**ABSTRACT**

**Background.** Urbanicity has been shown to be related to the higher prevalence of risk factors as well as the symptoms of mental-health problems. However, most of the studies were conducted in developed countries and there is a lack of evidence to know whether a similar effect of urbanicity can be observed in a developing country. In the present study we compared risk-factors and symptoms of psychosis, depression, and anxiety between urban and non-urban residents. **Method.** A community sample of 844 participants completed an anonymous cross-sectional online survey. T-tests and Mann-Whitney U Test were used to compare participants’ scores on mental health-risk factors and symptoms based on their area of residence. **Result.** Participants living in the urban area had higher scores on the measures of loneliness, bullying victim experience at home, negative schema, positive symptoms of psychosis, and depression. Moreover, this group tended to have lower sociodemographic scores but higher number of lifetime mental diagnosis. **Discussion.** A comparable result was found in a developing country. Urban living may be linked to more exposure to mental health risk factors and thus, increased the risk of having symptoms of mental health problems. Future research should investigate this mechanism further in a longitudinal data.

Keywords: *Anxiety, Depression, Psychotic Experiences; Risk factors; Schizophrenia, Urbanicity*

1. **Introduction**

The differences in rates of mental disorders between urban versus non-urban dwellers are well-known. This can be traced back to 100 years ago when a book was published showing that the rates of “insanity” varies according to the geographical location in the United States (White, 1903), specifically rates are higher in an urban area. Since then, many more studies have been conducted, and recent reviews have shown that rates of mental disorders such as psychosis are higher in an urban area (Van Os, 2004; Kelly et al., 2010).

Studies have consistently demonstrated the differential effect of urbanicity on the prevalence rate of the diagnosis of schizophrenia, broader psychosis disorders, and other mental health disorders. A study found that male participants living in an urban area had incidence rates of schizophrenia two times higher than of males living in rural areas (Kelly et al., 2010). The differential effect of residency area was also observed on other DSM Axis-I disorders, such as major depression, simple phobia, social phobia, dysthymic disorder, agoraphobia, panic disorder, generalized anxiety disorder, obsessive-compulsive disorder, or bipolar disorder (Kringlen, Torgersen & Cramer, 2006). Compared to the participants residing in rural area, city-dwellers showed relatively higher lifetime and 12-month prevalence of the diagnosis of those disorders (Kringle, et al., 2006). In term of the severity of the disorder, this study also found that city-dwellers had higher prevalence of severe mental health problems, as defined by having three or more Axis-I disorders (Kringlen, et al., 2006).

Another way to define urbanicity was by the density of the population. People who live in the most densely populated areas had 68-77% more risk of developing psychosis and 12-20% more risk of developing depression compared to the baseline group (Sundquist, Frank, & Sundquist; 2004). Furthermore, Pedersen and Mortensen (2001) found that alongside the number of the inhabitants in a particular area, the effect of urbanicity on the risk for schizophrenia was also affected by the accumulated number of years spent in urban versus non-urban area during upbringing. People who lived in the urban area during their first 15 years showed 2.75 fold increased risk of developing schizophrenia (Pederson & Mortensen, 2001).

The effect of urbanicity on the prevalence of psychosis is further supported by a meta-analysis that includes epidemiological studies with a predominantly European population (Vassos, Pedersen, Murray, Collier, & Lewis, 2012). When strict criteria were applied to define schizophrenia and urbanicity, the estimated pooled Odd Ratio (OR) for schizophrenia was 2.37. An odd ratio of 2.38 was found when broader definition psychosis, urbanicity (place of residence, population size, population density), and time of exposure (during the birth, upbringing, and onset of illness) were applied to include more studies for the analysis (Vassos et al., 2012).

The effect of urbanicity was not only related to the diagnosis of psychotic disorder, but also to the symptoms of psychosis (van Os, Hanssen, Bijl, & Vollebergh, 2001). An epidemiological study using a sample from the Netherlands shows that lifetime prevalence of the DSM diagnosis of psychotic disorder, rating of delusions and/or hallucination, clinician-assessed psychotic symptoms, and rating of psychosis-like symptoms increased in parallel with the level of population density (van Os et al., 2001). There was a negligible change in the parameter when adjustment for age, sex, level of education, and country of birth of subject and parents was made. Moreover, community level of psychotic symptoms were strongly correlated with diagnosis of psychotic disorder at all level of urbanicity, suggesting that urban environment was not only associated with increased level of psychotic disorders but also to the increased level of psychosis susceptibility (van Os et al., 2001).

