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Bridging the Digital Divide: How Smartphones Are Associated With Physical, Psychological, and Social Well-Being in Marginalized Groups

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Abstract

This paper examines the digital divide by investigating how smartphone use and digital exclusion are associated with the physical, psychological, and social well-being of marginalized populations—including migrants, people experiencing homelessness, and prisoners—across five correlational studies (total N = 817). The findings reveal both benefits (e.g., fostering integration and connection) and drawbacks (e.g., exacerbating psychological challenges) of smartphone use. Study 1 explored smartphone usage among migrants (N = 278), showing that information-seeking apps (e.g., location services) were positively associated with psychological need satisfaction, physical health, and adaptation, whereas communication apps were not significantly associated with any of the outcome variables. Studies 2a (N = 75) and 2b (N = 174) focused on migrants during their migration journeys. In Study 2a, smartphone use for communication was positively associated with adaptation. In contrast, using smartphones for emotional regulation was linked to poorer psychological well-being in both studies. Study 3 investigated smartphone use among people experiencing homelessness (N = 71), revealing that communication was positively associated with psychological health, whereas use for emotional regulation was tied to lower psychological well-being. Finally, Study 4 examined prisoners (N = 219), linking limited technological skills to poorer physical and psychological well-being, while lack of access alone was not significantly associated with these outcomes. Overall, the results point to meaningful links between smartphone use and experiences of integration and connection among marginalized groups, as well as to poorer psychological well-being associated with using smartphones for emotion regulation and to the adverse effects of digital exclusion.

Keywords: smartphones; digital exclusion; social exclusion; well-being; marginalized groups

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Introduction

In contemporary societies, digital technologies have become deeply embedded in everyday life, shaping how people access information, maintain relationships, and participate in economic and civic activities. Among these technologies, smartphones play a particularly central role due to their portability, affordability, and multifunctionality (Keusch et al., 2021; Rhoades, 2017). However, access to and effective use of smartphones are not equally distributed. For individuals already experiencing social marginalization, such as migrants, people experiencing homelessness, and prisoners, digital inequalities may either exacerbate existing vulnerabilities (e.g.,

Collier, 2008; Ochara & Mawela, 2015; Wamuyu, 2017) or provide critical resources for connection, integration, and well-being (e.g., Kardefelt-Winther, 2014; Kushlev & Leita, 2020; Waytz & Gray, 2018). Understanding whether and how smartphones function as tools of inclusion or exclusion for these populations is therefore both theoretically and socially significant.

Although prior research has examined the digital divide and documented disparities in access and digital skills, less attention has been paid to how different patterns of smartphone use, and experiences of digital exclusion, are associated with physical, psychological, and social well-being among structurally marginalized groups (Alam & Imran, 2015; Van Dijk, 2020; Warschauer & Matuchniak, 2010;). Existing studies often focus on single populations or emphasize access rather than outcomes, leaving a gap in our understanding of how digital engagement relates to well-being across diverse contexts of marginalization (Alam & Imran, 2015; Bastick & Mallet-Garcia, 2022; Ono & Zavodny, 2007; Van Dijk, 2020). To address this gap, the present research investigates the associations between smartphone use, digital exclusion, and well-being in five correlational studies involving migrants, people experiencing homelessness, and prisoners (total $N = 817$). By integrating perspectives from social exclusion theory and digital inequality research, this work aims to clarify the dual role of smartphones as potential resources for resilience and integration, but also as tools that may reinforce psychological distress and structural disadvantage. In doing so, it contributes to ongoing debates about digital inclusion by moving beyond access-based accounts and focusing on the lived consequences of digital engagement for marginalized populations.

Social Exclusion and Marginalized Groups

Social exclusion is a multidimensional concept that spans economic, social, and cultural domains, including poverty, restricted access to fundamental social rights (e.g., housing and health insurance), limited opportunities for social participation (e.g., unemployment), and poor cultural integration (e.g., criminal records; Jehoel-Gijsbers & Vrooman, 2008). From a psychosocial perspective, social exclusion is viewed as a relational threat that disrupts social bonds and undermines psychological well-being at both interpersonal and intergroup levels (Baumeister & Leary, 1995). Within this framework, Riva and Eck (2016) defined social exclusion as the experience of being kept apart from others, either physically (e.g., social isolation) or emotionally (e.g., being ignored or explicitly rejected). This definition encompasses both rejection (negative social attention) and ostracism (the lack of social attention) experiences.

Williams' (2009) model posits that both ostracism and broader forms of social exclusion are profoundly distressing experiences. Beyond eliciting immediate feelings of social pain and negative emotions, they threaten individuals' fundamental psychological needs for belonging, self-esteem, control, and recognition. This can lead to a resignation stage where individuals experience persistent feelings of depression, worthlessness, alienation, and helplessness. The model accounts for both short- and long-term psychological consequences of social exclusion, with the resignation stage emerging as a psychological outcome of prolonged exclusion and isolation (Aureli et al., 2020; Marinucci & Riva, 2021a; Rudert et al., 2021).

Marginalized groups, often excluded from economic, social, and cultural participation, face profound challenges to their physical, psychological, and social well-being, stemming from systemic barriers such as poverty, limited access to essential resources, and restricted opportunities for integration. As a result, the negative impact of social exclusion tends to be particularly severe among marginalized groups, such as immigrants, people experiencing homelessness, and prisoners, who often face chronic and pervasive exclusion (Bennett, 2020; Marinucci & Riva, 2021b; Mazzoni et al., 2020; Riva & Eck, 2016; Rothberg, 1991; Rudert et al., 2021; Williams, 2009; Zamperini et al., 2020).

At the same time, people can exhibit resilience in response to social exclusion by mobilizing available social resources. For instance, structured support groups and social ties with members of the national group can buffer the psychological consequences of exclusion and reduce resignation (Aureli et al., 2020; Hales et al., 2021; Marinucci, Mazzoni et al., 2022; Marinucci, Pancani et al., 2022; Marinucci & Riva, 2021a). However, for many marginalized individuals, stable offline networks are fragmented or inaccessible. In such contexts, digital connections offer an alternative pathway to maintain social bonds and may help mitigate some of the negative consequences of exclusion, including those described by Williams (2009), both in the short and long term. While some theories suggest that online interactions may dilute the depth of face-to-face relationships, they can also enhance connectivity and sustain interactions otherwise impossible (Waytz & Gray, 2018). Kardefelt-Winther (2014) proposed that internet use may act as a coping mechanism in challenging circumstances, rather than being purely compulsive. Among digital technologies, smartphones are particularly crucial, serving as primary tools for

accessing online resources and maintaining social connections, especially for marginalized groups with limited access to other digital devices. Kushlev and Leitao's (2020) displacement-interference-complementarity framework further explores this dynamic, suggesting that while smartphones may hinder well-being by displacing essential activities or interfering with face-to-face interactions (e.g., phubbing), they can also enhance well-being by providing access to otherwise unattainable resources and support. For instance, during the COVID-19 lockdown, Marinucci et al. (2022b) and Pancani et al. (2021) found that online interactions helped alleviate the resignation stage caused by the absence of face-to-face contacts.

