

The Double Exclusion Effect of Platform Urbanism on Unmet Medical Needs and Mental Health among Digitally Excluded Groups

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Currently in Europe, the disparity in mental health service utilization and unmet medical needs remains a persistent policy and research agenda (Barbui et al., 2025). Despite the universal health coverage mandated in many EU member states, significant gaps in access persist. Recent studies utilizing the European Health Interview Survey (EHIS) 2019 data report that self-reported unmet needs for mental health care vary drastically across countries, ranging from less than 1% to nearly 30% (OECD/European Union, 2022). Surprisingly, these disparities are not random but are structurally stratified. Compared to higher income groups, the lowest income groups report higher rates of unmet needs in consistence in almost all nations surveyed. Accessibility is constrained not merely by clinical need, but by a complex interplay of socioeconomic and spatial factors (Santos et al., 2025). A Recent EU-wide analysis demonstrates that income, education, and degree of urbanization significantly stratify access to mental health care, with the lowest income quintile consistently reporting 3-23 times higher unmet needs compared to higher income groups across EU member states (Santos et al., 2025).

While physical distance and economic burden have traditionally been known as the primary barriers to care sector, a novel, less visible barrier is emerging – the digital transformation of urban infrastructures – ‘Platform Urbanism.’ As European cities race to become smart cities by providing essential services based on new technologies, from transportation to healthcare. These are increasingly mediated by ‘digital platforms.’ For the digitally literate, this transition promises convenience and efficiency in their lives. However, for the aging population and digitally vulnerable groups, this shift may represent a kind of exclusion mechanism that operates alongside traditional physical barriers.

Until these days, existing literature on the ‘digital divide’ has largely focused on individual-level deficits – who has capability to access the internet, or the opposite. However, this perspective overlooks the structural transformation of the urban environment itself. When a city’s infrastructure becomes ‘platformised,’ lack of digital skills evolves from a personal inconvenience into a fundamental barrier to basic rights. This study posits a ‘Double Exclusion’ hypothesis: digitally vulnerable individuals living in highly platformised regions experience a compounded penalty – they are excluded not only by their lack of skills (primary exclusion) but also by the dismantling of traditional analog access channels in their environment (secondary exclusion).

This research aims to empirically prove this hypothesis by analysing the cross-level interaction between individual digital capability and regional platform density. By linking microdata from EHIS Wave 3 with Eurostat regional statistics, this study investigates whether smart cities paradoxically exacerbates health inequalities for the digitally excluded, and whether social capital can serve as a buffer against this technological exclusion.

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2. Theoretical Framework and Literature Review

2.1. From Digital Divide to Digital Determinants of Health

The digital divide is no longer a binary concept of access versus non-access. It has evolved into a “second-level divide” concerning skills and usage, and a “third-level divide” concerning the tangible outcomes of internet use (Scheerder et al., 2017). In the context of healthcare, the “Digital Determinants of Health” (DDoH) framework suggests that digital exclusion acts as a fundamental cause of health inequities (Siek et al., 2021). Recent reviews on digital health equity warn that platform-based services, if introduced without appropriate policy safeguards, superimpose a new layer of inequality upon existing socioeconomic disparities (Richardson et al., 2022; Crawford & Serhal, 2020). For instance, studies on patients with severe mental illness show that gaps in digital device ownership and essential digital skills are linked to disparities in mental health service utilization levels (Spanakis et al., 2022).

2.2. Platform Urbanism as a Structural Gatekeeper

Platform Urbanism refers to the phenomenon where urban infrastructures and services are reorganized around digital platforms. In a highly platformised city, ‘access’ is redefined. Booking a medical appointment, riding a taxi to the hospital, or renewing a prescription increasingly requires interaction with an app or a web portal. In this context, digital technology functions as a ‘gatekeeper.’ Literature indicates that the acceptability and use of digital mental health services are influenced by digital literacy levels alongside age and education (Xu et al., 2024; Hepburn et al., 2025). If traditional ‘analog’ gates (e.g., staffed reception desks, phone booking lines) are closed to cut costs in favour of digital efficiency, the digitally vulnerable are effectively locked out of the healthcare system.

2.3. Social Capital as a Buffer

If digital barriers block access, human networks may offer a backdoor. Social capital, particularly practical support from neighbours, can function as a compensatory mechanism. The concept of ‘warm experts’ or ‘proxy users’ suggests that digitally excluded individuals often rely on family members or neighbours to navigate digital systems on their behalf (e.g., a neighbour booking an Uber for an elderly resident) (Shao et al., 2025; Tetri et al., 2022). This study integrates this perspective by examining whether social support acts as a moderator, mitigating the negative health impacts of digital exclusion.

2.4. Research Hypotheses

Based on the theoretical framework of the ‘Digital Determinants of Health’ and ‘Platform Urbanism,’ this study proposes three hypotheses:

- H1. Individuals with lower digital capabilities (proxied by non-web survey participation) will have a higher probability of reporting unmet medical needs and higher depression scores than digitally capable individuals.

- H2. The negative health impact of digital exclusion will be amplified by the regional level of platformisation.

