-city youth to high levels of VATOD

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activity, an increased understanding is needed of the nature of the associations between individual and environmental-level factors to target in future preventive interventions. The purpose of the current paper is to establish preliminary metric qualities of the NifETy to ascertain how well it identifies and classifies these urban environmental indicators. These include validation of theoretical subscales (i.e., criterion validity) and reliability (inter-rater and internal consistency).

Three sets of theories guided the construction of the NifETy's theoretical domains so that they capture the major types of VATOD activities and neighborhood disorder, which, according to these theories, foster and perpetuate further VATOD activity and increase disorder. First, the Family of Incivility Theories or Disorder Theories posits that urban neighborhood disorder signals disregard for the neighborhood. A multi-step process may occur in which incivilities increase over time, weakening residents' control over neighborhood life and heightening local fear and crime (Wilson and Kelling, 1982). Second, Opportunity Theories maintain that offenders evaluate whether or not to seize existing opportunities for crime they encounter in routine daily activities, and that these opportunities can be blocked by environmental manipulations (Mair and Mair, 2003). Third, the Social Cognitive Behavioral Model, proposes a dynamic interaction between how the social environment influences an individual's cognition and behavior and vice versa (e.g., Barth, et al., 1992; Neumark-Sztainer, 1999; Rudan, 2000).

These three sets of theories guided the construction of the NifETy's theoretical domains so that they capture the prevalence of the major types of activities and neighborhood disorder which, according to these theories, foster and perpetuate VATOD activity, and increasing disorder. The domains include both social and physical order/disorder and decline. For example, the number of un-repaired broken windows signal heightened neighborhood disorder (e.g., Taylor, 2001), as do fighting, prostitution, and the nature and degree of nonresidential land use (e.g., vacant lots): these may provide crime or exposure opportunities (e.g., Taylor et al., 1995). To address the aspects of our theoretical model which pertain to opportunities for crime being necessary and sufficient for exposure, the NifETy includes a physical layout domain (e.g., block length and width, alley ways), and youth and adult activity domains (e.g., number of people present, youth supervision) to document the degree to which a block is inhabited. Both physical layout and degree of residency may provide opportunities for crime and youth exposure to VATOD activity. As a result of pilot-tests and qualitative field observations of Baltimore City blocks, the NifETy was expanded to include a domain to directly measure violence related evidence (e.g., police markings, bullet casings), and alcohol, tobacco and other drug (ATOD) activity (e.g., cigarette butts, liquor bottles, drug vials). Items were selected to assess readily observed artifacts of their respective domains.

Significance

The NifETy instrument is a promising new tool for standardized assessment of environmental hazards and protections in relationship to community health (Furr-Holden, et al., 2008). The instrument is intended to identify the most salient targets for effective community-based environmental preventive interventions. This will directly test the hypothesis that community violence exposure and substance use/abuse can be mitigated and prevented through environmental modifications and interventions (e.g., Mair and Mair, 2003). Establishing the metric soundness of the NifETy instrument is necessary before further exploration of its potential utility as a public health tool.

METHODS

The first wave of this longitudinal study was conducted between June and November of 2005 in a stratified sample of Baltimore City's 242 residential neighborhood statistical areas using a 75-item NIfETy instrument. Items were organized into seven theoretical domains: (1) Physical Layout; (2) Types of Dwellings; (3) Adult Activity; (4) Youth Activity; (5) Physical Order and Disorder; (6) Social Order and Disorder; and (7) Violence and ATOD Indicators. Modifications were made to the NIfETy before it was re-fielded in Wave 2 (Spring 2006) and Wave 3 (Summer 2006). Enhanced programming features were added to the PDA program (e.g., adding automatic skip patterns/screen advances, forced choice formats with non-logical values prohibited, etc.) and a number of non-analysis quality control variables and substantive analysis variables were added, deleted, or modified, resulting in 110 quantitative items (presented in Table 2).

Waves 2 (February–May 2006) and 3 (June–September 2006) were exact replications of the Wave 1 study and methods. A total of 845 block faces were surveyed in Wave 2. These included 447 randomly selected blocks, hereafter referred to as 'census blocks' and 398 block faces where youth in the Baltimore Prevention Program (BPP) resided. There were 919 blocks surveyed in Wave 3 (447 census blocks and 472 BPP blocks). Raters were blind to the expected outcomes of this study, that is they were trained to conduct the assessment but not told of expected outcomes of the study. Only one night rating was assessed per block, although most raters were accompanied by a partner for safety and efficiency. Night ratings inventory a subset of 35 of the 110 items. The current metrics are limited to the full daylight ratings. Detailed descriptions of the methodology are discussed in Furr-Holden et al. (2008).

Individual-Level BPP Data and Sample

Individual level data were obtained from the Second Generation Baltimore Prevention Program (BPP) at the Johns Hopkins Prevention Intervention Research Center. This longitudinal epidemiological study includes 678 high-risk Baltimore City youth (and their caregivers) assessed annually from the fall of the first grade, in 1993, through the present. The BPP youth 2005 12th grade assessment was used to establish validity for the NIfETy. Only the 398 whom resided in Baltimore City at the time of their 12th grade assessment were included in this metric analysis because the NIfETy study was fielded within the boundaries of Baltimore City. Of the 398 eligible 12th grade youth, 208 (52.3%) were male and 376 (94.5%) reported being African American. Age was reported by 323 12th graders: 224 (69%) were age 17, 98 (30%) were age 18, and there was one 19 year old. Approximately two-thirds (62.3%) of these youth received free or reduced lunch, a proxy for family income.