Smartphones: Tools of Inclusion and Exclusion for Marginalized Groups

Advancements in information and communication technology are reshaping how societies function, but the benefits of digital innovation are not equally distributed. Digital inclusion is broadly conceptualized as a multidimensional framework encompassing not only access to digital technologies but also the skills and support necessary to use them effectively (Crandall & Fisher, 2009; Haché & Cullen, 2010; Owens et al., 2023). In this sense, digital inclusion involves technological literacy, the ability to access relevant online services, and opportunities for meaningful engagement, enabling individuals to participate fully in economic, social, and civic life. However, when these conditions are not met, individuals may experience digital exclusion, defined as the inability to access or effectively use digital resources, significantly limiting individuals' participation in economic, social, and civic activities (Lloyd et al., 2013; Selwyn & Facer, 2007). This phenomenon, often referred to as the "digital divide," reflects disparities in access to technology, digital literacy, and actual usage of digital tools (Alam & Imran, 2015; Warschauer & Matuchniak, 2010). Consistent with this perspective, recent frameworks in digital inequality research emphasize that access alone is insufficient for inclusion. For instance, Van Dijk's (2020) model distinguishes between three interconnected levels of digital divides: first-level divides concern physical access to digital technologies; second-level divides pertain to differences in digital skills, literacy, and agency; and third-level divides refer to the unequal outcomes and benefits derived from digital engagement.

The digital divide manifests across various demographic lines, including income, gender, age, and race, creating barriers that prevent equal access to critical opportunities (Goedhart et al., 2019; Jackson et al., 2008). These disparities are particularly acute for marginalized groups such as the elderly, low-income individuals, people with disabilities, rural populations, and ethnic minorities (Bastick & Mallet-Garcia, 2022; Ono & Zavodny, 2007). For these populations, even modest gaps in access may exacerbate existing vulnerabilities, further limiting opportunities to engage with essential services such as healthcare, housing, and employment (Collier, 2008; Ochara & Mawela, 2015; Wamuyu, 2017).

This dual disadvantage—offline and online exclusion—is especially severe for marginalized groups such as migrants, people experiencing homelessness, and prisoners. Pre-existing inequalities, including limited education, financial constraints, and restricted access to technology, are mirrored and often intensified in digital spaces (Baum et al., 2012). As a result, these populations face heightened barriers to social and community integration. Migrants may struggle with language barriers and cultural differences in digital practices, people experiencing homelessness often lack stable access to devices or internet connectivity, and prisoners are frequently excluded entirely from digital tools by institutional restrictions. These overlapping disadvantages hinder not only access to vital resources but also opportunities to build meaningful social networks and reduce exclusion (Marinucci & Riva, 2025).

Among digital technologies, smartphones stand out as particularly vital tools for bridging these gaps due to their portability, accessibility, and multifunctionality. Unlike desktop computers or even laptops, smartphones are more affordable and require less infrastructure, making them accessible even to those with limited resources (Keusch et al., 2021; Rhoades, 2017). Research shows that even minimal access to smartphones can mitigate the negative effects of social rejection and improve well-being (Hunter et al., 2018). For marginalized individuals, smartphones are often the primary, or only, digital device available, acting as gateways to critical resources and opportunities. Smartphones offer marginalized individuals access to information about essential services, including housing, employment, and healthcare, while also enabling emotional support and community integration (Alam & Imran, 2015; Galperin et al., 2021). These devices act as lifelines for communication and information, providing tools such as social media, navigation apps, and calendars that help users adapt to different social contexts and manage daily challenges (Marler, 2019). Moreover, smartphones open pathways for autonomous learning and skill development, creating opportunities for personal growth and resilience. Their versatility and widespread use make them indispensable in efforts to address the digital divide and promote social inclusion.

Although smartphones, digital platforms and gig economies seem to offer opportunities, thanks to low entry barriers and flexible conditions, they often replicate and amplify offline inequalities. Migrants, particularly those from the Global South, are frequently subjected to algorithmic control, racial discrimination, and precarious working conditions (Calo & Rosenblat, 2017; Wood et al., 2019). These platforms tend to formalize aspects that benefit companies, like tracking and payments, while shifting risks to workers, leaving undocumented migrants especially vulnerable (Van Doorn et al., 2023). Thus, access to technology, while necessary, is not sufficient to ensure meaningful inclusion or empowerment.

In the following sections, we delve into how digital exclusion uniquely affects specific marginalized groups, including migrants, people experiencing homelessness, and prisoners, and explore how smartphones, as pivotal digital tools, can either mitigate or exacerbate their social and economic vulnerabilities.

While this study acknowledges the critical role of first-level divides, particularly for structurally marginalized groups such as migrants, people experiencing homelessness, and individuals in detention for whom access to digital technologies can be highly constrained, our primary analytical focus lies on the second and third levels. Specifically, we investigate how varying levels and modes of digital technology use, including limited or no access, as in the case of incarcerated individuals, relate to well-being across five studies. Additionally, albeit in a more limited way, and only in Study 4, our analysis also considers individuals' digital competencies in using technology, through a measure of perceived digital ability among incarcerated participants. These higher-order dimensions of digital inequality offer a deeper understanding of how digital inclusion and exclusion are associated with well-being and social participation among people already facing systemic disadvantage, moving beyond a simplistic focus on mere access.

Digital Exclusion and Migration

For migrants, digital exclusion stems from multiple factors, including the high cost of digital devices and internet services, limited digital literacy, language barriers, and cultural differences (Correa-Velez et al., 2013; López-Montero et al., 2021; Migliorino, 2010; Notley & Aziz, 2024). These barriers contribute to "information disjunctures," where migrants struggle to navigate the digital practices of their host countries, impeding access to essential services such as housing, healthcare, and education (Kaufmann, 2018; Leung, 2010). Limited digital skills further hinder migrants' participation in online environments, heightening feelings of isolation and complicating integration processes (Alam & Imran, 2015). As a result, digital exclusion exacerbates social exclusion, restricting opportunities for migrants to connect with communities and access critical resources for their well-being.

In contrast, smartphones play a crucial role throughout the migration journey, from the planning stages to the actual journey and eventual settlement in the host country (Mallett, 2022). These devices empower migrants by providing access to crucial information about their destination, planning safer routes, and sharing this knowledge with others. Social media platforms play a key role in this dynamic, facilitating the real-time exchange of updates, practical advice, and support among migrants and their trusted contacts (Dekker et al., 2018; Finotto, 2018; Gillespie et al., 2018; Mancini et al., 2019). Beyond logistical support, smartphones help migrants maintain connections with family and friends, offering emotional support that fosters a sense of belonging and alleviates acculturation stress and resignation (Lorenzana, 2016; Walsh et al., 2009; Williams, 2009).

During the adaptation phase, smartphones facilitate access to critical services such as housing, employment, and healthcare, while also offering tools to navigate local resources, including transportation, cultural events, and language-learning applications. Additionally, smartphones enable migrants to maintain ties to their cultural identity by accessing content such as news from their home countries (Alencar, 2018; Dekker & Engbersen, 2014). These digital tools not only support daily functioning but also contribute to long-term integration by promoting social inclusion and personal agency.

Ultimately, access to smartphones, or the lack thereof, could profoundly shape the integration experiences of migrants. While digital exclusion can amplify existing vulnerabilities, smartphones may act as critical resources for mitigating these challenges, enabling migrants to build connections, access vital information, and foster their overall well-being and social inclusion.