Specifically, the gap in unmet medical needs between digitally capable and digitally vulnerable individuals will be wider in high Platform Urbanism Index (PUI) regions than in low-PUI regions.

- H3. Social support will moderate the relationship between digital exclusion and health outcomes.

Specifically, among digitally vulnerable individuals, those with high social support (practical help from neighbours) will report significantly lower rates of unmet needs than those with low social support, supporting the ‘human intermediary’ mechanism.

3. Data and Methodology

3.1. Data Source

This study links two datasets:

- Individual Level: The European Health Interview Survey (EHIS) Wave 3, collected in 2019. This dataset provides standardized information on health status, health care use, and health determinants for individuals ages 15 and over across EU member states. The 2019 reference year provides a critical pre-pandemic baseline for structural inequalities.
- Regional Level: Eurostat regional statistics at the NUTS 2 level. These data are used to construct the environmental context of ‘Platform Urbanism.’

3.2. Measures

- Dependent Variables
 - *Unmet Medical Needs*: Binary variables indicating whether the respondent needed a medical examination but did not receive it due to
 - (a) “Waiting lists”
 - (b) “Distance/Transportation problems”
 - *Mental Health*: The PHQ-8 depression screener, analysed as a continuous score or a binary indicator of depressive symptoms.
- Independent Variables

Since EHIS does not contain detailed ICT literacy questions, this study employs a novel methodological proxy: *Data Collection Mode*.

 - Respondents who completed the survey via ‘web-based self-administration’ are classified as *Digitally Capable*, while those requiring “Face-to-face” or “Paper-and-pencil” methods are classified as *Digitally Vulnerable*. This variable captures the *demonstrated* capacity to interact with complex digital forms.
- Contextual Variable (Platform Urbanism Index – PUI)

A composite index calculated for each NUTS 2 region using Principal Component Analysis (PCA) of three indicators:

 - Density of short-stay accommodation via online platforms (Airbnb density)

- Percentage of individuals using the internet to make medical appointments
- Household broadband access rates

High PUI scores indicate regions where daily life and services are heavily mediated by digital platforms.

- Moderator: Social Support, measured by the ease of getting practical help from neighbours
- Covariates: Age, sex, household income, education level, and chronic morbidity

3.3. Analytic Strategy

We employ Multilevel Logistic Regression models (Random Intercept Models) to account for the nesting of individuals within NUTS 2 regions. The modeling strategy proceeds in three steps. First, Model 1 tests H1 by assessing the association between Digital Proxy and health outcomes, controlling for socioeconomic status. Then, Model 2 adds the Platform Urbanism Index (PUI) to test the direct effect of regional digitisation. Lastly, Model 3 adds the interaction term to test the ‘double exclusion’ hypothesis (H2), and the individual interaction term to test the buffering hypothesis (H3).

4. Expected Results

4.1. The Individual Penalty of Digital Exclusion

Consistent with H1, we expect to find that individuals classified as *Digitally Vulnerable* (non-web respondents) will report significantly higher odds of unmet medical needs and higher depression scores, even after controlling for income and education. This will confirm that digital capability is an independent social determinant of health, distinct from traditional socioeconomic status markers.

4.2. The Smart City Paradox

The core contribution of this study expected lies in H2. We anticipate a significant interaction effect where the gap in unmet needs between the digitally capable and the digitally vulnerable widens with PUI.

- Scenario A (Low Platformisation / Rural): In regions with low PUI, traditional analog channels (phone, walk-ins) remain dominant. Here, lack of digital skills may not significantly penalize access to care.
- Scenario B (High Platformisation / Smart City): In regions with high PUI, analog channels are dismantled, where being digitally vulnerable becomes a critical barrier. We expect the result to show that the “Digital Wall” is highest in the most technologically advanced cities, confirming the paradox that smart cities can be exclusionary spaces for the non-digital population.

4.3. The Buffering Role of Social Capital

Regarding H3, we define the ‘Connected Vulnerable’ (low digital skill + high social support) versus the ‘Isolated Vulnerable’ (low digital skill + low social support). We expect to find that high social support significantly attenuates the negative effect of digital exclusion. The results will likely show that digitally vulnerable individuals with strong neighbourhood support report unmet need rates comparable to digitally capable individuals, suggesting that human intermediaries effectively bridge

the digital gap. Conversely, the 'Isolated Vulnerable' group is expected to exhibit the worst health outcomes, suffering from both digital and social disconnection.

5. Discussion

5.1. Interpreting the 'Double Exclusion'

The findings of this study are expected to challenge the techno-optimist narrative of smart cities. The results will demonstrate that without deliberate inclusion strategies, digitising urban infrastructure does not merely replicate existing inequalities but amplifies them. The 'Double Exclusion' mechanism implies that the digitally vulnerable are 'penalised' twice: first by their lack of skills, and second by an urban environment that grows increasingly hostile to analog interactions.

5.2. Conclusion

This study provides the first empirical evidence linking Platform Urbanism with health inequalities using pan-European microdata. By treating the 'Smart City' not as a backdrop but as an active determinant of health access, this research highlights the urgent need to integrate digital justice into urban health policy.

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