Each comprehensive annual youth assessment includes constructs such as exposure to VATOD, familial management, deviant peer exposure, anxiety and depression symptoms, injury, behavioral changes, and neighborhood/community perceptions (from the Neighborhood Environment). These measures will be used to compare NIfETy ratings with self perceptions of neighborhood environment and functioning. Although caregivers are also assessed annually on constructs such as household structure, neighborhood/community perceptions, and parenting practices, only youth reports were used in conjunction with the NIfETy to identify specific environmental factors that are associated with self-reported community violence and AOD exposure. The intervention received by these youth in the first grade is not anticipated to influence current violence and AOD exposure. See Furr-Holden et al. (2004) for a more detailed description of BPP sample and instruments for this longitudinal study.

BPP Blocks

Baltimore City unit blocks on which the 398 BPP youth reside were assessed with the NifETy to evaluate associations between (a) individual-level reports of violence and AOD exposure and (b) observed environmental features based on the cross-sectional assessments of trained observers. Upon completion of a BPP youth interview, their current address was updated. Thus, the targeted sampling frame increased to 472 BPP blocks in Wave 3 due to residential moves since the last BPP assessment. When a BPP unit block was the same as a random census block, a different census block was randomly drawn from the same neighborhood. If more than one BPP youth lived on the same block, the same block ratings were used for all BPP youth residing on that block.

Sample Size and Power Calculations

Power analyses were used to determine the sample size required to detect significant differences in exposure to environmental characteristics with minimally powerful dichotomous indicators. Planned comparisons included characteristics within and across neighborhoods via prevalence estimation of indicators and inter-class correlations. There is sufficient power to identify seven discrete empirical domains given 554 unit blocks or approximately eight blocks per item in the 110-item NifETy scale. Validation through associating risk for exposure to VATOD and individual-level exposure self-reports with neighborhood indicators requires just 316 unit blocks for sufficient power, assuming an individual level prevalence rate of at least 30% (or 268 unit blocks if the prevalence was 15%) with the alpha equal to 0.05 and type II error beta equal to 0.02.

Data Management and Analysis

To obtain one rating per block for all analyses, except inter-rater reliability, items were aggregated to their maximum value based on unique block identifiers. Unless specified otherwise, SPSS version 11.5 (SPSS, Inc., Chicago IL) was used for all analyses.

Reliability Analyses—Intra-class correlation coefficients (ICC) were used to estimate inter-rater reliability because the NifETy is comprised of dichotomous, ordered polytomous, and continuous variables. Average rater reliability is reported for Shrout and Fleiss' (1979) two-way mixed effects ICC model (Case 3) with the consistency agreement definition. Average measure reliability uses the mean of all raters as the unit of analysis, and was reported given that similar ICC values were obtained when using a random sample of one rater per block. Consistency agreement assesses the degree of the correlation or similarity among raters rather than how identical they are. Paired ratings for each of the Baltimore City blocks were given binary identifiers to assess degree of agreement, independent of individual rater identity or characteristics. ICC estimates ranging from 0 to 0.2 were classified as poor, 0.2 to 0.4 as fair, 0.4 to 0.6 as moderate, 0.6 to 0.8 as substantial, and estimates between 0.8 and 1.0 as almost perfect (Landis and Koch, 1977).

Cronbach's alpha coefficient (1951, 1970) was used to estimate internal consistency reliability because it can be applied to both continuous and dichotomously coded variables (excluding binary items did not improve scale reliability so these estimates are not presented). To determine if an item should be retained on a scale/theoretical subscale, each item was examined for zero variance, corrected item-total correlation (negative values), squared multiple correlation (R^2 ; near zero values), and the change in scale alpha upon deletion of the item (.05 or greater). The weakest of such items were deleted one by one (unless it was deemed theoretically essential), alpha re-estimated, and exclusion criteria re-examined for all remaining items. Several low prevalence items had slightly negative ICC values. Removal of these items individually and in various combinations did not meaningfully improve any of the ICC values, so they were included in ICC estimates for

their respective subscales and the total scale. Cronbach's alpha ranges from 0 to 1, with higher values indicating a more reliable scale (e.g. .90 = 90% reliable and 10% unreliable). Although there is no one accepted cut-off score, a scale alpha as low as .60 is often considered acceptable in exploratory research. A minimum alpha of .70 is required for contributing items to constitute a scale (Nunnally, 1978; Nunnally and Bernstein, 1994). The standard error of measurement exceeds half a standard deviation (0.55) when $\alpha = .70$. Evaluation criteria used to for the alpha coefficients were: minimal ($< .60$); moderate (.60 to .69); extensive (.70 to .79); and exemplary ($\geq .80$).

Validity—In addition to the internal consistency reliability analyses, construct validity was assessed via convergent, divergent, and criterion validity correlations. Bivariate correlations were computed between composite violence, alcohol, and other drug indicators from Wave 2 of the NIfETy and various BPP youth report items. A composite violence variable was created for each block by making the violence indicators binary and then summing the number of endorsements of each item. The same method was used to create the composite alcohol and composite drug variables (The items used to create the composite scores are denoted on Table 2).

Convergent Validity—Concurrent validity was examined via correlations between composite violence, alcohol, and other drug indicators on the NIfETy and corresponding BPP youth reports about their experience of their neighborhood.

Discriminant Validity—Discriminant validity was assessed through correlations between the composite NIfETy items and the BPP youth report on the item “There are plenty of safe places to walk or spend time outdoors in my neighborhood.”

Criterion Validity—The areas with the highest density of violent crime were calculated using 2006 crime data from the City of Baltimore for the months of June – August. The crime types used were aggravated assaults, shootings, and murders. Density per square mile was calculated using the Kernel Method in ArcGIS 9.2. These values were then reclassified so that all values which were one standard deviation above the mean and higher were considered as the areas with the highest density of violent crimes.

The areas with the highest density of reported intoxication and drug activity were calculated using 2006 calls for service data from the City of Baltimore for the months of June – August. The calls for service categories for reported intoxication were driving while intoxicated and intoxicated person. Density of drug activity and intoxication were calculated and reclassified using the same method as violent crimes.

