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Urban remediation: a new recovery oriented strategy to manage urban stress after first episode psychosis

Running title: Urban remediation in first episode psychosis

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Abstract:
Urban living is a major risk factor for psychosis. Considering worldwide increasing rates of urbanization, new approaches are needed to enhance patients' wellbeing in cities. Indeed, recent data suggest that once psychosis has emerged, patients struggle to adapt to urban milieu and that they lose access to city centers, which contributes to isolation and reduced social contacts. While it is acknowledged that there are promising initiatives to improve mental health in cities, concrete therapeutic strategies to help patients with psychosis to better handle urban stress are lacking. We believe that we should no longer wait to develop and test new therapeutic approaches. We focus on intervention strategies at the urban planning level and on possible novel therapeutic strategies at the individual level. We propose the umbrella term 'urban remediation' as a set of therapeutic tools to help patients recover and reconnect with the city.

Keywords: urbanicity, city, stress, treatment, cognitive maps

1) INTRODUCTION:

Converging evidence suggest that both the natural and the built environment have an impact on the health of urban residents[1]. One of the most intriguing observations in this domain is the dose-effect relationship between the number of years lived in an urban environment during childhood and the level of risk to develop psychosis later in life[2, 3], which points towards a causal relationship rather than just a mere association[4].

While in many ways, cities are desirable because of their intense atmosphere and the resources they offer, they also confront urban dwellers with a hectic pace, high human density, noise, fear of crime and an often confusing built environment [5, 6], which will impact on their wellbeing. The specific components of this 'urban stress' that are involved in increasing the risk for psychosis are not yet identified[7, 8], but several factors have been proposed to explain this city-psychosis nexus, which can be classified into 'physical urban' and 'social urban factors'[9]. 'Physical urban factors' include urban design, pollution or lack of green spaces, while 'social urban factors' include cannabis exposure, migration, neighborhood deprivation and social capital, ethnic density and social defeat [8, 9], all these factors acting and interacting at different scales and points in time[8, 10]. To better understand the mechanisms at stake, we have proposed elsewhere that a change in perspective is needed, moving to a first person perspective and to an in situ experience-based approach[11].

However, while the quest for the identification of risk factors for psychiatric disorders has understandably led researchers to focus on the mechanisms underlying this potential causal link, various elements suggest that other aspects of the interaction between the urban environment and psychiatric patients are highly relevant topics for research as well. Among these, data showing that once psychosis has emerged, patients struggle to adapt to urban milieu, stay away from it or need to develop various strategies to adapt to it[11–15], suggest that city avoidance in early psychosis patients and ways to overcome it might be an important domain to explore as well.

Awareness regarding the issue of the increasing rate of urbanization and its impact on mental health is however growing[16]. Some promising initiatives around the world, (such as the interdisciplinary forum on neuro-urbanism in Berlin[a] [17] , the Centre for Urban Design and

[a] https://www.alfred-herrhausen-gesellschaft.de/en/neuro-urbanism.htm.

Mental Health (UD/MH)[b] in Washington DC, The Urban Brain Lab at King's College London[c] or Thrive NYC in New-York city[d]), have started to address this issue. While they may contribute to improve mental health in cities, concrete and specific therapeutic strategies aimed at helping patients with psychosis to better handle urban stress in the city are nevertheless lacking.

Even if there is no consensus yet on the definition of urban stress, we will argue in this paper that we now have sufficient evidence to justify the development and the evaluation of new therapeutic approaches to help psychosis patients cope better with the urban environment. In order to do so, we will first review how patients with psychosis may experience stress in the urban environment. On the basis of these elements, we will secondly describe a set of possible strategies that may be grouped under the umbrella term of 'urban remediation', and which could be proposed, either to patients at risk of psychosis, or to those recovering from a first psychotic episode.

2) PATHWAYS LEADING TO URBAN STRESS

Drawing on studies dealing with service users' experience of the city,[18–20] we define this experience as consisting of persons' relations to three phenomena: the built environment, social interactions occurring within this environment and the complex aspects of mobility of the subject within this environment (figure 1.a). Here we propose that 'alterations' in anyone of these domains as well as interactions between them may also play a role in eliciting 'urban stress' figure 1.b (which could potentially contribute to emergence of psychosis in vulnerable subjects although compelling evidence for this model is still lacking). We also hypothesize that psychosis has an impact on the experience of the urban and that it contributes to increasing the level of stress perceived when exposed to the city environment (figure 1.b), which as a consequence leads to a restriction of mobility and hence reduces access to the social and cultural enrichment that can be found there.

Indeed, the development of a first episode of psychosis will influence and interact with urban practices. For example, in first episode psychosis, higher levels of reality distortion (including hallucinations) and depressive symptoms are associated with increased population density [21]. Going into a busy street can trigger paranoia which may be at least partially mediated by increases in anxiety, depression, negative beliefs about others[13]; compatible with the view that social defeat may be one mechanism of urban stress[13]. While in first episode psychosis positive symptoms may limit urban practices[13], it is apparently the negative symptom dimension that predicts limitations in 'physical' mobility in chronic schizophrenia[22]. It should however be mentioned that some patients may actually enjoy being in a crowded city where anonymity [11] reduces the risk of complex encounters with known others and may create a sense of belonging without having to actually engage into social interactions.

To better grasp the experience of either stress or respite in the city after a first episode of psychosis, we conducted an interdisciplinary study using mixed methods such as video-recorded go-alongs, video-recorded film elicitations and semi-structured interviews, as well as a focus group with case managers taking care of early psychosis patients in a specialized program[11, 14] . In this frame, we gathered detailed information from patients regarding places where they suffer stress and tension and other places where in contrary they feel secure and experience relief. This work allowed the identification of three types of patients according to their pattern of use of the city: first, those who use the city frequently without experiencing any problems; second, those who use it at certain hours of the day only avoiding busy times; and third, those

[b] https://www.urbandesignmentalhealth.com/journal.html.

[c] https://urbanbrainlab.com/

[d] https://thrivenyc.cityofnewyork.us/

who generally avoid using the city altogether. In addition, four main sources of stress where identified: first, demographic density; second, sensory overload mainly related to excess of noise and physical contact; third, impossibility to avoid social interaction and fourth, hindrance to mobility (i.e. not being able to keep the pace, no escape options)[11]. Importantly, most participants preferred the countryside over urban areas and used psychological or social tactics to better face stress they experienced in the city[14]. Taken together, these elements point out to the importance of the interaction between mobility, social interactions and the built environment (figure 1b) in generating stress in psychotic patients.