Digital Exclusion and Homelessness

People experiencing homelessness face extreme social exclusion, further compounded by limited digital access. Recognized as one of the most marginalized groups (European Commission: Directorate-General for Employment, Social Affairs and Inclusion, 2010), they frequently encounter discrimination from various sources, including law enforcement and family members, which profoundly impacts their well-being (Marinucci et al., 2023; Milburn et al., 2006). Homelessness extends beyond poverty and the absence of shelter, encompassing significant psychological, cultural, and emotional burdens driven by the insecurity and instability of lacking a safe and affordable home (Bretherton & Pleace, 2023). This extreme marginalization disrupts the ability to maintain social networks, participate in community life, and access essential social services (McGrath et al., 2023).

The digital divide only worsens these challenges. Many people experiencing homelessness face constant issues like sporadic internet access, interrupted phone services due to financial constraints, and a lack of safe, reliable spaces to charge devices (Faith, 2018; Gonzales et al., 2016; Williams et al., 2024). These barriers create a constant shift between moments of connectivity and disconnection (Faith, 2018; Galperin et al., 2021; Gonzales et al., 2016).

Despite these challenges, smartphones serve as vital lifelines for people experiencing homelessness. They provide access to maps, apps, and communication services, enabling users to connect with case managers, potential employers, and healthcare providers (Leinen, 2017; Thurman et al., 2021). This access not only supports practical needs, such as navigating daily life, but also enhances social and emotional well-being by enabling contact with friends and family, connections linked to higher self-esteem, reduced social isolation, and greater resilience (Moczygemba et al., 2021; Raven et al., 2018). Additionally, mobile technologies are seen as tools for emotional support, helping people experiencing homelessness manage stress, depression, and loneliness (Adkins et al., 2017; Leinen, 2017). Moreover, smartphones assist in establishing routines, managing medication schedules, and accessing humanitarian aid, bus schedules, and directions, functions that directly support physical self-management and daily functioning, making them essential tools for overcoming barriers posed by digital exclusion (Kushel et al., 2006; Le Dantec & Edwards, 2008; Raven et al., 2018). Therefore, in the context of homelessness, smartphones could play a dual role: they may mitigate some of the most pressing challenges of exclusion while empowering individuals to access resources and rebuild social ties.

Digital Exclusion and Imprisonment

Incarcerated populations face an even more extreme form of digital exclusion due to restricted access to digital tools imposed by the prison system itself, which isolates prisoners from the digital world. Digital exclusion in this context is a structural issue rooted in the prison system, which restricts or entirely denies access to technology, thereby intensifying the social exclusion experienced by prisoners (Blomberg et al., 2021; Emasealu & Popoola, 2016; Reisdorf & Rikard, 2018). Unlike other forms of digital exclusion, which may stem from financial or educational barriers, the exclusion of prisoners is systematically enforced, leaving them disconnected from the rapidly evolving digital landscape.

Research on digital exclusion in prisons is limited, but existing studies underscore the growing gap between incarcerated populations and the digital world. During incarceration, limited or absent access to digital technologies restricts cognitive stimulation and communication (Jewkes, 2008) and undermines psychological well-being by intensifying feelings of loneliness and depression (Reisdorf & Jewkes, 2016; Palmer et al., 2020). This digital disconnection also hampers prisoners' ability to maintain social ties, which plays a key role in reducing the likelihood of reoffending (Bales & Mears, 2008). In addition, the lack of digital access leads to significant deficits in digital literacy, exacerbating marginalization upon release. Many former inmates face difficulties navigating online systems for employment, social services, and education, leaving them unprepared for life in a digital society (Reisdorf & Jewkes, 2016). These barriers may intensify feelings of exclusion and contribute to a heightened risk of recidivism (Blomberg et al., 2021; Hwang et al., 2024). Reisdorf and Rikard's Digital Rehabilitation Model (2018) further demonstrates how the absence of digital access during incarceration negatively affects several life domains, including economic, social, and health, both during imprisonment and after release.

Overview

This paper examines the role of smartphone use and digital exclusion in shaping the physical, psychological and social well-being of marginalized populations, focusing on migrants, people experiencing homelessness, and

prisoners. Through five cross-sectional studies, we examine the links between smartphone use patterns, experiences of digital exclusion, and well-being. To this end, we developed tailored scales for measuring smartphone use and digital exclusion, adapting them to the unique characteristics of each group. These scales were then linked to variables assessing physical and psychological health and socio-cultural adaptation. Descriptive statistics for all studies are presented in Table 1.

Given the diverse experiences of these populations, the smartphone use scales and corresponding items were adapted to reflect each group's specific context. In Study 1, which focused on migrants, smartphone use was assessed across a range of applications capturing interpersonal communication and information/service-related activities. Studies 2a and 2b extended this approach by assessing a broader set of smartphone functions across different stages of the migration journey, including staying in touch with family and friends, gathering information, accessing services, and managing emotions. Study 3 used a similar framework for people experiencing homelessness, focusing on communication, information seeking, and emotional support. Finally, Study 4 assessed digital exclusion among incarcerated individuals, capturing both limited access to technology and the perceived impact of digital deprivation on daily life and social participation. These forms of digital engagement are expected to relate to well-being because they provide pathways to maintain social ties, obtain essential information, and manage emotional states, resources that can buffer the negative effects of social and structural exclusion. Conversely, limited access or inability to use digital tools may exacerbate stress, reduce agency, and increase feelings of isolation, thereby undermining physical, psychological, and social well-being.

Following Williams' (2009) temporal model of social exclusion, psychological well-being was operationalized using theoretically grounded indicators across studies, ranging from more proximal to more distal outcomes. In Study 1, we focused on basic psychological needs satisfaction (i.e., belonging, self-esteem, meaningful existence, and control) as an immediate indicator of inclusion and exclusion. In Studies 2–4, by contrast, we examined resignation as a more distal indicator of prolonged exclusion and psychological disengagement, reflecting a convergence of depressive affect, alienation, diminished self-worth, and helplessness. Specifically, Study 1 examined migrants' smartphone use in relation to physical health (i.e., subjective evaluations of one's overall health and susceptibility to illness), basic psychological needs (i.e., belonging, control, self-esteem, and meaningful existence), and sociocultural adaptation, defined as the ability to navigate everyday life in the host society, including navigating institutions, accessing services, and engaging in meaningful social interactions within the new cultural environment. Studies 2a and 2b focused on migrants, exploring smartphone use during different stages of the migratory journey and its links to sociocultural adaptation and resignation. Study 3 investigated how different uses of smartphones among people experiencing homelessness relate to physical health and resignation. Finally, Study 4 focused on incarcerated individuals, exploring how different dimensions of digital exclusion, measured as limited access to technology and inability to use digital resources, representing an impediment to daily functioning, relate to physical well-being and resignation. Across all five studies, we explore general patterns linking digital engagement and exclusion to well-being. We broadly expect that greater use of smartphones for communication, information access, and practical or emotional support will be associated with higher physical, psychological, and social well-being, whereas higher levels of perceived digital exclusion will be linked to lower physical well-being and greater resignation.