RESULTS

Block aggregated descriptive statistics for the 17 continuous indicators are presented in Table 1. Measurement scales for the remaining items are indicated in Table 2 (with the superscripts a to h), as are item level prevalence rates based on block aggregated items.

Reliability

Inter-rater Reliability via Intra-Class Correlation Coefficients (ICC)—ICC values (for the total scale, the theoretical sub-scales, and all individual items) are displayed in Table 2.

For Waves 2 and 3, ICC coefficients for the Total scale ($ICC = .89$ and $.88$), Youth Activities subscale ($ICC = .86$ and $.88$), Physical (Dis)Order subscale ($ICC = .82$ and $.83$), and VATOD subscale ($ICC = .84$ and $.82$) were in the almost perfect range, and were stable

over time. Although the ICC estimate for the Adult Activities subscale was in the substantial range in Wave 2 ($ICC = .78$), it reached the near perfect range in Wave 3 ($ICC = .81$). The ICC estimates for the Social (Dis)Order subscale were in the substantial range for both waves ($ICC = .74$ and $.72$) and relatively stable. The lowest ICC scale estimates (below $.70$) for Waves 2 and 3 were obtained for the Physical Layout ($ICC = .63$ and $.63$) and Type of Dwelling/Edifice ($ICC = .60$ and $.64$) subscales, however, these were still in the substantial range and relatively stable from Wave 2 to Wave 3.

Despite the comparatively lower subscale ICC, ICC estimates for all of the individual items on the Physical Layout subscale in Wave 2 and 3 were in the almost perfect range (except for the substantial ICC of $.76$ for the Length of Block item in Wave 2). Items in this domain either remained the same or increased from Wave 2 to Wave 3.

For both Wave 2 and 3, seven out of 10 items on the Dwelling/Edifice subscale were in the almost perfect range. The Multi-Family Home item for both waves, Illegitimate or Informal Businesses item in Wave 3, and the Other Non-Residential Property item in Wave 2 were all in the substantial range. The lowest ICC coefficients on the Dwelling/Edifice subscale occurred for Other Non-Residential Property in Wave 3 ($ICC = .50$ /moderate) and Bars ($ICC = .39$ /fair). With the exception of decreased coefficients for Illegitimate Businesses and Other Non-Residential Properties, ICC estimates were stable (i.e., Liquor Stores and Churches) or increased across time for the remaining items.

For both waves, ICC estimates for nearly all items on the Adult Activities subscale were in the substantial to almost perfect range. Most items on the Youth Activities subscale were in the substantial to almost perfect range for both Waves 2 and 3. Exceptions were the Youth in Transit item and Dangerous Youth Activities items in Wave 3, which were in the moderate range, and Other Youth Activities ($ICC = .15$ /poor) in Wave 2.

Of the 48 items on the Physical (Dis)Order subscale, 31 items in Wave 2 and 36 items in Wave 3 had ICC coefficients in the substantial to almost perfect range. Eleven Wave 2 and four Wave 3 items were in the moderate range. Items on this scale varied greatly across time (e.g., 18 of the 48 items increased notably from Wave 2 to Wave 3, while 15 items decreased), reflecting the NifETy's anticipated sensitivity to seasonal/time variations.

ICC estimates items in the Social (Dis)Order generally fell in the substantial to moderate range. The Wave 2 items that fell below the substantial range were Court Yards ($ICC = .28$ /fair), Noisy ($ICC = .57$ /moderate), and People Yelling ($ICC = .59$ /moderate). In Wave 3, five items fell in the moderate range: Noisy, Homeless People, People Yelling, People Swearing, and People Loitering. Although stability across time could not be assessed for the aforementioned items, three items (Outdoor Community Recreational Outlets, Parks and Playgrounds, and Court Yards) showed marked improvement from Wave 2 to Wave 3.

Approximately two-thirds of the items in the VATOD subscale for Waves 2 and 3 were in the substantial to almost perfect range. In Wave 2, Blunt Guts/Wrappers and People Consuming Alcohol were in the moderate range, and three low prevalence items (Marijuana Roaches, Other Drug Paraphernalia, and Blood in Streets or Sidewalks) had ICC values at or near zero. In Wave 3, Obvious Signs of Drug Selling ($ICC = .57$) was in the moderate range, People Smoking Tobacco ($ICC = .29$) was in the fair range, and four primarily low prevalence items (Marijuana Roaches, Crack Pipes, People Consuming Alcohol, and Shell Casings) had ICC values at or near zero. While seven items (Syringes, Blunt Guts/Wrappers, Other Drug Paraphernalia, Cigarette Butts, People Using Drugs, Blood in Street or Sidewalks, and Police Tape/Outlines) exhibited notable improvements over time, five items (Crack Pipes, People Smoking Tobacco, People Consuming Alcohol, Obvious Signs of Drug Selling, and Memorials) decreased notably over time.

Internal Consistency Reliability—Internal consistency reliability is presented for the total NifETy scale and each subscale in Table 2. Internal consistency reliability for the Total NifETy scale was exemplary for both Wave 2 ($\alpha = .84$) and Wave 3 ($\alpha = .87$). Alpha coefficients ranged from minimal to exemplary for each of the subscales ($\alpha = .27$ to $.90$ in Wave 2, and $.27$ to $.91$ in Wave 3). The Physical Layout subscale had the strongest alpha estimates for Wave 2 ($\alpha = .90$) and Wave 3 ($\alpha = .91$). The next highest alphas were for the Youth Activities subscale ($\alpha = .79$ /Extensive in Wave 2 and $.81$ /exemplary in Wave 3), followed by extensive alpha coefficients for the Physical (Dis)Order subscale ($\alpha = .71$ in Wave 2 and $.77$ in Wave 3). Internal consistency for the Adult Activities subscale increased from the moderate range in Wave 2 ($\alpha = .63$) to the extensive range in Wave 3 ($\alpha = .71$). The only subscale to decrease across time, the Violence and AOD subscale exhibited a slight decrease from Wave 2 ($\alpha = .74$) to Wave 3 ($\alpha = .71$), but remained in the extensive range. Across waves, the Type of Dwelling/Edifice had the poorest internal consistency estimates ($\alpha = .27$ or minimal in both instances), followed Social (Dis)Order subscale (α was minimal at $.59$ in Wave 2, and increased to $.64$ or moderate in Wave 3).