In order to study the generalizability of these findings, we developed a questionnaire that we proposed to 117 early psychosis patients and 220 medical students[15].
Among various domains, the questionnaire explored frequency of city attendance as well as urban elements that are generating stress, ranging from nature of the built environment to social interactions and sensory stimulations. It also compared the situation before and after the first psychotic outbreak. Analysis of the results revealed three main findings. First, the development of psychosis seems to influence city perception and leads to an increase of city avoidance. Second, patients' tendency to avoid city center correlates with both problematic social interactions and stimuli perceived as unpleasant. Third, patients and controls are similar regarding the stimuli characterized as unpleasant, but the impact of such perceptions on city avoidance seems much more intense in patients. In sum, these findings suggest that the onset of psychosis hinders patients in their capacity to experience the urban environment in a positive way, and they support the idea that these elements should be a focus of intervention.

Figure 1
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3) EVIDENCE SUGGESTING THAT 'URBAN PSYCHOSIS' MAY BE TREATABLE

Population attributable risk for the development of schizophrenia ascribed to residence in an urban environment during childhood is substantial, reaching approximately 30%[23]. Although we would need a better understanding of the mechanisms in order to prevent an increased prevalence of psychosis in cities, there are indications that, within a concept where schizophrenia is a multifactorial disorder, it is possible to modify the part of the risk attributable to urban living. For instance, moving during childhood from a high to a low demographic density area decreases the risk for schizophrenia[4], suggesting indirectly that some kind of interventions may be possible to mitigate the impact of the urban milieu. Further, Wimberley et al. found that higher demographic density was associated with lower rates of treatment resistant schizophrenia[24], which suggests that 'urban psychosis' may be a form of psychosis which is more responsive to treatment[24] and consequently more sensitive to intervention. Taken together, these findings suggest as well that interventions on the urban milieu may have an impact, even after psychosis onset. In other words, if there is evidence that urban living may contribute to the emergence and the onset of psychosis, we hypothesize that interventions at the level of the urban milieu might also have a positive impact on the recovery process. We propose to refer to these interventions, ranging from adaptation of urban planning to therapeutic interventions at the individual and clinical level, under the umbrella term of 'urban remediation'.

4) THE ROLE OF URBAN POLICIES, PLANNING AND DESIGN IN URBAN REMEDIATION

Urban policies and urban planning have been recognized for decades as an important mean to act on health conditions[25]. The WHO launched its Healthy cities network 30 years ago.
As reviewed recently by Okkels, there are however no consensus guidelines regarding mental health[16]. Most approaches are limited to the design of asylums and community care

facilities[26, 27]. But there is scarce consideration of the necessity to conceive therapeutic strategies at the urban scale as a whole, in an age where deinstitutionalized mental healthcare and global shift to community treatment makes it even more necessary[28]. At the urban scale, these strategies cover at least three areas: urban design, urban planning and housing policies. Urban design focuses on the material form of cities. There is still little evidence to identify what material forms could have a positive influence on mental health even though some authors argue that variegated, legible and stimulating urban forms are constitutive of a health promoting urban design[29]. There is more evidence in support of planning options: as reviewed by Okkels et al., such options should include 'active spaces, pro-social spaces, safe spaces, and green spaces'[16].

There is of course a long tradition in psychiatry suggesting that the countryside has therapeutic effects[30]. Recently, studies have more systematically investigated the role of urban green spaces, which seem to be associated with greater positive affect[31, 32], reduced heat related morbidity and mortality[32] and reduced noise levels[32]. Further, the restorative properties of those spaces on attention[33, 34] may be particularly relevant in the context of patients with psychosis who exhibit attentional deficits. The benefits of access to green spaces for children is also well recognised[35]. Greenness within surrounding schools is associated with better cognitive development in schoolchildren[36]. Moreover, moving to greener urban spaces is associated with improved mental health[37]. Greening interventions of run-down and vacant lands may increase perception of safety and actual physical safety[38]. In a study from the same data set, greening intervention of vacant lots improved mental health in terms of self-reported depression and worthlessness[39].
A nationwide Danish study explored the potential impact of green spaces on schizophrenia risk. Engeman et al.[40], demonstrated a dose-effect association between the amount of green spaces during childhood and later risk of developing schizophrenia. Green spaces might conversely be a risk-reducing environment factor through mechanisms that still need to be elucidated, ranging from stress mitigation, pollution reduction or modulation of the immune system[40].
Beyond green spaces, more studies are needed to develop urban planning guidelines regarding inclusive public spaces, appropriate locations for care facilities and housing for persons living with a diagnosis of psychosis. The experience gathered by cities across the world recently involved in the community grounded Thrive approach will be important in this respect[e].
Housing policy is the third important element. Many people with severe mental illness are either homeless or face great difficulties to gain access to appropriate housing. Originating in the US in the late 1980s and since then spreading across the world, the 'Housing First' model proposes to address this problem in priority, even before dealing with mental health problems[41]. A study on five Canadian cities shows that this approach leads to more stable housing condition, better community integration and higher quality of life for homeless people with severe mental illness[42]. Most patients also prefer independent living[43]. In a recent study, we found that home in its different forms (patient's own apartment, a temporary therapeutic housing, parents' apartment) was the primary place associated with an atmosphere of comfort[14]. This finding underlines the importance to facilitating patients' access to housing and to the possibility of creating a sense of home.

5) URBAN REMEDIATION AT THE INDIVIDUAL LEVEL

If urban policies are central to urban remediation, we consider that their combination with interventions at the individual level is required. In the following section, we suggest to assess urban practices, before planning an intervention. We then propose three directions for the development of such individual interventions. First, we discuss strategies that should allow a reduction of urban stress and a better use of the resources of the city. Second, we explore

[e] See for instance Thrive London: https://www.thriveldn.co.uk/ or Thrive New York: https://thrivenyc.cityofnewyork.us/.

strategies geared to a better handling of stress. Finally, we discuss interventions that may have an impact at the level of anhedonia and patient's level of motivation.

Assessing urban practices

Before implementing an urban remediation, it is essential to gather sufficient information to appreciate the urban practices at the individual level and determine whether going into the city is problematic or not. The purpose of assessing urban practices is to understand why there may be avoidance of the city at this point in time (Table 1). Here again, the built environment, forms of mobility and social interactions are key elements to be assessed. Go-alongs may be a useful tool to evaluate the interaction of early psychosis patients with the urban environment[11] and identify domains of intervention. Cognitive maps, which are subjective mental representations of an (urban) environment[44, 45], are forged through the personal and affective experiences in specific places in the city[46, 47] and are composed of the key places that count for the patients in their urban environment, because of positive or negative qualities they attribute to them. Although needing much more work, such cognitive maps, may offer an interesting point of entry for further assessing urban practices and working towards the restoration of more satisfying urban practices.