The effect of urbanicity was also evidenced outside developed countries and Western culture where the urban environment may have different physical components and social exposures. A study in Uganda with young adult sample (18-30 years old) examined the relationship between urbanicity, which was defined as the place of birth (urban, semi-urban, and rural), and lifetime delusional ideation and symptoms of psychosis, depression, and anxiety during the past weeks (Lundberg, Cantor-Graae, Rukundo, Ashaba, & Ostergren, 2009). The study found that compared to rural birth, urban birth was associated with more lifetime delusional ideation experience, especially with grandiosity, as well as more recent symptoms of psychosis, depression, and anxiety even after being adjusted for age, gender, and education (Lundberg et al., 2009). Another study with young adult male sample (18-34 years old) in China investigated whether urbanicity (urban birth and current living), work migrancy, and residential stability related to prevalence and severity of psychotic experiences (PEs; Coid, et al., 2017). The study found that lower level of PEs (prevalence of 1 or more PEs) was not associated with urban birth, current living, or migrancy but associated with residential stability in which sample who stayed longer associated with lower PEs. Meanwhile, prevalence of 3 or more PEs was related with urban birth, current living status, and residential stability. In Indonesia, a study has been conducted to examine the effect of urban-rural migration on psychological problem (Lu, 2010) which found that moving from rural to urban area increased participants’ experience of depressive symptoms. Reduced social support was suggested to be the reason on why the effect was observed only in a group of migrants who moved alone, but not in the group who moved with family members.

However, we do not know why rates of mental disorders between urban vs non-urban dwellers differ. There are several possible explanations. First, the medical coverage in urban areas are better. This means that sufferers of mental disorders are not really higher in urban areas in comparison to non-urban areas, but they are just detected and diagnosed better in urban areas. One consequence of this is that the rates of mental disorders symptoms between urban vs non-urban dwellers should not differ. Second, there is higher rates of people with mental disorders among urban dwellers because there actually are higher number of people with mental disorder because common risk factors of mental disorders are higher in urban areas. This should be reflected by the observation that levels of mental disorder symptoms and common risk factors are higher in urban areas. Third, there is higher number of people with mental disorder in urban areas, but this is not attributable to common risk factors of mental disorders. Thus, to examine possible explanations above the present study aims to compare participants’ mental health-risk factors and symptoms based on their area of residence. Specifically, we hypothesized that participants living in the urban and non-urban area would show differences in a) common risk-factors such as loneliness, bullying victim experience, child abuse experience, and negative schema; b) symptoms of psychosis, depression, and anxiety.

# 2. Method

## 2.1. Participants and Procedure

Participants were recruited as a part of a multi-national study on psychosis risk-factors and psychotic experiences (Jaya, Lincoln, & Ascone, 2016). Participants came from a community sample that covered the continuum of psychotic experiences. Participants were recruited through Crowdflower and other websites, such as internet forums or social networking websites, and were requested to complete an anonymous 30-minute online survey. To follow the sampling method from the COMED study (Hanssen, Krabbendam, Vollema, Delespaul, & Van Os, 2006), we also advertised our study in internet forums focused on mental disorders, particularly schizophrenia, in order to have a sample with variation reflecting the continuum of psychosis. Participants who were recruited from Crowdflower received 0.50 US$ for completing the survey. The incentive was matched to the median hourly wage in Amazon MTurk (Buhrmester, Kwang, & Gosling, 2011). Participants recruited from other websites were not given compensation for reasons of data security. Previous studies have shown that using internet survey to collect self-report data on mental health symptoms is reliable (e.g. Moritz et al., 2013) and that recruiting participants via crowdsourcing websites produces a sample with heterogeneous demographic data (e.g. Shapiro et al., 2013). Participants had to be above 18 years old and agree to fill written informed consent to be able to participate in the study. This study has been approved by the ethical committee of the German Psychological Society (DGPs, 119 TL062014\_2).