Test-Retest Reliability—Test-retest correlation estimates were computed for each of the 110 items. To conserve space, the specific estimates for all items are not reported here, but are available from the first author upon request. Of the 110 items, 81 items (74%) had significant test-retest values. Of the 29 non-significant estimates, three items (Train stations, Police Walking the Beat, and Police Making Arrests) could not be estimated due to zero prevalence in one or both of the waves. Similarly, 13 items had prevalence rates below one percent in one or both waves (Trolleys/Light Rails, Hacks, Multiple Parked Police Cars, Police Engaging Civilians, People in Physical Fights, Evidence of Prostitution, Marijuana Roaches, Crack Pipes, Single Parked Police Cars, Signs with Negative Messages, Syringes, Other Drug Paraphernalia, and People Using Drugs). Thus, 13 items (16%) failed to reach significance despite prevalence rates greater than one percent. Three of these 13 items trended towards significance: Adults in Work Uniforms, $r(845) = .05$, $p = .06$, Dangerous Youth Activities, $r(845) = .05$, $p = .06$, and Un-Boarded Abandoned Buildings, $r(845) = .05$, $p \leq .08$. The remaining 10 non-significant items were: Adults Exercising, Eviction Signs, Inoperable Vehicles, Used Condoms, Court Yards, People Loitering, Intoxicated People, Blunt Guts/Wrappers, People Consuming Alcohol, and Obvious Signs of Drug Selling.

Validity

Convergent Validity—The composite violence item correlated positively and significantly with BPP youth reported counts of violence victimization (“Victim of violent event”), $r(324) = .17$, $p \leq .05$, and witnessing violence (“Witness violent event”) $r(324) = .11$, $p \leq .05$. There was a significant positive relationship between the NifETy composite alcohol item and the BPP youth item “In the morning or later in the day, I often see drunk people on the street in my neighborhood,” $r(324) = .24$, $p \leq .05$. There was also a significant positive correlation between the NifETy composite drug item and the BPP youth item “I have seen people using or selling drugs in my neighborhood,” $r(324) = .29$, $p \leq .05$.

Discriminant Validity—There were significant negative correlations between violence victimization and/or witnessing violence and composite neighborhood violence [$r(324) = -.17$, $p \leq .05$], composite alcohol [$r(324) = -.23$, $p \leq .05$], and composite drugs [$r(324) = -.27$, $p \leq .05$]. There was also a trend toward significance for the negative correlation between the NifETy composite violence item the BPP youth item “I feel safe when I walk around my neighborhood by myself at night,” $r(324) = -.09$, $p = .06$. However, this BPP item correlated significantly and negatively with the composite alcohol [$r(324) = -.17$, $p \leq .05$] and drug [$r(324) = -.17$, $p \leq .05$] variables. Furthermore, BPP youth reports for “Most

adults in my neighborhood respect the law” had a significant negative correlation with the composite alcohol [$r(324) = -.21, p \leq .05$] and drug [$r(324) = -.22, p \leq .05$] items. Discriminant validity was also considered for the three composite NifETy items as a function of demographic characteristics consistently reported to vary with violence and AOD (i.e., gender and race), however, no significant group differences were found for gender or race.

Criterion Validity—Of the NifETy sampled block faces that had an alcohol indicator of two or more, 25% were located within 500ft of the areas with the highest density of reported intoxication. Of the NifETy sampled streets that had a drug indicator of one or more, 53% were located within 500ft of the areas with the highest density of reported intoxication. Of the NifETy sampled streets that had a violence indicator of one or more, 72% were located within 500ft of the areas with the highest density of violent crimes. We used a higher threshold for alcohol because it is more prevalent.

DISCUSSION

The NifETy is replicable across raters and therefore, it can serve as a reliable index of exposure. Inter-rater reliability is substantial to almost perfect for the total scale and all of the critical subscales. Generally consistent inter-rater reliability estimates were obtained for the total scale and subscales across Waves 2 and 3. Item level fluctuations across time were greater than scale level fluctuations. Meaningful differences across wave may also be due to seasonal variations in certain activities or indicators and it was anticipated, a priori, that the NifETy would be sensitive to these changes. Many items failed to reach significance due to the low prevalence of atypical events (e.g., shell casings). Scales/subscales with $\alpha < .70$ /moderate or worse range indicate that their component items do not hang together conceptually, and thus do not constitute a scale (Nunnally, 1978; Nunnally and Bernstein, 1994). The Physical Layout and Dwellings/Edifice subscales are not deemed essential to the Total scale and, in fact, several of their items relate in a problematic manner to the rest of the items on the NifETy. The uniform character of Baltimore City blocks (they are typically comprised of one dwelling type per block) likely contributes to the observed suppression of ICC and alpha values when these items are included in scale estimates. Removing (a) the entire Physical Layout subscale, (b) all four types of residential dwelling items, and (c) the entire Dwellings/Edifice subscale alone or in various combinations did not notably improve the either the ICC or alpha estimates for the Total scale, regardless of wave. Therefore, only problematic layout and edifice items were removed as required. Although the Dwellings Count item is problematic for all scales, it remains a critical item for inclusion on the NifETy. This item in conjunction with other items in the Physical layout and Physical (Dis)order domains can be used as a proxy for residential occupancy, necessary for service planning and delivery. It is not requisite that internal consistency be high when the constructs assessed by a scale/subscale are independent of each other. Specifically, it is not unexpected that the alpha estimates for the Type of Dwelling/Edifice subscale only achieved minimal reliability because it contains observations that may not necessarily be related to each other. In contrast, such observations are often highly related to other items on the total scale, contributing to an extensive alpha level for the entire scale. However, the relatively low alpha for the Social (Dis)Order subscale was unexpected and will be explored by additional analyses. It is possible that this scale captures more than one dimension or construct. Due to the lower than desired internal consistency levels on physical layout and type of structures subscales, a factor analysis will be conducted in future research to re-evaluate the theoretical organization of items into subscales and the necessity of removing poorer performing items.