Table 1. Assessing urban practices

A. General	How long have you been living in this city? How well do you know the city? Has your relationship with the city changed after your illness
B. Avoidance of the city?	How many times a week do you go to the city centre? At what time of the day? Where do you go? Are there things that make you feel uneasy in the city ? (explore in terms of crowding, noise, social interactions)
C. Built environment/housing	What are the places you like or dislike or avoid? Why? Where do you live in the city? Do you feel at home in this place?
D. Mobility	How do you move around in the city? Have you moved house a lot?
E. Social interaction	Do you avoid places to avoid encounters with known others? Do you avoid places because of traumatic/stressful experiences? (Explore in terms of social defeat, paranoia, social anxiety)

Table 1. This semi-structured interview is meant to guide the evaluation of urban practices and personalize the intervention. Section (A) evaluates whether the patient has grown up in the city. Section (B) helps to assess if the patient actually tends to avoid the city and if an intervention of urban remediation is necessary. When assessing avoidance of places, it is important to take into account the patient's personal experience of places in the city including positive and negative ones. Section (C), (D) and (E) evaluate the experience of the city in terms of built environment, mobility and social interactions. Compare with figure 1.

Reducing the experience of stress in the city

a) ***Adapted housing and creating a sense of home.*** One of the basic needs of an individual is a secure, restorative and personal living space especially in an urban environment where privacy is difficult to achieve. Creating a sense of home may be a critical step before being able to further explore the city and develop a safe interaction with the city (figure 1. b) and this may prove quite challenging for psychosis patients. When patients have lost their home, working with them at finding a place to live should be done with caution, taking into account the specific nature of their personal trajectory. As previously mentioned, 'Housing First' programs may contribute to achieving this goal[14]. Our own clinical experience indicates that patients who suffer from paranoia or anxiety in crowded places will usually not feel at ease in therapeutic community housing. In addition, patients who have experienced increased residential mobility during childhood and adolescence, an established risk factor

for schizophrenia[48], may have even greater difficulties to establish stable and secure relationships with peers as well as stable place attachment with their living environment.

b) ***Increasing contact with restorative places.*** Psychological restoration is the recovery from attention fatigue and stress; it is particularly important in a crowded, noisy urban environment[49]. It has been suggested that restorative properties of a natural environment are related to the type of cognitive engagement or so-called fascination[50]. 'Soft fascination' is a pleasing level of stimulation, which does not involve any cognitive effort but still keeps the mind captivated[34, 50]. However, restorative qualities are not unique to natural settings. While busy streets often lack restorative properties, urban places like museums, places of worship, places with rich historic fascination[51] and importantly homes [49, 52] and sport facilities [53] tend to have such properties. Interestingly, restorative experience also depends on perceived level of danger[49, 54]. Preferences for the type of restorative place further depends on the presence of attentional fatigue, presence of company and engagement in activity[49]. Increasing geographical knowledge and attendance of such places (green places, pleasant places with potential positive social interactions, public places with art[55, 56]) and engaging in activities occurring away from overcrowded and noisy places can therefore have therapeutic qualities.

c) ***Planning and regulating trajectories in the city***. Although mobility is an important aspect of urban planning, it is under-researched with respect to psychosis and the urban environment. In video-elicitations of urban walk of patients who experienced a first episode of psychosis, programming mobility (i.e. planning the route to take) came up as a key tactic for patients to manage stress in the city[14]. The aim of this tactic is for example to avoid noisy or crowded streets or to decrease the risk to meet known people, in order to render the urban environment more predictable. In this regard, it is worth mentioning initiatives that develop mobile phone applications designed to help define a path within the city, on the basis of various criteria, allowing to compute for instance the most pleasant[57] or the safest[58] path rather than the shortest one. Such apps could become useful tools for assisting patients to find the most adapted way for their walks through the city.

Better handling urban stress.

a) ***Reinforcing or adapting psychological and social tactics.*** In a previous study, EP patients mentioned various tactics in order to face stress while immersed in the city[14]. The most commonly mentioned were creating sensory bubbles of isolation and creating atmosphere of comfort. Patients create sensory bubbles of isolation through the use of headphones to decrease exposure to noise, avoidance of gazes, immersion in a conversation with a friend, recollection of fond memories in order to disconnect from the external world and find oneself in a 'thought bubble'. Creating an atmosphere of comfort means for example choosing places where escape is possible, places where landscape is visible, places where withdrawal is possible. These tactics seem to help regulating interactions with the urban milieu be it physical or social[14]. A word of caution may be warranted as it may be argued that these tactics are similar to safety-seeking behaviors[59], which may promote some form of 'retreat' and increase distress down the line. We believe however that these tactics are different from safety-seeking behaviors because they were identified in patients who actually go in to the city and theses tactics thus seem to help patient's mobility. In sum, these urban tactics should be assessed in patients, however, much more work is needed to evaluate how efficient existing psychological and social tactics could be integrated into an urban therapy.

b) ***Treatment of paranoid ideation***. Going outside of home into busy streets may trigger paranoid thoughts[12, 13]. Data from Freeman et al. suggest this is linked mainly to

increased exposure to social defeat [13], and that it is amenable to treatment, a short CBT intervention inducing a significant decrease in the level of distress [60]. Further research is needed to test whether longer intervention may prove more efficient and if they may additionally have an impact on delusional conviction. In the same line of thoughts, another research team developed a smartphone application (SlowMo) targeting paranoid thoughts and assisting patients in situ to help them find alternative explanations to reasoning in paranoia[61].

c) ***Go-along therapy (or 'walk and talk therapy').*** In our recent go-along study aimed to explore how persons with psychosis handle stress in the city, patients were accompanied by a person of their choice (e.g. friend or family member)[14]. For some participants, the presence of chosen walking partners was a useful resource to facilitate either the creation of such a bubble as mentioned above through conversation while walking, or the organization of a safe trajectory in the city. During the study, it became clear that go-along per se could also be a useful therapeutic strategy. As discussed previously, some early psychosis patients cannot leave home or engage in regular treatment because of stigma, paranoia or negative symptoms and therefore require the intervention of mobile teams that can make home visits or accompany them to places they would fear going alone. In some way, mobile team case-managers already apply some form of go-along therapy; such a strategy could however gain increased efficiency in a clearer conceptual framework, indicated by defined criteria and structured along progressive stages. One could imagine a progressive strategy, starting by go-along with a therapist in order to develop coping strategies in the frame of an immersion in urban stress. In a second stage, the patient could be accompanied by a friend or relative, which would allow to practice coping mechanisms with support.