This work focuses on understanding how digital technologies, or their absence, are related to the well-being and social integration of marginalized populations such as migrants, people experiencing homelessness, and prisoners. By examining the dual role of technology as both a tool of inclusion and exclusion, we aim to shed light on the complex dynamics shaping their experiences in a digitally connected world.

Given the involvement of potentially vulnerable populations (migrants, people experiencing homelessness, and prisoners), particular attention was paid to ensuring inclusivity, voluntariness, and the protection of participants' rights and well-being throughout all phases of the research. Before initiating contact with participants, the research protocols were designed to minimize potential risks and burdens. Recruitment was carried out in collaboration with hosting centers, associations, and institutional authorities already working with the target populations, in order to ensure an appropriate and respectful approach. Participation was entirely voluntary, and no negative consequences followed refusal or withdrawal from the study at any stage. Prior to data collection, all participants received clear and accessible information about the study aims, procedures, anonymity, and data use.

Table 1. Descriptive Statistics of Sample Characteristics Across the Five Studies.

	Study 1	Study 2a	Study 2b	Study 3	Study 4
<i>N</i>	278 immigrants	75 immigrants	174 immigrants	71 homeless	219 prisoners
Gender	25.5% female	0% female	44.8% female	83.1% female	0% female
	71.9% male	100% male	55.2% male	15.5% male	95% male
	1.8% unspecified	—	—	1.4% unspecified	5% unspecified
	0.7% non binary	—	—	—	—
Age	30.66 (<i>SD</i> = 10.67)	25.8 (<i>SD</i> = 6.4)	34.56 (<i>SD</i> = 10.6)	53.1 (<i>SD</i> = 11.02)	43.22 (<i>SD</i> = 13.04)
Country of origin	43.2% Western Africa	92.1% Western Africa	40.8% Western Africa	95.7% Italy	76.7% Italy
	9.5% Northern Africa	1.3% Northern Africa	17.8% Northern Africa	4.3% Other	13.7% Northern Africa
	5.9% Eastern Europe	1.3% Eastern Africa	5.1% Eastern Europe	—	9.6% Other
	8.5% South Asia	5.3% South Asia	6.3% South Asia	—	—
	13.8% Latin America	—	18.4% Latin America	—	—
	3.0% Middle East	—	11.6% Other	—	—
	24.6% Other	—	—	—	—
Marital status	62.9% Single	77.3% Single	45.9% Single	48.6% Single	38.6% Single
	29.2% Married	15.4% Married	36.4% Married	1.4% Married	35.7% Married
	5.6% Separated/ divorced	6.3% Separated/ divorced	7.2% Separated/ divorced	48.6% Separated/ divorced	23.7% Separated/ divorced
	2.3% Widowed	0.9% Widowed	10.5% Widowed	1.4% Widowed	1.93% Widowed
Occupational status	59.1% Unemployed	83.5% Unemployed	48.8% Unemployed	84.1% Unemployed	—
	40.1% Employed	16.5% Employed	51.2% Employed	15.9% Employed	—
Migration status	74.4% Forced migrants	100% Forced migrants	52.2% Forced migrants	—	—
	25.6% Voluntary migrants	—	47.8% Voluntary migrants	—	—
Night locations	—	—	—	18.31% Street	—
	—	—	—	67.60% Shelters	—
	—	—	—	11.27% Apartments	—
	—	—	—	2.82% Other	—
Months of stay in Italy (<i>SD</i>)	72.4 (<i>SD</i> = 88.0)	15 (<i>SD</i> = 8.1)	68 (<i>SD</i> = 62.5)	—	—
Months as homeless (<i>SD</i>)	—	—	—	49.27 (<i>SD</i> = 50.84)	—
Months spent in prison (<i>SD</i>)	—	—	—	—	48.41 (<i>SD</i> = 50.84)
Remaining prison sentence in months (<i>SD</i>)	—	—	—	—	64.99 (<i>SD</i> = 71.56)
Education level	—	—	—	12.7% Primary school	4.4% Primary school
	—	—	—	38% Secondary school	46.6% Secondary school
	—	—	—	38% High school	42.2% High school
	—	—	—	11.3% University	4.8% University
	—	—	—	—	1.9% Master/Phd
Years of education (<i>SD</i>)	10.5 (<i>SD</i> = 5.2)	10.4 (<i>SD</i> = 3.8)	11.4 (<i>SD</i> = 4.86)	—	—
Daily smartphone usage time (<i>SD</i>)	2.85 Hours (<i>SD</i> = 2.17)	—	—	199.16 Minutes (<i>SD</i> = 140.37)	—

Informed consent was obtained from all participants. To promote inclusivity and comprehension, questionnaires were made available in multiple languages (Italian, English, French, Spanish, and Arabic), and participants were free to choose the language in which they felt most proficient. For asylum seekers and refugees, data collection took place with the support of cultural and linguistic mediators, who facilitated communication and ensured that instructions and consent procedures were fully understood. As such Italian proficiency was not required for

studies among migrants. Data were collected anonymously using self-report questionnaires, and no identifying information was recorded. Participants were informed that their responses would be treated confidentially and used exclusively for research purposes. For prisoners, data collection was conducted in accordance with institutional regulations, ensuring that participation was not linked in any way to detention conditions, benefits, or evaluations, and that perceived coercion was minimized. After data collection, all data were securely stored and analyzed in aggregated form only. Participants were offered the opportunity to ask questions or request further information about the study, and care was taken to ensure that the research process did not interfere with the services provided by the hosting institutions or associations. All participants were adults (18 years or older). Besides, major age, eligibility criteria were primarily related to the target population of each study: first-generation migrants without Italian citizenship for the migrant studies, people experiencing homelessness for Study 3, and incarcerated individuals for Study 4. No additional specific eligibility criteria were applied regarding the time since migration, homelessness, or imprisonment.

Analytic Strategy

Given the distinct characteristics of the marginalized groups considered, we used Principal Component Analysis (PCA) to evaluate item performance in these populations—selecting only the most relevant when needed—and assess the dimensionality of all the measures, including both well-established scales from literature and scales specifically developed to measure smartphone use and digital exclusion. This decision was driven by the recognition that our samples differ from typical populations in psychological research, like students or the general public.

The analytical approach across all five studies followed two steps. First, PCAs examined the dimensionality of the smartphone use and digital exclusion scales and various outcomes, including physical, psychological and social well-being. Following this, we conducted correlations and path analyses to investigate how the smartphone use and digital exclusion components derived from the PCAs were associated with the outcomes. In the path analyses, gender, age and education were included as covariates, given their well-established associations with both digital engagement patterns and psychosocial well-being (Chan, 2018; Neagu & Vieriu, 2025), and to account for potential structural differences across participants. We tested path analyses within the Structural Equation Modeling approach (SEM) using *lavaan package* (Rosseel, 2012) in RStudio (Posit team, 2024, Version 2024.04.2+764). The Ethical Committee of the University of Milano Bicocca approved all the studies.

Studies' hypotheses were not pre-registered. Datasets, analytic codes, and the studies' materials are available on the OSF platform at: <https://osf.io/e2tfv/>.