Multiple methods were used to evaluate both validity and reliability, including theory based item selection, internal consistency, inter-rater agreement, test-retest, correlations with BPP measures, and GIS analyses. Taken together, the findings provide strong support for the reliability and validity of the NIfETy.

The magnitude, direction, and significance of all but one of the validity correlations supported the divergent and convergent validity of the NIfETy. The significance value of the one non-significant correlation between the composite NIfETy violence variable and BPP youth reports of feeling safe when walking around their neighborhoods at night fell just short of significance. Future investigations will include BPP youth reports of safety and night-time ratings.

The NIfETy is currently being fielded in other cities and suburban areas in the greater Baltimore-Washington area. The genesis and evolution of the NIfETy over the past five years has required a delicate balance between making the inventory suitable to the idiosyncrasies of Baltimore City environments while building an instrument that is generalizable for use in other cities and non-urban locales.

A few limitations of this research merit mention. Validity of the NIfETy may be impaired by reliance upon BPP self-reported measures of potentially incriminating behaviors (e.g., violence, drug use) perpetrated by themselves or others close to themselves. However, the BPP investigative team has taken steps to ensure accuracy of responses, including using audio computer-assisted self-interview methods for sensitive items. Another potential bias relates to the use of just a few of the numerous potential pathways between environment and individual functioning. However, the selected pathways were chosen based on theory to explain the largest proportion of the observed variance in reported exposure. Future extensions of this work will include more expansive psychosocial constructs of potential importance, such as the school environment or academic performance. Also, despite random assignment of packets, some raters were more proficient/prolific than others and were therefore assigned more blocks and thus their biases, strengths/weaknesses are weighted more heavily. There were a total of 11 raters and they comprised 14 unique rater-pairs. We found no statistical relationship between individual rater or rater-pair and NIfETy items or scale scores. The presence of raters on a block may also have influenced human activity on that block during the rating periods (some ratings took as long as an hour). Some of the observed items have a low frequency because they occur infrequently or have a low prevalence while others have a low frequency because the likelihood of the activity being observed in a brief cross-sectional assessment is very low. We have chosen for now to retain all these items to measure whether detection over time is a signal for increased neighborhood hazard. Consistent with principles of measurement, it is important have a mixture of items, some that are readily detectable and others that are harder to measure or occur infrequently. Lastly, the current metric analyses do not include findings on night ratings. Despite these limitations, the metric properties of the NIfETy instrument are sound, the assessment is valid and reliable and the approach is promising. Future research will examine the resolution of the NIfETy, and determine if the block-level data are distinct from larger environmental units, like census tract or neighborhood. As we refine the approach and determine optimal analytic units and approaches, the NIfETy will have greater utility as a tool to identify potential targets for future environmental preventive interventions.

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Table 1

NIfETy Descriptive Statistics for Continuous Items

	Wave 2			Wave 3		
	N	Range	Mean (SD)	N	Range	Mean (SD)
Dwelling Count	845	0 – 99	24.44 (18.21)	919	0 – 98	24.62 (18.62)
Commercial Business	845	0 – 15	.57 (1.69)	919	0 – 18	.51 (1.56)
Illegitimate/Informal Businesses	845	0 – 1	.02 (.12)	919	0 – 2	.01 (.13)
Liquor Stores	845	0 – 2	.03 (.20)	919	0 – 2	.03 (.19)
Bars	845	0 – 10	.04 (.39)	919	0 – 4	.02 (.19)
Church	845	0 – 2	.12 (.36)	919	0 – 2	.10 (.32)
Other Non-Residential Property	845	0 – 4	.19 (.50)	919	0 – 11	.17 (.75)
Adults in Transit	845	0 – 13	1.56 (2.01)	919	0 – 11	1.13 (1.61)
Adults in Work Uniforms	845	0 – 8	.22 (.71)	919	0 – 11	.16 (.71)
Total Broken Windows	845	0 – 85	.59 (3.53)	919	0 – 30	.43 (1.93)
Structures with Broken Windows	845	0 – 11	.26 (.88)	919	0 – 15	.26 (1.02)
Eviction Signs	845	0 – 2	.03 (.18)	919	0 – 1	.01 (.12)
Boarded Abandoned Buildings	845	0 – 60	1.11 (3.81)	919	0 – 44	.97 (3.33)
Un-boarded Abandoned Buildings	845	0 – 60	.27 (2.18)	919	0 – 14	.17 (1.05)
Vacant Houses	845	0 – 60	.51 (2.41)	919	0 – 9	.29 (.78)
Vacant Commercial Buildings	750	0 – 12	.12 (.63)	919	0 – 7	.11 (.51)
Used Condoms Count	845	0 – 4	.06 (.33)	919	0 – 3	.03 (.20)

Table 2

NIFETy Wave 2 and Wave 3 Prevalence Rates, Intra-Class Correlation Coefficients (ICC), and Internal Consistency Reliability Estimates (α) for Census and BPP Blocks