A total number of 844 participants completed the survey however only 832 participants could be used for further analysis due to the missing data on the question about the current area of residence (urban and non-urban).

## 2.2. Measures

Back-translation procedure and cultural adaption of measures were conducted by native Indonesians according to guidelines (Schmitt & Eid, 2007). A complete description of the scale and scoring procedure is available from the corresponding author.

**2.2.1. Demographic Measures**

Demographic data consist of participants’ age, sex, and socio-economic status. Participants were asked to indicate their sex (male or female) and age. Participants’ socio-economic status was measured with a multidimensional index developed by Lampert and Kroll (2009). Scores from measures of education (range 1 to 7), household income (range 1 to 7), and job position (range 1 to 7) were summed up to produce socio-economic status index (ranges 3 to 21). The options for questions about education and household income were created based on the census categories published by statistical offices of Indonesia. Participants were also asked to indicate if they have ever had a mental health problem and schizophrenia or other psychotic disorders during their lifetime.

## 2.2.2. Mental Health-Risk Factors Measures

Mental Health-Risk Factors consists of measures of loneliness, bullying experience, child abuse experience, and negative schemas. Loneliness was measured using UCLA Loneliness Scale, Version 3 (Russell, 1996) which consists of twenty items (e.g. I lacked companionship). Participants were asked to rate their experiences during the past four weeks on a 4-point Likert scale (1 = never to 4 = often). The scale has been reported to have a good validity and reliability (Russell, 1996).

Bullying victim experience was measured with a bullying victimization questionnaire (Wolke & Sapouna, 2008). The questionnaire measured direct and relational bullying victim experience in a school context during childhood and in a home and work context during adulthood. Each experience was measured in terms of frequency and duration. Frequency was measured with a 5-point Likert scale (0: never; 1: once or twice; 2: occasionally; 3: about once a week; 4: several times a week). Participant who answered “never” in the frequency question was not given the duration question. Duration was measured with a 5-point Likert scale (1: a few days; 2: several weeks; 3: several months; 4: several years; 5: It´s still going on now). An average score ranging from 0 to 5 was created from frequency and duration scores. This score was used to indicate the bullying victim experience at school, home, and work and for further statistical analyses.

Child abuse experience before the age of 16 was measured with a self-report questionnaire developed based on a semi-structured interview from the NEMESIS study (Janssen et al., 2004). Child abuse experience consisted of emotional, psychological, physical, and sexual abuse. Participants were asked to indicate with a yes or no answer if they ever experienced an abuse according to a given definition that was presented (e.g. emotional abuse: “This means for example that people at home didn’t listen to you, that your problems were ignored, that you had the feeling of not being able to find any attention or support from the people in your house”) and to rate the frequency of the experience on a 6-point Likert scale (0 = never to 5 = very often).

Negative schemas were measured using Brief Core Schema Scales (BCCS; Fowler et al., 2006). The scale consisted of negative-self schema and negative-others schema subscales with six items for each subscale (e.g. negative-self schemas: I am unloved; negative-others schemas: Other people are hostile). The scale has been reported to have a good validity and reliability (Fowler et al., 2006). In our online survey, the original format of BCCS was slightly modified due to technical reasons. In the original format, prior to answering questions with the 4-point Likert scale (1: Believe it slightly, 2: Believe it moderately, 3: Believe it very much, 4: Believe it totally) participants have to answer ‘Yes’ or ‘No’ first for each item. This was slightly modified into a 5-point Likert scale (1: No, Do not believe it, 2: Yes, Believe it slightly, 3: Yes, Believe it moderately, 4: Yes, Believe it very much, 5: Yes, Believe it totally).

## 2.2.3. Symptoms Measures

An Indonesian version of Community Assessment of Psychic Experience (CAPE, (Jaya, 2017; Stefanis et al., 2002) was used to measure psychotic symptoms, specifically, twenty positive symptom items and fourteen negative symptom items were used. Participants were asked to rate symptom frequency during the past four weeks on a 4-point Likert scale (1 = never to 4 = nearly always). Multidimensional model of the CAPE was used as it has been shown to have better factorial validity compared to the original three-dimensional model (Schlier, Jaya, Moritz, & Lincoln, 2015). Confirmatory Factor Analysis (CFA) showed that bizarre experiences, hallucinations, paranoia, grandiosity, magical thinking load into a positive symptom factor, while social withdrawal, affective flattening, and avolition load into a negative symptom factor (Schlier, et al., 2015).