Study 1

Study 1 focused on both forced and voluntary migrants, examining how the frequency of use of different categories of smartphone applications was associated with physical, psychological and social well-being, operationalized with perceived physical health, basic psychological needs satisfaction, and socio-cultural adaptation, respectively. The applications assessed included communication-oriented apps (e.g., messaging apps, phone calls, social media) as well as information- and service-oriented apps (e.g., news, calendar and notes, location services, entertainment, and service-search apps). Drawing on previous research on smartphone use for emotional regulation (e.g., Kardefelt-Winther, 2014; Panova & Lleras, 2016) and digital practices among migrants that appear to support coping strategies and social integration (e.g., Dekker & Engbersen, 2014; Lorenzana, 2016; Mallett, 2022), we formulated the exploratory hypothesis that more frequent use of various smartphone applications would be related to higher levels of basic psychological needs satisfaction, perceived physical health, and socio-cultural adaptation. These apps may support coping, connection, and adaptation, providing resources that promote well-being across physical, psychological, and social domains. Additionally, we explored which types of smartphone applications might show stronger associations with these outcomes.

Method

Participants

A convenience sample of 288 migrants participated in this study. Ten participants were excluded as they did not answer any items related to smartphone application usage. The final sample consisted of 278 participants. All descriptive information regarding the sample's demographic, educational, migration-related, and smartphone usage characteristics is summarized in Table 1.

Participants completed a paper-and-pencil self-report questionnaire on sociodemographic information, well-being, adaptation to the new country, and general health. Although additional measures were collected, only the indices relevant to the study's aims are reported.

Questionnaires were translated by native speakers into three languages: Italian, French, and English, allowing participants to select the version in which they felt most proficient. For asylum seekers and refugees, data were collected in collective sessions in migrant hosting centers, with the available support of cultural and linguistic mediators. Differently, voluntary migrants were invited to participate in the study in cultural and sports associations. All participants joined the study voluntarily after giving their informed consent. Data collection took place between January and June 2019 in Northern Italy.

Measures

Smartphone Applications Usage Scale. The smartphone scale used in this study was developed specifically for the research. It comprised 13 items that assessed the frequency of use of various smartphone application categories, including texting apps, social media, photo cameras, calendars, and others. Participants were asked to rate the frequency of their use of each app type on a scale of 1 (*never*) to 5 (*almost always*). A principal component analysis suggested that the pool of items loaded adequately onto two factors, namely *Communication* and *Information* applications. Item 4, which measured camera usage, was removed as it did not align with the content of the *Communication* factor. After its removal, the two-factor solution accounted for 48% of the total variance. Loadings from the oblimin-rotated solution indicated that the *Communication* factor consisted of three items related to interpersonal communication: social media apps, phone calls, and messaging apps (loadings' range: $\lambda = .64-.86$; Cronbach's $\alpha = .69$). The *Information* factor included nine items for applications used for accessing news, utilizing the calendar, notes, location services, entertainment, and looking for different services (loadings' range: $\lambda = .53-.77$; Cronbach's $\alpha = .83$). We saved the factors' scores by averaging the related items. For transparency, the full set of items and their factor loadings is reported in Appendix Table A1.

Basic Psychological Needs Satisfaction. The Need Threat Scale (Williams, 2009; Zadro et al., 2004) was used to assess the level of threat to the four fundamental needs outlined in Williams's (2009) model: belonging, self-esteem, meaningful existence, and control. These 20 items were rated on a 5-point Likert scale, ranging from 1 (*not at all*) to 5 (*extremely*). An initial PCA suggested a two-factor structure, with non-reversed and reversed items loading separately. Because this pattern appeared to reflect methodological wording effects rather than conceptual distinctions between needs, reversed items were excluded and the final PCA was conducted on the remaining 11 items. After removing poor fitting items, a PCA indicated that the final pool of 11 items assessing the four needs adequately loaded onto a single factor (explained variance: 41%, loadings' range: $\lambda = .43-.71$; Cronbach's $\alpha = .85$). We averaged the 11 items into an overall index so that higher scores indicated higher need satisfaction (i.e., greater psychological well-being). For transparency, Appendix Table A2 presents the final items and their PCA loadings.

Physical Health. Health was measured using the Perceived General Health subscale of the 36-Item Short-Form Health Survey (SF-36; Ware & Sherbourne, 1992). This subscale includes four items that evaluate individuals' perceptions of their overall health, such as the question, *I feel like I get sick more easily than others* (reversed). The response scale ranged from 1 (definitely false) to 5 (definitely true). In addition, we used a single-item measure of overall perceived health: *In general, would you say that your health is?* (1 = *poor*, 5 = *excellent*). A principal component analysis suggested that the items loaded onto a single factor explaining 41% of the variance (loadings' range: $\lambda = .44-.81$; Cronbach's $\alpha = .61$). We averaged the items into an overall index, with higher levels indicating a higher perception of health.

Socio-Cultural Adaptation. The revised Socio-Cultural Adaptation Scale by Wilson et al. (2017) was used to measure socio-cultural adaptation. It assesses culturally competent behaviors necessary for effective adaptation in new cultural settings. It consists of 11 items categorized into three key domains of cultural competencies: Social Interaction (the ability to communicate effectively and manage casual interactions with members of the host culture), Community Engagement (the ability to establish friendships and social networks with host nationals), and Ecological Adaptability (navigating and adapting to the unfamiliar environment of the host country). Respondents evaluate their level of competence in performing specific behaviors related to these domains using a five-point Likert scale ranging from 1 (not at all) to 5 (extremely). A principal component analysis suggested that the items loaded onto a single factor explaining 44% of the variance (loadings' range: $\lambda = .57-.77$; Cronbach's $\alpha = .87$). We averaged the items into an overall index, with higher levels indicating a higher perception of socio-cultural adaptation. Descriptive statistics and correlations of the measures are reported in Table 2.

Results

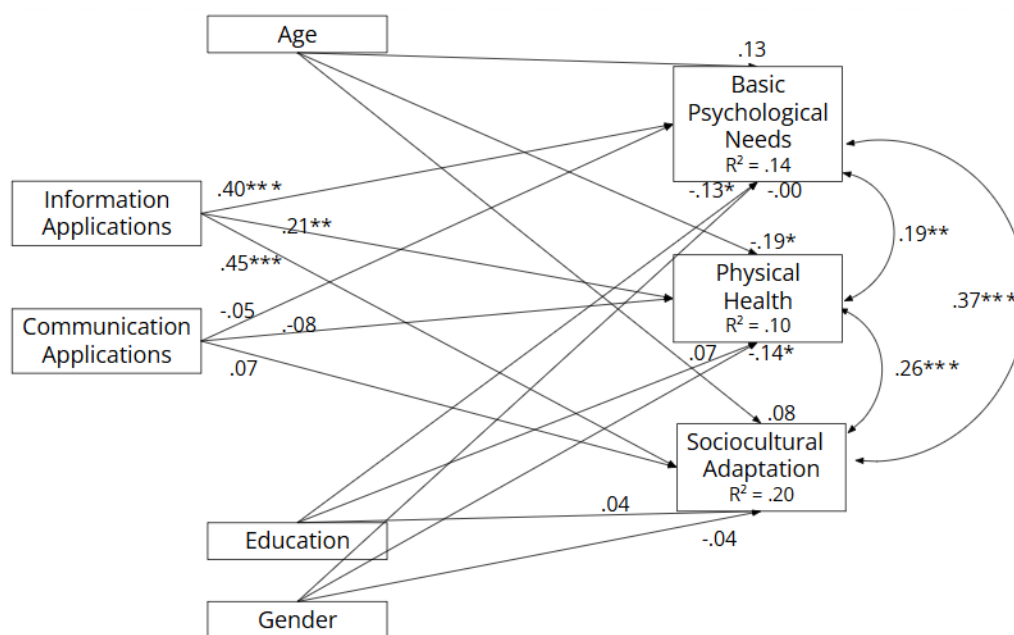
Correlational analyses (refer to Table 2) indicated a positive correlation between the use of information-related smartphone applications and basic psychological needs satisfaction, physical health, and socio-cultural adaptation. In contrast, the use of communication applications was only associated with a higher degree of socio-cultural adaptation.