d) ***Strengthening cognitive resources.*** Various elements from the literature suggest that cognitive deficits may render the individual more vulnerable to urban stress. First, adolescents with poor social and cognitive functioning are at increased risk of hospitalization for schizophrenia later in life when exposed to high population density[62]. The effect of urban birth on schizophrenia risk is however not explained by IQ level[63]. Second, verbal and working memory can be disrupted by noise. This is the case both in healthy controls and in patients with schizophrenia, but the impact of noise is greater in patients given pre-existing cognitive deficits[64]. Third, deficits in spatial navigation are present in patients with schizophrenia with typically difficulties in way finding[65] which may further hamper the possibilities for patients with schizophrenia to navigate through the urban environment. Fourth, in older adults with schizophrenia, high levels of negative symptoms and lower processing speed had a negative impact on functional mobility [66]. Finally, deficits in selective attention may result in failure to suppress attention to irrelevant stimuli particularly significant in a noisy urban environment[67] where many aspects of the city are designed to convey meaning[68] (architecture, advertisement, traffic signaling, ambulance siren etc.). It is likely that these elements play as well a role in first episode psychosis given that cognitive deficits appear early in the course of the disease. Taken together, these findings suggest that, cognitive remediation aiming at specific deficits like route planning (executive functioning), spatial navigation, selective attention and speed of processing may be useful for better handling and adapting to a stressful urban environment.

Reducing anhedonia and improving motivation in the city.

Through a recent survey among early psychosis patients and controls, we found that while both groups prefer parks and open spaces to crowded places, the former do so to at a lesser degree than the latter[15]. In other words, patients seem to have less capacity to draw pleasure from exposure to commonly considered 'enjoyable places' than controls, suggesting they may in turn have less capacity to derive respite from them. Both anhedonia and more globally negative symptoms could explain this observation. Deficits in hedonic capacity or reward processing may be one of the mechanisms[69, 70]. Although the link between urban milieu and negative

symptoms is not clear (some data suggesting that living in an urban environment increases the risk to develop negative symptoms independently of a formal psychiatric diagnosis[71], while other suggest that level of such symptoms does not correlate with the density of the urban environment in first episode psychosis[72]), work on negative symptoms may be beneficial to decrease city avoidance. Considering drug-based treatments are insufficient to treat negative symptoms in schizophrenia, group-based treatment such as the 'positive emotions program for schizophrenia' (PEPS)[70], aimed at improving pleasure and motivation in schizophrenia, may prove beneficial in this regard. Tailoring such approaches to specific aspects of city avoidance and combining them with the organization of pleasurable group activities in the urban milieu may be beneficial.

6) FROM URBAN ALIENATION TO URBAN REMEDIATION: PROMOTING RECOVERY IN THE CITY

The current review along with our own results, where city avoidance correlates with experience of stressful situations in the city[15], lead us to hypothesize a mediating role of the urban environment in a downward spiral of isolation and psychological distress (figure 2).
Persons with early psychosis may have more difficulties to adjust their interaction with the city environment, which may lead to a self-perpetuating cycle of increasing interactions with the negative features of the urban milieu. While interventions aimed to develop an urban planning that is more favorable for mental health are necessary, they take time and are not sufficient to address all of the elements that lead patients to avoid city centers.

Figure 2

Figure 2. Vicious and virtuous cycles in the city psychosis relation. Positive symptoms, such as paranoia[60] *which may induce active social withdrawal, or negative symptoms such as anhedonia, may be a point of entry into the vicious cycle (in blue). The virtuous cycle (in green) evolves along two axis, treatment/environmental enrichment and recovery process* [73, 74]. *Note that the schematic representation of a spiral may give the impression of a deterministic course when in fact these are non-linear processes.*

We believe that 'urban remediation', which can be considered as a form of 'environmental enrichment'[75] aiming at 'reprogramming' cognitive maps, may contribute to reverse the process of a downward spiral and help patients to engage into a virtuous cycle promoting recovery after a first episode of psychosis and avoiding progression to the next stage. We may also hypothesize that such interventions could be beneficial for At Risk Mental State (ARMS) subjects or in familial High-Risk children and their parents where similar vicious cycles may be expected.
Concretely, we propose urban remediation in the form of a set of interventions aimed at facilitating the interaction between patients and the city they live in (table 2).

Table 2. Proposed key elements of urban remediation

- Assessment: (1) Does the patient avoid the city (see table 1) ? (2) What are the urban practices in terms of built environment, social interactions, mobility, (3) Evaluate level of psychosis (negative and positive symptoms) and (3) Assess personal history (including trauma).
- Intervention:
    - Psychoeducation regarding urban psychosis, potential stress factors, resources and restorative places in the city (B, M, P, S, SI)
    - Reducing the experience of stress
        - Adapted housing and creating a sense of home (B, S)
        - Increase contact with restorative places (B, M, S)
        - Planning and regulating trajectories in the city (M, B, S)
    - Better handling urban stress
        - Reinforcing or adapting psychological and social tactics (S, SI)
        - Treatment of paranoid ideation (P, S, SI)
        - Go-along therapy (B, M, S, SI)
        - Strengthening cognitive resources (S)
    - Reducing anhedonia and improving motivation in the city (B, P)
    - Other:
        - Stress management techniques (e.g. relaxation, meditation, sport activities) (S)
        - Trauma focused therapy (S, SI)
        - Promoting urban group walking (B, M, S , SI).
        - Use of new technologies (ecological momentary interventions, virtual reality, mobile applications) (B, M, S, SI).

Intervention is tailored according to the findings in the assessment. Assessing psychopathology is important, as the treatment will be different depending on negative vs positive symptoms. In the table, interventions were tagged with the domain they are most concerned with, built environment (B), mobility (M), psychosis (P), stress management (S), social interactions (SI). Treatment is also personalized according to the personal history (e.g. taking into account trauma). The objective of urban remediation is to help patients reconnect with the city and meaningful activities (e.g. work, cultural activities, sports, volunteering etc.) as well as social interactions. Compare with figure 1.

In such a framework, psychological and social support for psychosis would be revisited and could be tailored to the specific patients' needs, taking into account specificities of the urban context and early psychosis patient's difficulties to face it. While assessing urban practices (table 1) and defining the specific interventions, four aspects are of importance: nature of the built environment, type of social interactions, degree of mobility and level of psychological distress (figure 1). Indeed, these elements are in full interaction and imbalance in any one of them will influence the others and may eventually interfere with patient's well-being and stability.