A 9-item Patient Health Questionnaire-9 (PHQ-9; (Kroenke, Spitzer, & Williams, 2001) was used to measure depression symptoms. A 7-item Generalized Anxiety Disorder-7 scale (GAD-7; Spitzer, Kroenke, Williams, & Löwe, 2006) was used to measure anxiety symptoms. On both scales, participants were asked to rate the presence of the symptoms during the past four weeks on a 4-point Likert scale (1 = not at all to 4 = nearly every day). Both scales are based on the DSM-IV criteria. The published Indonesian versions of the questionnaires were used (available in [www.phqscreeners.com](http://www.phqscreeners.com)).

## 2.3. Statistical Analyses

All data were analyzed using SPSS version 20. All tests were set as a two-tailed test, with Level of Significance (LOS) set at *p<*.05. T-test was performed to compare urban and non-urban groups on continuous variables, such as age, income, loneliness, bullying experience, abusive experience, negative schema, and symptoms of psychosis, depression, and anxiety. Mann-Whitney U Test was performed to compare groups on ordinal variables, such as education, job, and SES. Sex, lifetime mental health diagnosis, and lifetime schizophrenia or other psychosis diagnoses were analyzed using Pearson’s Chi-square.

# 3. Results

## 3.1. Participant Characteristics

The participants were 29.55 years old on average and 74.8% were male. Most of the participants were university graduates (46.8%), were working as a trained or skilled worker (23.8%), and had an income with a range of Rp1,000,000-Rp3,000,000 (36.7%). Moreover, 24.1% of the participants reported having a lifetime mental diagnosis and 1.1% participants reported to have a lifetime diagnosis of a schizophrenia or psychotic disorder. Participants were significantly different in terms of age (*t*(680.460) = -4.11, *p* < .01), income (*t*(830) = -2.49, *p* < .05), education (*U* = 96,316.500, *p* < .01), and SES (*U* = 93,813.00, *p* < .05) with non-urban participants showing higher mean scores across measures than urban participants. Participants also showed significant differences on sex (χ2 (1, N = 832) = 14.42, *p* < .01) and lifetime mental diagnosis (χ2 (1, N = 832) = 9.03, *p* < .01). Proportion of male participant was higher both in urban (44.7%) and non-urban area (30%). In terms of lifetime mental diagnosis, participants living in urban area tended to have a higher number of cases than participants living in non-urban area (15.7% and 8.4%, respectively). There was no significant difference on the rates of schizophrenia or psychotic lifetime diagnosis between urban and non-urban area, although urban area showed a higher number of cases compared to non-urban (1% and 0.1%, respectively).

**3.2 Urban and Non-Urban Differences in Mental Health Risk-Factors and Symptoms of Psychosis, Depression and Anxiety**

Analyses on mental health risk-factors and clinical symptoms showed that participants living in urban area had significantly higher score on measures of loneliness (*t*(830) = 3.65, *p* < .01), bullying victim experience at home (*t*(828.276) = 0.024, *p* < .05), negative-self schema (*t*(825.140) = 3.25, *p <* .01, negative-others schema (*t*(823.181) = 3.43, *p* < .01), positive symptoms (*t*(830) = 2.92, *p* < .05), and depression (*t*(830) = 2.01, *p* < .05). Detailed results are provided in Table 1.