Table 2. Means, Standard Deviations, and Correlations for the Core Constructs of Study 1.

Variable	<i>M</i>	<i>SD</i>	1	2	3	4	5
1. Communication	3.70	0.85	—	—	—	—	—
2. Information	2.46	0.83	.35***	—	—	—	—
			[.24, .45]				
3. Basic psychological needs satisfaction	3.17	0.72	.10	.32***	—	—	—
			[−.02, .21]	[.21, .42]			
4. Socio-cultural adaptation	3.42	0.70	.25***	.39***	.50***	—	—
			[.13, .36]	[.28, .48]	[.40, .58]		
5. Physical Health	3.76	0.73	−.01	.21***	.24***	.28***	—
			[−.13, .11]	[.09, .32]	[.12, .34]	[.17, .38]	

Note. *** $p < .001$. 95% CI values between brackets.

Figure 1. Results of Study 1.



To further examine these relationships, we ran a path analysis specifying the *Information* and *Communication* applications factors as predictors of the three outcomes of basic psychological needs satisfaction, perceived physical health, and sociocultural adaptation. The results are presented in Figure 1, and the full set of path coefficients is reported in Appendix Table A8.

The analysis revealed that the *Information* factor was significantly associated with higher levels of basic psychological needs satisfaction, perceived physical health, and sociocultural adaptation among immigrants. In contrast, the *Communication* factor was not significantly related to any of the three outcomes.

Discussion

Study 1 examined how smartphone use is associated with basic psychological needs satisfaction, socio-cultural adaptation, and physical health among migrants, distinguishing between communication and information-based applications. The results from both correlational and path analyses provide valuable insights into these relationships.

Correlational analyses showed a positive association between information applications and all three outcomes: basic psychological needs satisfaction, socio-cultural adaptation, and physical health. This highlights the importance of apps that provide access to information and services, aligning with the complementarity hypothesis, which suggests digital technologies enhance well-being by providing otherwise inaccessible resources (Kushlev & Leita, 2020). Path analysis corroborated these findings, showing a significant positive association between information apps and the three outcomes. This underscores the key role of information-based apps in promoting well-being and integration among migrants.

In contrast, the use of communication applications was not associated with any of the three outcomes, indicating that their use showed no systematic relationship with these aspects of well-being, unlike information-oriented applications.

Overall, these results highlight distinct patterns of association between different types of smartphone applications and immigrants' well-being. Information-related applications were more consistently associated with various well-being indicators, whereas communication applications showed more limited associations with overall well-being.

Study 2a

Following an initial study on migrants focusing on the frequency of smartphone application use, we conducted two related studies (Studies 2a–2b) examining smartphone use across the migration process, from pre-departure to the journey and arrival in Italy, and its associations with psychological and social well-being. These outcomes were operationalized as resignation and sociocultural adaptation among forced and voluntary migrants, respectively. Importantly, unlike Study 1, which assessed broad categories of applications (e.g., messaging, social media, entertainment) without considering their functional role, these studies captured a wider and more context-specific range of smartphone uses directly tied to the migration experience. Participants were asked to report on their smartphone use across several key functions, including gathering information before migration, staying connected with family and friends, and facilitating their integration into Italian society. By identifying distinct smartphone usage patterns through principal component analysis, this study sought to understand the specific ways in which smartphones support or hinder psychological and social well-being during the migration process. While this study was primarily exploratory in nature, we hypothesized that more frequent smartphone use would correlate with better adaptation, and psychological well-being. This expectation draws on prior literature suggesting that digital engagement can support coping strategies and social integration, especially among migrants (e.g., Dekker & Engbersen, 2014; Kardefelt-Winther, 2014). At the same time, we explored which specific usage patterns were most strongly associated with these outcomes.

Given its particularly limited sample size, Study 2a served as a preliminary exploration to refine the scale measuring smartphone usage across the migration journey and to identify potential associations with psychological and social well-being outcomes, laying the groundwork for the more comprehensive analyses in Study 2b.

Method

Participants

A convenience sample of 112 individuals participated in the study; however, only 81 responded to the questions regarding smartphone use, with 75 participants reporting they owned a smartphone and 6 indicating they did not.

All descriptive information regarding the sample's demographic, educational, and migration-related characteristics is summarized in Table 1.

Data was collected through self-reported questionnaires administered during group meetings in three different hosting centers for asylum seekers and refugees in Northern Italy. The questionnaires were available in Italian, English, and French, allowing participants to choose their preferred language. Cultural-linguistic mediators were present to assist participants during data collection when necessary. Data collection took place between September and December 2018.

Measures

Smartphone Usage Scale. Compared to Study 1, which focused on broad application categories, the Smartphone Usage Scale was developed specifically for this study and comprised 28 items designed to assess the frequency of smartphone use for various purposes at different stages of the migratory journey. All participants responded to all items, reporting retrospectively on their smartphone use (a) before departure to Italy (e.g., searching for entry opportunities or job prospects), (b) during the journey (e.g., obtaining travel-related information or seeking assistance), and (c) upon arrival in Italy (e.g., maintaining contact with family in the home country or searching for employment and housing). Items were organized in blocks corresponding to these three temporal phases. Participants rated the frequency of smartphone use for each function on a scale from 1 (*never*) to 5 (*almost always*). A principal component analysis was used to identify the dimensionality; four items were excluded due to methodological reasons (i.e., low loadings) and theoretical considerations (i.e., they did not represent specific aspects of smartphone use within the migratory context). We identified four components that captured distinct ways smartphones are used throughout the migration process. The *Pre-arrival use* dimension consisted in 12 items focusing on smartphone use before reaching Italy to gather information prior to departure and pertaining to communication and logistics during the journey (loading range: $\lambda = .62-.85$; Cronbach's $\alpha = .93$). The *Communication* dimension included four items emphasizing maintaining ties with family and friends in the home country after arriving in Italy (loading range: $\lambda = .69-.83$; Cronbach's $\alpha = .83$). The *Information* dimension consisted of four items on using smartphones to establish relationships with Italians and search for employment in Italian society (loading range: $\lambda = .58-.80$; Cronbach's $\alpha = .79$). Finally, the *Emotional regulation* dimension captured individual, everyday use of smartphones as a coping mechanism, such as using the phone when feeling sad, uncertain, or in need of distraction. This dimension included four items related to managing negative emotions after arrival in Italy (loading range: $\lambda = .46-.88$; Cronbach's $\alpha = .79$). The four-dimension solution explained 64% of the variance (see Table 3 for correlations between the dimensions). We averaged the items for each factor to calculate factor scores. For transparency, the full set of items and their factor loadings is reported in Appendix Table A3.