Scale or Sub-Scale	Prevalence Rates ¹			Inter-Rater Reliability (ICC)			Internal Consistency Reliability ²		
	Wave 2	Wave 3		Wave 2 (789 Block Pairs)	Wave 3 (451 Block Pairs)		Wave 2 (845 Unique Blocks)	Wave 3 (919 Unique Blocks)	
	%	%		Items	ICC	Items	Items	α	Items
NIFETy TOTAL SCALE (110 Items) ³				109	.89* ¹¹		109	.88* ¹⁰	105
PHYSICAL LAYOUT SUBSCALE ⁴									
1. Length of Block ^a				4	.63*		4	.63* ¹⁰	2
					.76*			.82*	
	Short	13.96	14.47						
	Standard	61.07	62.24						
	Long	19.41	18.82						
	Extra Long	5.56	4.46						
2. Width of Block ^a					.83*			.89*	
	Narrow	28.99	32.43						
	Standard	53.49	54.84						
	Wide	11.83	8.38						
	Extra Wide	5.68	4.35						
3. Alleys Present ^b		32.54	30.36		.87*			.90*	
4. Alley Runs Through to Next Street ^{b, i}		24.73	23.29		.86*			.86* ¹⁰	
5. Dwelling Count ^c		99.76	99.78		.99*			.99*	
DWELLING/EDIFICE SUBSCALE ⁵									
1. Attached Homes ^d			27.64	8	.60*		8	.64*	8
	0%				.88*			.93*	
	0–20%	28.17							
	1–20%		2.50						
	21–40%	3.55	2.61						
	41–60%	12.19	3.81						
	61–80%	6.39	6.53						
	81–100%	49.70	56.91						
2. Apartment Buildings ^d			83.57		.91*			.94*	
	0%								

Scale or Sub-Scale	Prevalence Rates ¹			Inter-Rater Reliability (ICC)				Internal Consistency Reliability ²			
	Wave 2		Wave 3	Wave 2 (789 Block Pairs)		Wave 3 (451 Block Pairs)		Wave 2 (845 Unique Blocks)		Wave 3 (919 Unique Blocks)	
	%	%	%	Items	ICC	Items	ICC	Items	α	Items	α
3. Single Family/Detached Homes ^d	0–20%	85.80									
	1–20%		4.68								
	21–40%	3.20	1.63								
	41–60%	4.14	1.85								
	61–80%	1.30	1.85								
	81–100%	5.56	6.42								
	0%		67.79		.91 *						.97 *
	0–20%	71.48									
	1–20%		4.46								
	21–40%	3.91	3.05								
4. Multi-Family Homes ^d	41–60%	4.14	3.26								
	61–80%	2.01	4.03								
	81–100%	18.46	17.41								
	0%		90.64		.71 *						.76 *
	0–20%	94.79									
	1–20%		5.01								
	21–40%	1.78	1.20								
	41–60%	1.42	.65								
	61–80%	.59	.65								
	81–100%	1.42	1.85								
5. Commercial Businesses ^c		20.95	19.04		.98 *						.99 *
		1.54	1.31		.82 *						.60 *
		32.96	2.72		.95 *						.95 *
		2.72	1.74		.39 *						.87 *
		11.24	9.36		.93 *						.93 *
		15.50	9.58		.73 *						.50 *
6. Illegitimate or Informal Businesses ^c											
7. Liquor Stores ^c											
8. Bars ^c											
9. Churches ^c											
10. Other Non-Residential Property ^c											

Scale or Sub-Scale	Prevalence Rates ¹		Inter-Rater Reliability (ICC)				Internal Consistency Reliability ²			
	Wave 2		Wave 3		Wave 2 (789 Block Pairs)		Wave 3 (451 Block Pairs)		Wave 2 (845 Unique Blocks)	
	%	%	%	%	Items	ICC	Items	ICC	Items	α
ADULT ACTIVITY SUBSCALE										
					7	.78*	7	.81*	7	.63
1. Adults Present ^e	71.24	67.79				.87*		.83*		
2. Adults in Transit ^c	58.22	46.79				.83*		.77*		
3. Adults in Work Uniforms ^c	13.85	8.71				.74*		.75*		
4. Adults Sitting on Steps ^f	18.82	36.02				.72*		.78*		
5. Adults Exercising ^f	2.49	3.48				.64*		.60*		
6. Adults Watching Youth ^f	14.67	18.39				.73*		.77*		
7. Positive Adult Interactions ^f	17.99	18.72				.41*		.60*		
YOUTH ACTIVITY SUBSCALE										
					8	.86*	8	.88*	8	.79
1. Youth Present ^e	39.53	38.08				.85*		.87*		
2. Unsupervised Youth ^e	30.41	26.77				1.00*		1.00*		
3. Youth Playing ^f	14.20	17.74				.77*		.76*		
4. Youth Riding Bicycles ^f	4.50	7.83				1.00*		1.00*		
5. Youth in Transit ^f	22.96	17.41				.67*		.59*		
6. Youth Sitting in a Group ^f	9.47	14.47				.69*		.65*		
7. Dangerous Youth Activities ^f	2.25	1.96				.83*		.49*		
8. Other Youth Activities ^f	2.25	1.41				.15*		.87*		
PHYSICAL (DIS)ORDER SUBSCALE ⁶										
					48	.82* ¹¹	48	.83*	42	.71 ⁹
1. Total Broken Windows ^c	14.32	11.53				.69*		.76*		
2. Structures with Broken Windows ^c	14.32	11.53				.93*		.81*		
3. Eviction Signs ^c	2.25	1.41				.77*		.56*		
4. Boarded Abandoned Buildings ^c	23.91	20.89				.96*		.99*		
5. Un-Boarded Abandoned Buildings ^c	11.12	5.98				.24*		.67*		