One strategy that deserves further comment is urban walking which may become a key intervention of 'urban remediation'. Some patients prefer to avoid the outpatient clinic and find outdoor spaces to be a more open therapeutic setting[76–78]. Walking is an important mode of mobility in persons with schizophrenia and seems to be associated with the aesthetics of the urban environment and population density[79]. In particular, walk and talk groups may create synergies of impact, between walking (mobility and exercise), proximity with restorative places (nature or other 'safe havens' in the city; see[77] for urban walking) and immersion within a group (social interaction) [76]. In addition, interactions with peers would allow exchange about the strategies they developed in order to reconquer the city after a first episode of psychosis.

New technologies such as handheld and wearable devices offer new resources to assess the link between subjective experiences and the environment (experience sampling methods). This may open on a whole new world of opportunities for designing new interventions (i.e. ecological momentary interventions) [80] aiming at reducing city avoidance. Domains like spatial navigation, optimal route finding, coping with paranoid ideations, creating social contacts as well as monitoring the effect of the intervention through sensors could be integrated. Virtual reality[81] is another rapid growing field which may offer exciting possibilities for designing virtual city environments to disentangle components of stress and design interventions to help patients to learn new skills and tactics. Further, using virtual reality could help patients to better deal with problematic social encounters [82].

Finally, it is interesting to note, that the relationship between urban living and psychosis is not uniform around the world and recent studies have not found an association in middle and low-income countries[83][84]. We believe that these studies reinforce the point of view that 'the urban environment' is not a homogenous entity[11] and problematic and/or protective situations may vary in proportion in cities around the world. A better understanding of these factors, which can vary with geography, may of course further inform urban remediation.

Urban remediation and the concepts developed above are evidently highly speculative and a lot of work remains to be done before it can be usefully proposed to patients. However, considering the number of patients living in cities, the high prevalence of social withdrawal and its detrimental impact on the recovery process, we strongly believe that researchers should invest this new domain in order to help patients regain access to the community they live in.

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References:

1. Press WHO, Appia A, Press WHO, et al (2010) Unmasking and Overcoming Health Inequities in Urban Settings. Evol Ecol 10:1–145. https://doi.org/10.1373/clinchem.2011.163634
2. Vassos E, Pedersen CB, Murray RM, et al (2012) Meta-analysis of the association of urbanicity with schizophrenia. Schizophr Bull 38:1118–23. https://doi.org/10.1093/schbul/sbs096
3. Kelly BD, O'Callaghan E, Waddington JL, et al (2010) Schizophrenia and the city: A review of literature and prospective study of psychosis and urbanicity in Ireland. Schizophr Res 116:75–89. https://doi.org/10.1016/j.schres.2009.10.015
4. Pedersen CB, Mortensen PB (2001) Evidence of a dose-response relationship between urbanicity during upbringing and schizophrenia risk. Arch Gen Psychiatry 58:1039–46
5. Abbot A (2012) Urban Decay. Nature 490:162–164. https://doi.org/10.1038/490162a
6. Amin A (2006) The Good City. Urban Stud 43:1009–1023
7. Plana-Ripoll O, Pedersen CB, McGrath JJ (2018) Urbanicity and Risk of Schizophrenia—NewStudies and Old Hypotheses. JAMA Psychiatry 75:678–686. https://doi.org/10.1001/jamapsychiatry.2018.0577
8. Abrahamyan Empson L, Baumann PS, Söderström O, et al (2019) Urbanicity: the need for new avenues to explore the link between urban living and psychosis. Early Interv Psychiatry. https://doi.org/10.1111/eip.12861.
9. Gruebner O, Rapp MA, Adli M, et al (2017) Cities and mental health. Dtsch Arztebl Int 114:121–127. https://doi.org/10.3238/arztebl.2017.0121
10. Adli M (2017) Stress and the city : Why cities make us ill. And why they are still good for us. C. Bertelsmann, Munich
11. Söderström O, Empson LA, Codeluppi Z, et al (2016) Unpacking "the City": An experience-based approach to the role of urban living in psychosis. Heal Place 42:104–110. https://doi.org/10.1016/j.healthplace.2016.09.002
12. Ellett L, Freeman D, Garety P a (2008) The psychological effect of an urban environment on individuals with persecutory delusions: the Camberwell walk study. Schizophr Res 99:77–84. https://doi.org/10.1016/j.schres.2007.10.027
13. Freeman D, Emsley R, Dunn G, et al (2015) The Stress of the Street for Patients with Persecutory Delusions: A Test of the Symptomatic and Psychological Effects of Going