Table 1. Urban vs. non-urban differences in mental health risk-factors and symptoms of anxiety, depression and psychosis (n = 832)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Variables** | **All Sample *M*(SD)** | **Urban *M*(SD)** | **Non-Urban *M*(SD)** | ***t* Value** | **Significance (*p-*value)** | **Effect Size (Cohen’s d)** |
| Loneliness | 2.14 (0.52) | 2.20 (0.52) | 2.10 (0.51) | 3.65 | < 0.000\*\* | 0.19 |
| School Bully | 1.88 (0.95) | 1.90 (0.98) | 1.85 (0.91) | 0.74 | 0.457 | 0.05 |
| Home Bully | 1.57 (0.74) | 1.62 (0.80) | 1.51 (0.66) | 2.26 | 0.024\* | 0.15 |
| Work Bully | 1.62 (0.78) | 1.65 (0.80) | 1.59 (0.75) | 1.16 | 0.247 | 0.08 |
| Emo Abuse | 0.93 (1.26) | 0.96 (1.27) | 0.90 (1.26) | 0.62 | 0.535 | 0.05 |
| Psy Abuse | 0.80 (1.19) | 0.80 (1.21) | 0.78 (1.16) | 0.20 | 0.839 | 0.02 |
| Phy Abuse | 0.59 (0.92) | 0.58 (0.90) | 0.62 (0.95) | -0.63 | 0.532 | 0.04 |
| Sex Abuse | 0.24 (0.66) | 0.24 (0.68) | 0.25 (0.63) | -0.17 | 0.867 | 0.02 |
| Child Abuse | 0.99 (1.04) | 1.00 (1.02) | 0.99 (1.05) | 0.15 | 0.878 | 0.01 |
| Negative-self | 1.70 (0.86) | 1.78 (0.91) | 1.59 (0.77) | 3.25 | 0.001\*\* | 0.23 |
| Negative-others | 1.71 (0.78) | 1.80 (0.83) | 1.61 (0.71) | 3.43 | 0.001\*\* | 0.25 |
| Positive Symp | 1.72 (0.45) | 1.76 (0.46) | 1.67 (0.44) | 2.92 | 0.004\*\* | 0.20 |
| Negative Symp | 2.00 (0.49) | 2.02 (0.50) | 1.97 (0.46) | 1.35 | 0.177 | 0.10 |
| Depression | 1.87 (0.56) | 1.90 (0.55) | 1.82 (0.57) | 2.01 | 0.045\* | 0.14 |
| Anxiety | 1.78 (0.64) | 1.81 (0.64) | 1.74 (0.63) | 1.64 | 0.101 | 0.11 |

Note. \*significant at *p* < .05; \*\*significant of *p* < .01; effect size (Cohen’s d) is defined as: 0.20 is small, 0.50 is medium, and 0.80 or above is large.

**School bully** indicates bullying victim experience at school; **Home Bully** = bullying victim experience at home, **Work bully** = bullying victim experience at home; **Emo Abuse** = emotional abuse; **Psy Abuse** = psychological abuse; **Phy Abuse** = psychological abuse; **Negative-self** = negative self-schema; **Negative-others** = negative-others schema; **Positive Symp** = positive symptom of psychosis; **Negative Symp** = negative symptom of psychosis

**4. Discussion**

**4.1 Main findings**

The aims of this study were to test whether participants with an urban and non-urban area of residence would show differences in symptoms of psychosis, depression, and anxiety as well as mental health risk factors. In general, this study found that the two groups were significantly different in several measures of symptoms and mental health risk factors. Participants living in the urban area showed a significantly higher level of positive symptoms and depression. They also showed a significantly higher level of loneliness, bullying victim experience at home, negative-self schema, and negative-others schema. Participants were also different in terms of demographic characteristics and mental-health history. Participants living in the non-urban area were significantly older, had a higher level of income, education, as well as socio-economic status. However, participants in the non-urban area had a lower number of the cases of lifetime mental diagnosis. When they were compared in terms of schizophrenia lifetime diagnosis, urban and non-urban dwellers showed a relatively similar number of cases.