Scale or Sub-Scale	Prevalence Rates ¹		Inter-Rater Reliability (ICC)				Internal Consistency Reliability ²			
	Wave 2		Wave 3		Wave 2 (789 Block Pairs)		Wave 3 (451 Block Pairs)		Wave 2 (845 Unique Blocks)	
	%	%	%	%	Items	ICC	Items	ICC	Items	α
6. Vacant Houses ^c	21.89	17.85			.34*			.86*		
7. Vacant Commercial Buildings ^c	7.20	6.75			.60* ¹¹			.86*		
8. New Construction or Renovations ^f	11.73	11.53			.85* ¹¹			.63*		
9. Un-Maintained Property ^f	46.15	39.80			.72*			.72*		
10. Trash in Street ^g	84.38	52.88			.71*			.97*		
11. Trash in Alley ^{g, i}	25.68	14.04			.87* ¹¹			.94*		
12. Trash in Other Open Spaces ^g	83.55	48.31			.68*			.97*		
13. Vacant Lots ^f	10.89	8.16			.72*			.77*		
14. Broken Bottles ^f	57.16	47.66			.75*			.75*		
15. Potholes ^f	20.36	13.28			.52*			.50*		
16. Graffiti ^g	10.30	10.88			.78*			.71*		
17. Clothes Drying ^f	.67	.76			.96* ¹¹			.91*		
18. Fire Escapes ^f	2.53	2.07			.76* ¹¹			.75*		
19. Damaged Sidewalks ^f	48.28	51.47			.55*			.27*		
20. Warning Signs ^f	38.34	29.82			.47*			.60*		
21. Bus Stops ^f	18.82	19.59			.84*			.84*		
22. Other Public Transportation ^f	5.20	2.29			.51* ¹¹			.44*		
23. Train Stations ^b	.00	.00			N/A ⁸			N/A ⁸		
24. Trolleys/Light Rail ^b	.13	.22			1.00* ¹¹			1.00*		
25. Taxis ^b	4.53	1.74			.50* ¹¹			.19*		
26. "Hacks" (Illegal/Unlicensed Taxis) ^b	.93	.33			.40* ¹¹			.67*		
27. Murals ^f	1.89	1.31			.49*			.84*		
28. Speed Bumps ^f	5.21	5.11			.76* ¹¹			.73*		
29. Blue Light Camera(s) Present ^f	1.42	2.50			.92* ¹¹			.93*		

Scale or Sub-Scale	Prevalence Rates ¹		Inter-Rater Reliability (ICC)				Internal Consistency Reliability ²			
	Wave 2		Wave 3		Wave 2 (789 Block Pairs)		Wave 3 (451 Block Pairs)		Wave 2 (845 Unique Blocks)	
	%	%	%	%	Items	ICC	Items	ICC	Items	α
30. Surveillance Camera(s) Present ^f	2.13	2.50			.63* ¹¹			.67*		
31. Flood Light(s) ^f	.47	.33			.60* ¹¹			1.00*		
32. Police Present ^g	3.20	3.92			.87* ¹¹			.86*		
33. Police Cruising in Car ^b	2.60	2.94			.76* ¹¹			.59*		
34. Single Parked Police Car (Marked) ^b	.95	1.41			.97* ¹¹			.67*		
35. Multiple Parked Police Cars (Marked) ^b	.12	.65			.00 ^{8, 11}			.80*		
36. Police Engaging with Civilians ^b	.24	.76			1.00* ¹¹			.92*		
37. Police Walking "the Beat" ^b	.00	.33			N/A ⁸			N/A ⁸		
38. Police Making Arrest(s) ^b	.00	.33			N/A ⁸			.80*		
39. Other Police Activity ^b	.47	.65			.80* ¹¹			.80*		
40. Week Days Posted for Street Cleaning ^{h, i}	28.52	21.55			.81*			.82*		
41. Signs with Positive/Neutral Messages ^b	15.98	9.36			.49*			.27*		
42. Signs with Negative Messages ^b	6.15	.76			.52*			.39*		
43. Security Alarm Signs on Houses ^f	86.51	75.63			.66*			.77*		
44. Evidence of Vandalism ^g	11.72	9.47			.55*			.37*		
45. Evidence of Landscaping ^f	88.76	83.13			.54*			.71*		
46. Operable Vehicles ^f	94.32	85.42			.68*			.83*		
47. Inoperable Vehicles ^f	8.88	4.42			.67*			.24*		
48. Used Condoms ^c	4.02	2.50			.64*			.83*		
SOCIAL (DIS)ORDER SUBSCALE ⁷					14	.74* ¹¹	14	.72*	14	.59
1. Outdoor Community Recreation Outlets ^f	5.33	3.70			.78* ¹¹			.87*		
2. Parks and Playgrounds ^b	4.02	2.94			.81* ¹¹			.97*		
									13	.64

Scale or Sub-Scale	Prevalence Rates ¹		Inter-Rater Reliability (ICC)				Internal Consistency Reliability ²			
	Wave 2		Wave 3		Wave 2 (789 Block Pairs)		Wave 3 (451 Block Pairs)		Wave 2 (845 Unique Blocks)	
	%	%	%	%	Items	ICC	Items	ICC	Items	α
3. Pools ^b	.83	.11				.62* ¹¹		N/A ⁸		
4. Benches ^b	2.01	1.85				.85* ¹¹		.89*		
5. Court Yards ^b	1.30	1.09				.28* ¹¹		.92*		
6. Organized Game Courts ^b	.95	1.20				.87* ¹¹		.84*		
7. Noisy ^g	43.79	43.09				.57*		.55*		
8. Homeless People ^f	2.25	1.52				.76*		.47*		
9. People Yelling ^{f, 12}	9.47	10.01				.59*		.51*		
10. People Swearing ^{f, 12}	4.26	3.48				.75*		.54*		
11. People in Physical Fights ^{f, 12}	.59	.11				.73*		N/A ⁸		
12. People Loitering ^f	7.10	6.53				.62*		.59*		
13. Intoxicated People ^{f, 13}	3.91	2.50				.65*		.66*		
14. Evidence of Prostitution ^b	.83	.44				.61*		.00		
VATOD SUBSCALE					18	.84* ¹¹	18	.82*	18	.74
1. Drug Paraphernalia ^g	47.10	45.38				.80*		.84*		
2. Syringes ^{b, 14}	1.54	.44				.82*		.89*		
3. Baggies ^{b, 14}	34.32	34.82				.63*		.65*		
4. Vials ^{b, 14}	30.77	25.24				.78*		.77*		
5. Blunt Guts/Wrappers ^{b, 14}	6.63	16.43				.57*		.74*		
6. Marijuana (Pot) Roaches ^{b, 14}	.47	.33				.00		.00		
7. Crack Pipes ^b	.59	.22				.73*		.00		
8. Other Drug Paraphernalia ^b	1.18	.44				-.01		1.00*		
9. People Smoking Tobacco ^f	14.21	11.10				.64*		.29*		
10. Cigarette Butts ^f	96.09	79.76				.61*		.98*		
11. People Consuming Alcohol ^{f, 13}	2.01	2.12				.48*		-.01		