Outside into a Busy Urban Area. Schizophr Bull 41:971–979. https://doi.org/10.1093/schbul/sbu173
14. Söderström O, Söderström D, Codeluppi Z, et al (2017) Emplacing recovery: how persons diagnosed with psychosis handle stress in cities. Psychosis 2439:1–8. https://doi.org/10.1080/17522439.2017.1344296
15. Conus P, Abrahamyan-Empson L, Codeluppi Z, et al (2019) City avoidance in the early phase of psychosis: a neglected domain of assessment and potential target for recovery strategies. Front Psychiatry. https://doi.org/10.3389/FPSYT.2019.00342
16. Okkels N, Kristiansen CB, Munk-Jørgensen P, Sartorius N (2018) Urban mental health: Challenges and perspectives. Curr Opin Psychiatry 31:258–264. https://doi.org/10.1097/YCO.0000000000000413
17. Adli M, Berger M, Brakemeier EL, et al (2017) Neurourbanism: towards a new discipline. The Lancet Psychiatry 4:183–185. https://doi.org/10.1016/S2215-0366(16)30371-6
18. Knowles C (2000) Bedlam on the Streets. Routledge, London
19. Parr H Mental Health and Social Space: Towards Inclusionary Geographies?e. Oxford: Wiles-Blackwell.
20. Duff C (2012) Exploring the role of " enabling places " in promoting recovery from mental illness : A qualitative test of a relational model. Health (Irvine Calif) 18:1388–1395
21. Oher FJ, Demjaha a, Jackson D, et al (2014) The effect of the environment on symptom dimensions in the first episode of psychosis: a multilevel study. Psychol Med 1–12. https://doi.org/10.1017/S0033291713003188
22. Viertiö S, Sainio P, Koskinen S, et al (2009) Mobility limitations in persons with psychotic disorder: Findings from a population-based survey. Soc Psychiatry Psychiatr Epidemiol 44:325–332. https://doi.org/10.1007/s00127-008-0433-y
23. Brown AS (2011) The environment and susceptibility to schizophrenia. Prog Neurobiol 93:23–58. https://doi.org/10.1016/j.pneurobio.2010.09.003
24. Wimberley T, Pedersen CB, MacCabe JH, et al (2016) Inverse association between urbanicity and treatment resistance in schizophrenia. Schizophr Res 174:150–155. https://doi.org/10.1016/j.schres.2016.03.021
25. Giles-Corti B, Vernez-Moudon A, Reis R, et al (2016) City planning and population health: a global challenge. Lancet 388:2912–2924. https://doi.org/10.1016/S0140-6736(16)30066-6
26. Gesler W, Bell M, Curtis S, et al (2004) Therapy by design: Evaluating the UK hospital building program. Heal Place 10:117–128. https://doi.org/10.1016/S1353-8292(03)00052-2
27. Curtis SE, Gesler W, Fabian K, et al (2007) Therapeutic landscapes in hospital design: A qualitative assessment by staff and service users of the design of a new mental health inpatient unit. Environ Plan C Gov Policy 25:591–610. https://doi.org/10.1068/c1312r
28. Söderström O (2017) "I don't care about places": the whereabouts of design in mental health care. In: R. Imrie CB& KK (ed) In Care and Design: Bodies, Buildings, Cities. Oxford:Wiley-Blackwell, Chichester, West Sussex, pp 56–73
29. Golembiewski JA (2012) Using a salutogenic model for the develpment and management of mental health facilities. Des Heal Sci Rev 1:74–79
30. Parr H (2007) Mental health, nature work, and social inclusion. Environ Plan D Soc Sp 25:537–561. https://doi.org/10.1068/d67j
31. McMahan E, Estes D (2015) The effect of contact with natural environments on positive and negative affect. J Posit Psychol 10:507–519
32. van den Bosch M, Ode Sang (2017) Urban natural environments as nature-based solutions for improved public health – A systematic review of reviews. Environ Res 158:373–384. https://doi.org/10.1016/j.envres.2017.05.040
33. Berto R (2005) Exposure to restorative environments helps restore attentional capacity. J Environ Psychol 25:249–259. https://doi.org/10.1016/j.jenvp.2005.07.001
34. Kaplan S (1995) The restorative benefits of nature: towards an integrative framework. J Environ Psychol Ment Psychol 15:169–182

35. Chawla L (2015) Benefits of Nature Contact for Children. J Plan Lit 30:433–452. https://doi.org/10.1177/0885412215595441
36. Dadvand P, Nieuwenhuijsen MJ, Esnaola M, et al (2015) Green spaces and cognitive development in primary schoolchildren. Proc Natl Acad Sci U S A 112:7937–7942. https://doi.org/10.1073/pnas.1503402112
37. Alcock I, White MP, Wheeler BW, et al (2014) Longitudinal effects on mental health of moving to greener and less green urban areas. Environ Sci Technol 48:1247–1255. https://doi.org/10.1021/es403688w
38. Branas CC, South E, Kondo MC, et al (2018) Citywide cluster randomized trial to restore blighted vacant land and its effects on violence, crime, and fear. Proc Natl Acad Sci 115:2946–2951. https://doi.org/10.1073/pnas.1718503115
39. South E, Hohl BC, Kondo MC, et al (2018) Effect of greening vacant land on mental health of Community-dwelling adults. A cluster randomized trial. JAMA Netw Open 1–4. https://doi.org/10.15713/ins.mmj.3
40. Engemann K, Pedersen CB, Arge L, et al (2018) Childhood exposure to green space – A novel risk-decreasing mechanism for schizophrenia? Schizophr Res. https://doi.org/10.1016/j.schres.2018.03.026
41. Newman S, Goldman H (2008) Putting housing first, making housing last: Housing policy for persons with severe mental illness. Am J Psychiatry 165:1242–1248. https://doi.org/10.1176/appi.ajp.2008.08020279
42. Aubry T, Nelson G, Tsemberis S (2015) Housing first for people with severe mental illness who are homeless: A review of the research and findings from the at Home-Chez soi demonstration project. Can J Psychiatry 60:467–474. https://doi.org/10.1177/070674371506001102
43. Newman SJ (2001) Housing Attributes and Serious Mental Illness: Implications for Research and Practice. Psychiatr Serv 52:1309–1317. https://doi.org/10.1176/appi.ps.52.10.1309
44. Tversky B (1993) Cognitive maps, cognitive collages, and spatial mental models. In: Frank A, Campari I (eds) Spatial Information Theory: A Theoretical Basis for GIS, Proceedings COSIT '93., Lecture No. Berlin
45. Tolman EC (1948) Cognitive maps in rats and men. Psychol Rev 55:189–208
46. Downs RM, Stea D (1973) Cognitive Maps and Spatial Behaviour : Process and Products. In: Image and Environment. Aldine Press, Chicago, IL, pp 8–26
47. Kitchin RM (1994) Cognitive maps: what are they and why study them. J Environ Psychol 14:1–19
48. Paksarian D, Eaton WW, Mortensen PB, Pedersen CB (2015) Childhood Residential Mobility, Schizophrenia, and Bipolar Disorder: A Population-based Study in Denmark. Schizophr Bull 41:346–354. https://doi.org/10.1093/schbul/sbu074
49. Staats H, Jahncke H, Herzog TR, Hartig T (2016) Urban options for psychological restoration: Common strategies in everyday situations. PLoS One 11:1–24. https://doi.org/10.1371/journal.pone.0146213
50. Pheasant RJ, Fisher MN, Watts GR, et al (2010) The importance of auditory-visual interaction in the construction of "tranquil space." J Environ Psychol 30:501–509. https://doi.org/10.1016/j.jenvp.2010.03.006
51. Roe J, Aspinall P (2011) The restorative benefits of walking in urban and rural settings in adults with good and poor mental health. Heal Place 17:103–113. https://doi.org/10.1016/j.healthplace.2010.09.003
52. Scopelliti M, Vittoria Giuliani M (2004) Choosing restorative environments across the lifespan: A matter of place experience. J Environ Psychol 24:423–437. https://doi.org/10.1016/j.jenvp.2004.11.002
53. Hug S-M, Hartig T, Hansmann R, et al (2009) Restorative qualities of indoor and outdoor exercise settings as predictors of exercise frequency. Health Place 15:971–980. https://doi.org/10.1016/J.HEALTHPLACE.2009.03.002
54. Herzog TR, Rector AE (2009) Perceived danger and judged likelihood of restoration.