Consistent with the previous studies (Coid et al., 2017; Lundberg et al., 2009; Van Os et al. 2001), we found that prevalence of psychotic experiences were higher among city-dwellers, specifically positive symptoms during the past four weeks. Evidence about elevated psychotic experiences in urban community was useful because symptoms of psychosis were hypothesized to be part of schizophrenia continuum (Johns & Van Os, 2001) and might serve as an indicator of ‘psychosis proneness’ in the general population (Van Os et al., 2001). Consistent with previous studies (Lundberg et al., 2009; Lu, 2010), we also found that participant living in a city also experienced higher symptoms of depression. However, in contrast to many previous studies that found that urbanicity was associated with higher lifetime diagnosis of psychosis (Kelly et al., 2010; Pedersen & Mortensen, 2001; Sundquist et al., 2004; Van Os et al., 2001; Vega, Kolody, Agutlar-Gaxtola, Alderete, Catalano & Caraveo-Anduaga, 1998), we found no significant difference in the number of lifetime diagnosis of schizophrenia and other psychotic disorders between urban and non-urban residents. Importantly, the prevalence for lifetime diagnosis of general mental health disorders was higher in urban residents suggesting that urban residents are generally in a poorer mental health condition in comparison to non-urban residents.

In regards to the mental health risk-factors, people living in an urban area reported higher level of loneliness, bullying victim experience at home, and negative schema. To our knowledge, no study has examined direct association between urbanicity and risk factors for mental disorders which are related to social adversity experiences (e.g. bullying victim experiences, child abuse), loneliness, and negative schema. However, the differences between the urban and non-urban area in terms of risk factors is understandable. Social adversities experiences, loneliness, and negative schema may be related to a number of urban social environment characteristics, which included but not limited to low social isolation, low collective efficacy, high social segregation, higher number of accident, violence, and crime rates (Gruebner et al., 2017). Urban area is also associated with a concentrated low socio-economic status (Gruebner et al., 2017) which was also observed in our sample.

**4.2 Strengths and limitations**

To our knowledge, this study is among the first that explores the association between urbanicity and mental-health condition with an Indonesian sample. Not only it includes the lifetime diagnosis of mental health problems, this study also includes measures of the symptoms as well as common-risk factors. The inclusion of symptoms and risk-factors provide an opportunity to further explore possible explanations for different rates of mental disorders between urban and non-urban residents. Based on our findings, the higher rates of diagnosis and symptoms of mental disorders in an urban sample may be explained by the higher number of common risk factors for mental disorders associated with living an urban area.

This study has several limitations. First, the accuracy of the participants’ lifetime mental health diagnosis cannot be ascertained because it is only based on the participants’ self-report. Specifically, the reported prevalence rates may be underestimated due to stigma surrounding mental health diagnosis. In addition to the underestimation of the rates of mental health diagnosis, there is also a statistical power issue that may explain the lack of significance difference in the rates of schizophrenia and other psychotic diagnosis between urban (1%) and non-urban (0.1%) areas, even though the difference is ten-fold.

Second, in this study urbanicity was conceptualized as the current place of residence. Besides place of residence, it is also common to define urbanicity in terms of place of birth (Marcelis, Takei, & Van Os, 1999), environment during upbringing and cumulative effect of time (Pedersen & Mortensen, 2001; Vega et al., 1998), population density (Van Os et al., 2001); or population size (Breslau, Marshall, Pincus, & Brown, 2014). Although the association between urbanicity and the prevalence of disorders is robust regardless of the definition of urbanicity (Vassos et al., 2012), future studies should take into account the specific definition of urbanicity.

Third, measures of common risk factors included in this study were limited to the risk factors operating in individual-level, such as loneliness, bullying victim experience, childhood abuse experience, and negative-schema. To provide a better understanding on risk factors that differently characterize urban and non-urban environment, future studies should include measures of risk factors related to the socio-demographic and neighbourhood social characteristics, for example, social deprivation, social capital, or social fragmentation, social cohesion, or neighborhood disorders (Gruebner et al., 2017; Heinz, Deserno, & Reininghaus, 2013; Newbury, Arsenault, Caspi, Moffitt, Odgers, & Fisher, 2017).

**4.3 Conclusion**

We found similar findings to the studies conducted in developed countries, which is that living in an urban environment is one risk factor contributing to a poorer mental health condition. This may be attributable to the fact that urban-dwellers were living in a poorer socioeconomic condition as well as experiencing more loneliness, bullying, and negative-schema. Findings from this study could be used as a basis to promote prevention and psychoeducation program as well as mental health screening for people living in an urban area, especially for those who live in high-risk neighborhoods.

# Ethical statement

This study received approval from the ethical commission of German Psychological Society and was carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki).

# Conflict of interest

The authors declare that they have no conflict of interest.

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