Scale or Sub-Scale	Prevalence Rates ¹		Inter-Rater Reliability (ICC)				Internal Consistency Reliability ²			
	Wave 2		Wave 3		Wave 2 (789 Block Pairs)		Wave 3 (451 Block Pairs)		Wave 2 (845 Unique Blocks)	
	%		%		Items	ICC	Items	ICC	Items	α
12. Alcohol Bottles ^{f, 13}	51.12		43.09			.78*		.81*		
13. People Using Drugs ^{f, 14}	.83		1.09			.61*		.70*		
14. Obvious Signs of Drug Selling ^{b, 14}	2.13		2.72			.66*		.57*		
15. Blood in Street or Sidewalks ^{b, 12}	.36		.11			-.00		1.00*		
16. Shell Casings in Street ^{b, 12}	.47		.22			.80*		N/A ⁸		
17. Police Tape/Outlines in Street ^{b, 12}	.36		.11			.67* ¹¹		1.00*		
18. Memorials ^{b, 12}	.47		.76			.92*		.73*		

* Denotes significance ($p \leq .05$).

Measurement Scales

^a Range = 0–3 (length: 0 = Short, 1 = Standard, 2 = Long, 3 = Extra Long, width: 0 = Narrow, 1 = Standard, 2 = Wide, 3 = Extra Wide).

^b Range = 0–1 (binary: No = 0, Yes = 1).

^c Continuous (open ended count of indicators, range varies). Descriptive statistics are presented in Table 1.

^d Range = 0–4 (0 = 0–20% in Wave 2 and 0 = 0 in Wave 3, 1 = 21–40% in Wave 2 and 1 = 1–20% in Wave 3, 2 = 41–60% in Wave 2 and 2 = 21–40% in Wave 3, 3 = 61–80% in Wave 2 and 3 = 41–60% in Wave 3, 4 = 81–100% in Wave 2 and 4 = 61–80% in Wave 3, 5 = 81–100% in Wave 3).

^e Range = 0–4 (0 = Zero, 1 = 1–3, 2 = 4–7, 3 = 8–10, 4 = 11+).

^f Range = 0–3 (0 = None, 1 = Few, 2 = Some, 3 = Many).

^g Range = 0–3 (0 = None, 1 = A Little, 2 = Some, 3 = A Lot).

^h Range = 1–7 (1 = Sunday, 7 = Saturday).

ⁱ Prior to analysis, missing values for Alley Runs Through to Next Street (71–72% user missing for streets without double ended alleyways), Trash in Alley (72% user missing for streets without alleyways), and Days of the Week Posted for Street Cleaning (76–81% user missing when no signs were present) were recoded into zeros prior to analyses due to the absence of alley ways or street cleaning signs. This minimized loss of power associated with list-wise deletions in the calculation of ICC coefficients and Cronbach's alpha.

Scale Development

¹ Items with prevalence rates below 1% appear in boldface font.

² Cronbach's alpha coefficients were computed using variables that were created by aggregating across blocks.

- ³ The Total scale ICC and alpha estimates for both Waves 2 and 3 do not include the Dwellings Count item. The Total scale alpha for Wave 2 also does not include the Train Stations, Multiple Parked Police Cars, Police Walking the Beat, and Police Making Arrests items (due to zero or near zero variance), nor the Single Family/Detached Homes, Evidence of Landscaping, and Security Alarm Signs items (due to notably negative corrected item-total correlations). The Total scale alpha for Wave 3 also does not include the Train Stations item (due to zero variance), nor the Single Family/Detached Homes, Evidence of Landscaping, and Security Alarm Signs items (due to highly negative corrected item-total correlations). However, removing items with corrected item-total correlations did not notably improve alpha estimates for either wave.
- ⁴ The ICC estimates for the Physical Layout subscale for both Waves 2 and 3 do not include the Dwellings Count item. The alphas for both waves also do not include Length of Block and Width of Block.
- ⁵ The ICC and alpha estimates for the Type of Dwelling/Edifice subscale do not include either the Attached or Detached Home items. The Wave 2 alpha for this subscale also does not include the Apartment Buildings item.
- ⁶ The Wave 2 and Wave 3 alpha estimates for the Physical (Dis)Order subscale do not include the Train Station item due to zero variance, nor do they include the Evidence of Landscaping and Security Alarm Signs items due to substantially negative corrected item-total correlations (although removing the latter two items did not meaningfully improve the alpha estimates). The Wave 2 alpha estimate for this subscale also does not include the Multiple Police Cars, Police Walking the Beat, and Police Making Arrests items due to zero or near zero variance.
- ⁷ The Social (Dis)Order subscale for Wave 3 does not include the Noisy item.
- ⁸ This low prevalence rate item has either zero or near zero variance.
- ⁹ Only 750 unique block rating contributed to this estimate.
- ¹⁰ Only 449 unique block ratings contributed to this estimate.
- ¹¹ Between 683 and 788 unique block ratings contributed to this estimate.
- ¹² Included in composite violence variable.
- ¹³ Included in composite alcohol variable.
- ¹⁴ Included in composite drug variable.