Environ Behav 41:387–401. https://doi.org/10.1177/0013916508315351
55. Nanda U, Eisen S, Zadeh RS, Owen D (2011) Effect of visual art on patient anxiety and agitation in a mental health facility and implications for the business case. J Psychiatr Ment Health Nurs 18:386–393. https://doi.org/10.1111/j.1365-2850.2010.01682.x
56. Semenza JC (2003) The Intersection of Urban Planning , Art , and Public Health : The Sunnyside Piazza. Am J Public Health 93:2001–2003
57. Quercia D, Schifanella R, Aiello LM (2014) The Shortest Path to Happiness: Recommending Beautiful, Quiet, and Happy Routes in the City. https://doi.org/10.1145/2631775.2631799
58. Galbrun E, Pelechrinis K, Terzi E (2016) Urban navigation beyond shortest route: The case of safe paths. Inf Syst 57:160–171. https://doi.org/10.1016/j.is.2015.10.005
59. Tully S, Wells A, Morrison AP (2017) An exploration of the relationship between use of safety - seeking behaviours and psychosis : A systematic review and meta - analysis. Clin Psychol Psychother 24:1384–1405. https://doi.org/10.1002/cpp.2099
60. Freeman D, Waller H, Harpur-Lewis RA, et al (2015) Urbanicity, persecutory delusions, and clinical intervention: The development of a brief CBT module for helping patients with persecutory delusions enter social urban environments. Behav Cogn Psychother 43:42–51. https://doi.org/10.1017/S1352465813000660
61. Garety PA, Ward T, Freeman D, et al (2017) SlowMo, a digital therapy targeting reasoning in paranoia, versus treatment as usual in the treatment of people who fear harm from others: Study protocol for a randomised controlled trial. Trials 18:1–13. https://doi.org/10.1186/s13063-017-2242-7
62. Weiser M, Van Os J, Reichenberg A, et al (2007) Social and cognitive functioning, urbanicity and risk for schizophrenia. Br J Psychiatry 191:320–324. https://doi.org/10.1192/bjp.bp.106.031328
63. Toulopoulou T, Picchioni M, Mortensen PB, Petersen L (2017) IQ, the urban environment, and their impact on future schizophrenia risk in men. Schizophr Bull 43:1056–1063. https://doi.org/10.1093/schbul/sbw147
64. Wright B, Peters E, Ettinger U, et al (2016) Effects of environmental noise on cognitive (dys)functions in schizophrenia: A pilot within-subjects experimental study. Schizophr Res 173:101–108. https://doi.org/10.1016/j.schres.2016.03.017
65. Zawadzki J a, Girard T a, Foussias G, et al (2013) Simulating real world functioning in schizophrenia using a naturalistic city environment and single-trial, goal-directed navigation. Front Behav Neurosci 7:180. https://doi.org/10.3389/fnbeh.2013.00180
66. Leutwyler H, Hubbard E, Jeste D, et al (2014) Association between schizophrenia symptoms and neurocognition on mobility in older adults with schizophrenia. Aging Ment Heal 18:1006–1012. https://doi.org/10.1080/13607863.2014.903467
67. Smucny J, Rojas DC, Eichman LC, Tregellas JR (2013) Neural Effects of Auditory Distraction on Visual Attention in Schizophrenia. PLoS One 8:1–9. https://doi.org/10.1371/journal.pone.0060606
68. Golembiewski Bfa J, March B, Architect R (2017) Architecture, the urban environment and severe psychosis: Aetiology
69. Gilleen J, Shergill SS, Kapur S (2015) Impaired subjective well-being in schizophrenia is associated with reduced anterior cingulate activity during reward processing. Psychol Med 45:589–600. https://doi.org/10.1017/S0033291714001718
70. Favrod J, Nguyen A, Chaix J, et al (2019) Improving Pleasure and Motivation in Schizophrenia: A Randomized Controlled Clinical Trial. Psychother Psychosom 88:84–95. https://doi.org/10.1159/000496479
71. van Os J, Hanssen M, de Graaf R, Vollebergh W (2002) Does the urban environment independently increase the risk for both negative and positive features of psychosis? Soc Psychiatry Psychiatr Epidemiol 37:460–464. https://doi.org/10.1007/s00127-002-0588-x
72. Oher FJ, Demjaha A, Jackson D, et al (2014) The effect of the environment on symptom dimensions in the first episode of psychosis: A multilevel study. Psychol Med 44:2419–

2430. https://doi.org/10.1017/S0033291713003188
73. McFarlane C, Söderström O (2017) On alternative smart cities: From a technology-intensive to a knowledge-intensive smart urbanism. City 21:312–328. https://doi.org/10.1080/13604813.2017.1327166
74. Andresen R, Oades L, Caputi P (2003) The experience of recovery from schizophrenia: towards an empirically validated stage model. Aust N Z J Psychiatry 37:586–94
75. Kühn S, Düzel S, Eibich P, et al (2017) In search of features that constitute an "enriched environment" in humans: Associations between geographical properties and brain structure. Sci Rep 7:1–8. https://doi.org/10.1038/s41598-017-12046-7
76. Priest P (2007) The healing balm effect: Using a walking group to feel better. J Health Psychol 12:36–52. https://doi.org/10.1177/1359105307071734
77. Muir J, Mcgrath L (2018) Life lines : Loss , loneliness and expanding meshworks with an urban Walk and Talk group. Health Place 53:164–172. https://doi.org/10.1016/j.healthplace.2018.08.007
78. Song C, Ikei H, Igarashi M, et al (2015) Physiological and psychological effects of a walk in urban parks in fall. Environ Res Public Heal 12:1416–14228. https://doi.org/https://doi.org/10.3390/ijerph121114216
79. Vancampfort D, De Hert M, De Herdt A, et al (2013) Associations between physical activity and the built environment in patients with schizophrenia: a multi-centre study. Gen Hosp Psychiatry 35:653–658. https://doi.org/10.1016/j.genhosppsych.2013.07.004
80. Mannheim MF, Mannheim MF, Haven N, et al (2019) Recurrent Neural Networks in Mobile Sampling and Intervention. Schizophr Bull 45:272–276. https://doi.org/10.1093/schbul/sby171
81. Valmaggia L (2017) The use of virtual reality in psychosis research and treatment. World Psychiatry 16:246–247. https://doi.org/10.1002/wps.20443
82. Veling W, Pot-Kolder R, Counotte J, et al (2016) Environmental Social Stress, Paranoia and Psychosis Liability: A Virtual Reality Study. Schizophr Bull 42:1363–1371. https://doi.org/10.1093/schbul/sbw031
83. DeVylder JE, Kelleher I, Lalane M, et al (2018) Association of urbanicity with psychosis in low- and middle-income countries. JAMA Psychiatry 75:678–686. https://doi.org/10.1001/jamapsychiatry.2018.0577
84. Jongsma HE, Gayer-Anderson C, Lasalvia A, et al (2018) Treated incidence of psychotic disorders in the multinational EU-GEI study. JAMA Psychiatry 75:36–46. https://doi.org/10.1001/jamapsychiatry.2017.3554