Resignation. Following the temporal model of social exclusion (Williams, 2009), we conceptualized resignation as a distal indicator of psychological well-being, reflecting prolonged disengagement resulting from chronic exclusion. As similarly done in previous research (e.g., Riva et al., 2016), we measured the resignation stage by assessing its components of depression, alienation, unworthiness, and helplessness, as theorized by Williams (2009). Depression was measured using 11 items from the Depression subscale of the Symptom Checklist-90R (Derogatis & Unger, 2010). Alienation was assessed with 8 items from the Social Connectedness Scale (Lee & Robbins, 1995). Unworthiness was evaluated using 5 items from the Rosenberg Self-Esteem Scale (Rosenberg, 1965), and helplessness with 4 items from the Beck Hopelessness Scale (Beck et al., 1974). Participants rated the 28 items on a 5-point Likert scale (1 = *not at all*, 5 = *extremely*) based on their experiences over the past three months. An initial parallel analysis suggested a four-dimension solution. However, the solution was very complex to interpret with many items having poor or high saturation on all the dimensions, items from the same scale loading onto different dimensions, and negative item-dimension correlations. To simplify the solution, we selected the highest-loading items from each of the four theoretical components of resignation, resulting in a final set of nine items (two assessing depression, three alienation, two unworthiness, and two helplessness). A final PCA supported a single-component solution, explaining 35% of the variance (loadings range: $\lambda = .37-.78$; Cronbach's $\alpha = .75$). We averaged the nine items to compute an aggregated resignation index, with higher scores indicating greater resignation.

Socio-Cultural Adaptation. We measured socio-cultural adaptation using the revised Socio-Cultural Adaptation Scale by Wilson et al. (2017). This scale assesses behaviors required for effective adaptation in new cultural settings across three domains: Social Interaction, Community Engagement, and Ecological Adaptability. Participants rated

their competence on a 5-point Likert scale. A principal component analysis suggested that the items loaded onto a single factor explaining 41% of the variance (loadings' range: $\lambda = .40-.80$; Cronbach's $\alpha = .85$). We averaged the 11 items into an overall index, with higher levels indicating greater socio-cultural adaptation. Descriptive statistics and correlations are shown in Table 3.

Results

Correlational analyses revealed positive associations between smartphone use for communication and better socio-cultural adaptation. Also, smartphone use for information-seeking was associated with higher sociocultural adaptation. Conversely, higher smartphone use for coping with negative emotions was associated with greater feelings of resignation.

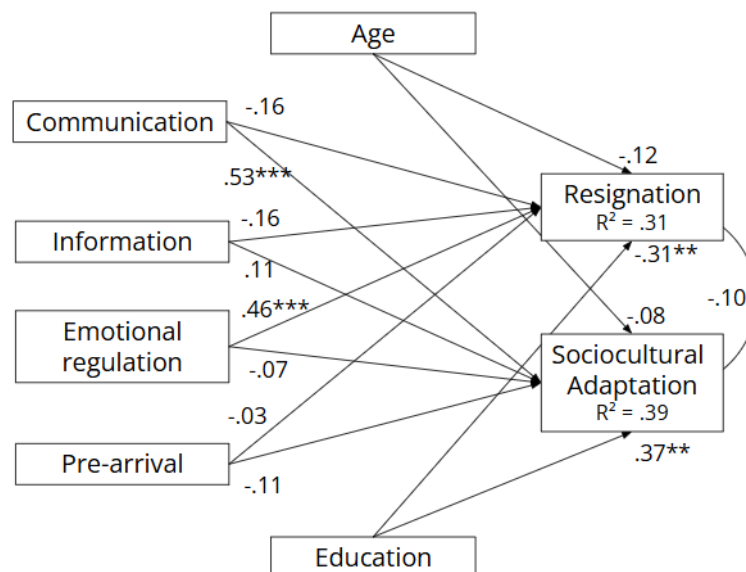
Table 3. Means, Standard Deviations, and Correlations for the Core Constructs of Study 2a.

Variable	<i>M</i>	<i>SD</i>	1	2	3	4	5
1. Communication	3.11	1.04	—	—	—	—	—
2. Information	3.55	1.00	.33** [.12, .52]	—	—	—	—
3. Emotional regulation	2.73	1.04	.22 [-.01, .42]	.21 [-.02, .41]	—	—	—
4. Pre-arrival use	1.83	0.98	.30** [.08, .49]	.39*** [.18, .57]	.10 [-.13, .32]	—	—
5. Resignation	2.04	0.72	-.06 [-.28, .17]	-.19 [-.40, .04]	.34** [.12, .52]	-.14 [-.36, .09]	—
6. Socio-cultural adaptation	3.45	0.70	.44*** [.22, .62]	.38** [.15, .57]	.14 [-.11, .37]	.11 [-.13, .35]	-.24* [-.45, -.01]

Note. * $p < .05$, ** $p < .01$, *** $p < .001$. 95% CI values between brackets.

To examine this relationship, we ran a path analysis specifying the *Pre-arrival use*, *Communication*, *Information*, and *Emotional regulation* factors as predictors of the two outcomes of socio-cultural adaptation and resignation. Results are reported in Figure 2, and the full set of path coefficients is reported in Appendix Table A9. Results revealed that *Emotional regulation* was significantly associated with higher resignation. Additionally, *Communication* was found to be significantly linked to socio-cultural adaptation. Although, *Information* and *Pre-arrival use* were not linked to any of the two outcomes.

Figure 2. Results of Study 2a.



Note. Standardized coefficients. * $p < .05$, ** $p < .01$, *** $p < .001$.

Discussion

Study 2a served as an exploratory pilot to examine how distinct patterns of smartphone usage during the migration journey are associated with socio-cultural adaptation and resignation. By identifying four usage factors, *Pre-arrival use*, *Communication*, *Information*, and *Emotional regulation*, we sought to uncover the diverse roles smartphones play in addressing both practical and emotional needs during migration.

The findings suggest that *communication* via smartphones was positively associated with socio-cultural adaptation, emphasizing the importance of maintaining and building social connections. However, the positive link between *emotional regulation* and resignation indicates a more complex relationship between smartphone use and well-being. Greater reliance on smartphones for coping is associated with higher levels of helplessness; yet, it is equally plausible that individuals experiencing higher levels of depression, helplessness, or low self-worth turn to smartphones for emotional regulation.

The exploratory nature of this study highlights the intricate impact of smartphones on migrant experiences and provides a foundation for the more robust analyses conducted in Study 2b.

Study 2b

Study 2b sought to replicate the findings of Study 2a with a larger sample of immigrants. The primary objectives were to test whether (a) the smartphone usage scale retained a similar four-component structure as identified in Study 2a and (b) the associations between the four components and the outcomes of resignation and socio-cultural adaptation could be replicated in a similar population. While the general hypothesis across studies predicts that greater smartphone use for communication, information access, and emotional support is associated with higher physical, psychological and social well-being, Study 2b also formulates a specific hypothesis based on the results of Study 2a: that greater smartphone use for *emotional regulation* would be associated with increased resignation, while higher use of smartphones for *communication* would be linked to improved socio-cultural adaptation.