Figure 1

Figure 1.a. Experience of the city

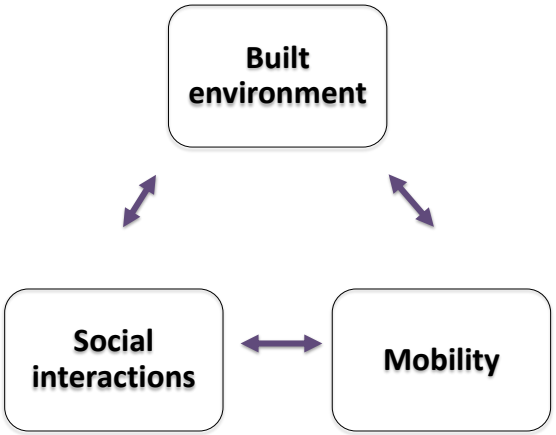


Figure 1.b. Interaction between psychosis and urban stress

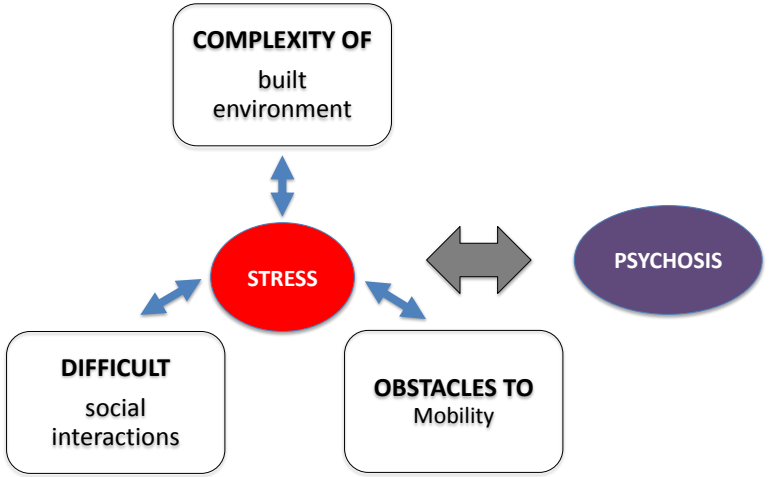
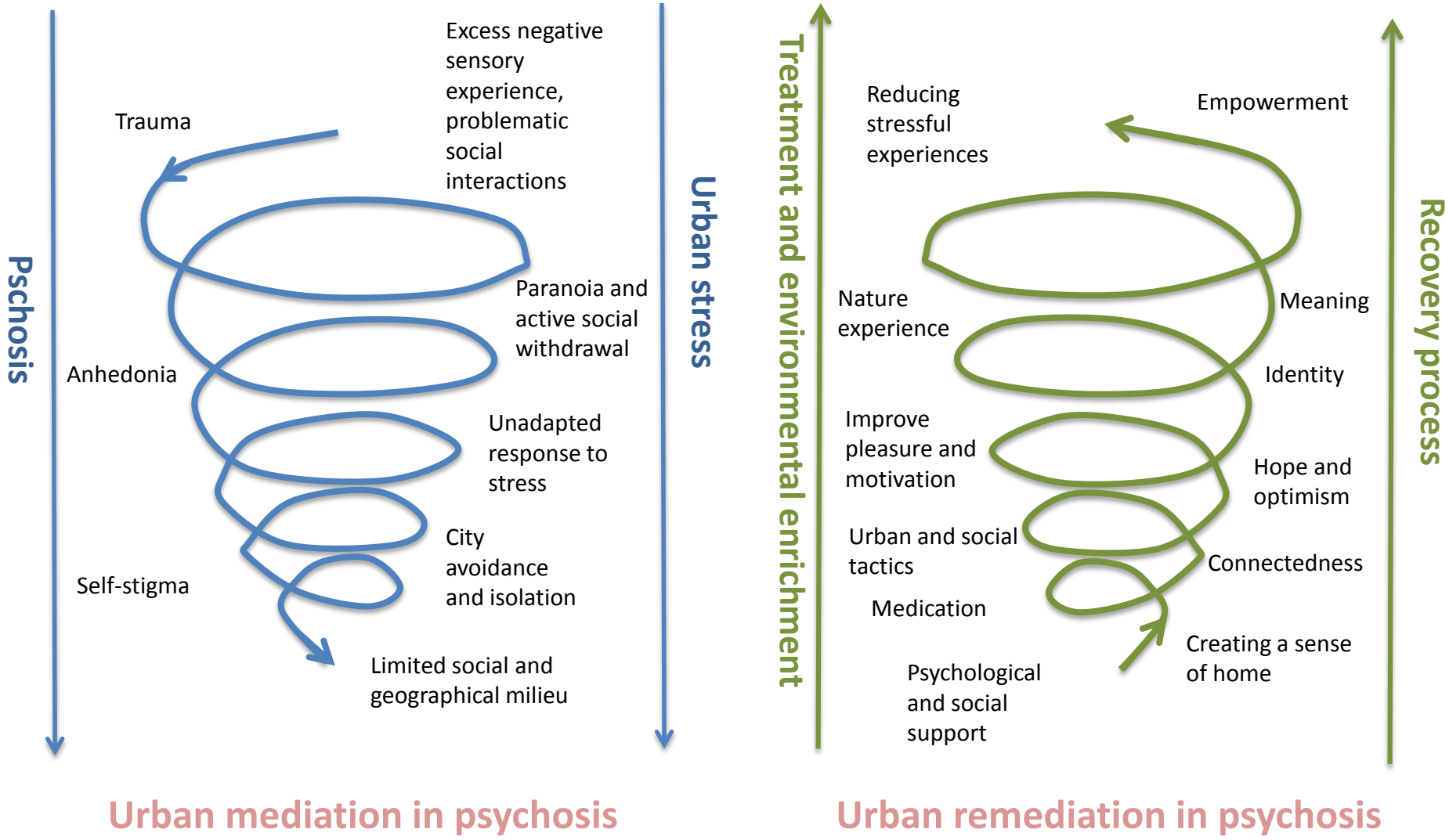


Figure 2

Figure 1. Vicious and virtuous cycles in the city psychosis relation



Urban mediation in psychosis

Urban remediation in psychosis