Method

Participants

A convenience sample of 212 participants took part in the study, with 199 responding to smartphone-related questions and 174 owning a smartphone. All descriptive information regarding the sample is summarized in Table 1.

Participants were primarily recruited from state-run hosting centers for asylum seekers and refugees in Northern Italy. Other participants were drawn from two organizations focused on teaching Italian. Additionally, some participants had already completed the reception process and were living independently. Data were collected in group sessions held within migrant hosting centers, with the support of available cultural and linguistic mediators. All participants completed the same self-reported questionnaire used in Study 2a. Data collection took place between March and September 2023.

Measures

Smartphone Usage Scale. In this study, we re-examined the same initial Smartphone Usage Scale item pool used in Study 2a. The PCA yielded a final 25-item solution; unlike in Study 2a, SM23 was retained. The scale assessed the frequency of smartphone use across different stages of the migratory journey: pre-departure, during the journey, and upon arrival in Italy. A principal component analysis confirmed the presence of four distinct factors, consistent with Study 2a. The first factor, *Pre-arrival use*, showed loadings ranging from .50 to .81 and a Cronbach's alpha of .93. The second factor, *Communication*, had loadings between .50 and .78 and a Cronbach's alpha of .81. The third factor, *Information*, showed factor loadings ranging from .57 to .71 and a Cronbach's alpha of .80. Finally, the fourth factor, *Emotional regulation*, had loadings from .74 to .89 and Cronbach's alpha = .86. Overall, these factors collectively explained 64% of the variance in smartphone use, and the scale showed good internal

consistency with a Cronbach's alpha of .88. Factor scores were computed by averaging the items related to each factor. For transparency, the full set of items and their factor loadings is reported in Appendix Table A4.

Socio-Cultural Adaptation. The revised Socio-cultural Adaptation Scale by Wilson et al. (2017) was used to measure socio-cultural adaptation. A principal component analysis suggested that the items loaded onto a single factor explaining 43% of the variance (loadings' range: $\lambda = .28-.77$; Cronbach's $\alpha = .86$). We averaged the 11 items into an overall index, with higher levels indicating greater socio-cultural adaptation.

Resignation. In Study 2b we measured the four components of resignation using a reduced set of items to reduce participant fatigue compared to Study 2a. Depression was measured with three items from the Depression-Anxiety-Stress Scale (Bottesi et al., 2015). Unworthiness was assessed with three items from the Rosenberg Self-Esteem Scale (Rosenberg, 1965). Alienation was measured using three items from the Social Connectedness Scale—alienation subscale (Lee & Robbins, 1995). Helplessness was captured using two items from the Beck Depression Inventory (Beck et al., 1996) and one item from the Beck Hopelessness Scale (Beck et al., 1974). Participants rated their agreement with these items over the past three months using a 5-point Likert scale (1 = *not at all*, 5 = *extremely*). After conducting a principal component analysis, we found that one item (SE1R) from the Unworthiness scale did not load well and was excluded. The final analysis suggested that the remaining items loaded onto a single factor, accounting for 48% of the variance (loadings ranged from $\lambda = .50$ to $.76$; Cronbach's $\alpha = .89$). A composite resignation index was calculated by averaging the scores across all dimensions, with higher scores indicating greater resignation. Descriptive statistics and correlations are presented in Table 4.

Results

Correlational analyses revealed that the use of a smartphone to regulate negative emotions was associated with higher levels of resignation. Moreover, *Information* was associated with higher socio-cultural adaptation.

Table 4. Means, Standard Deviations, and Correlations for the Core Constructs of Study 2b.

Variable	<i>M</i>	<i>SD</i>	1	2	3	4	5
1. Communication	3.94	0.99	—	—	—	—	—
2. Information	3.64	0.98	.45*** [.32, .56]	—	—	—	—
3. Emotional regulation	3.29	1.21	.33*** [.19, .45]	.26*** [.12, .39]	—	—	—
4. Pre-arrival use	2.65	1.14	.35*** [.21, .48]	.37*** [.23, .50]	.21** [.05, .35]	—	—
5. Resignation	2.13	0.89	-.06 [-.20, .09]	-.01 [-.15, .14]	.17* [.02, .31]	-.02 [-.18, .13]	—
6. Socio-cultural adaptation	3.60	0.90	.13 [-.02, .27]	.18* [.03, .32]	.06 [-.09, .20]	.05 [-.11, .20]	-.20* [-.32, -.06]

Note. * $p < .05$, ** $p < .01$, *** $p < .001$. 95% CI values between brackets.

To examine this relationship, we ran a path analysis specifying the *Pre-arrival use*, *Communication*, *Information*, and *Emotional regulation* factors as predictors of the two outcomes of socio-cultural adaptation and resignation. Results are reported in Figure 3, and the full set of path coefficients is reported in Appendix Table A10.

Results revealed that *Emotional regulation* was significantly associated with higher resignation. Moreover, *Communication* was marginally linked to resignation.

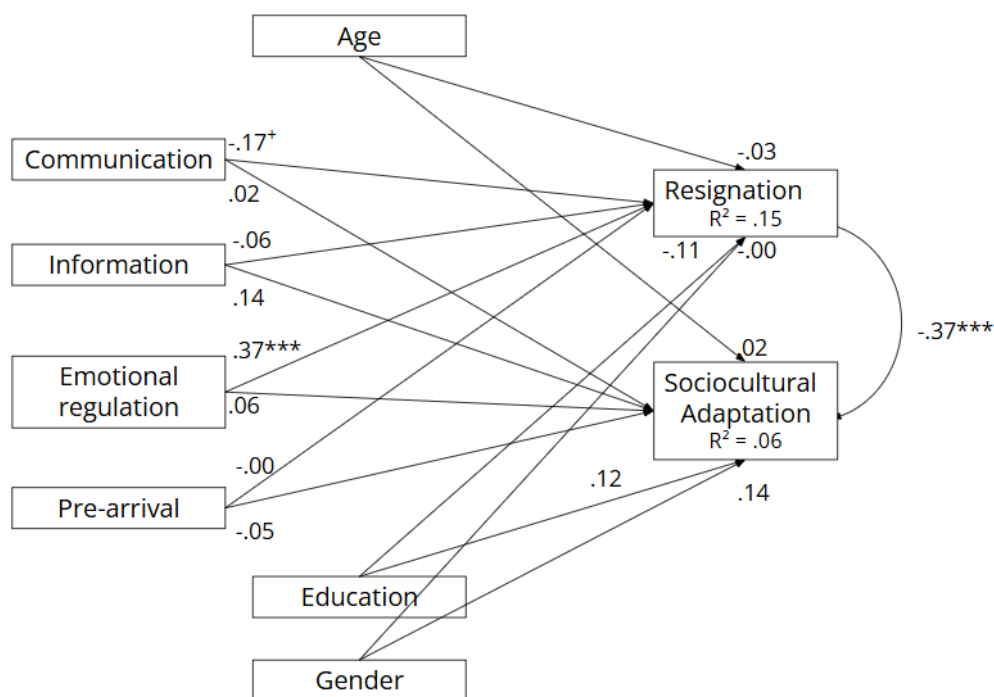
Instead, *Pre-arrival use* was not significantly linked to either resignation and socio-cultural adaptation. Similarly, *Information* was not significantly connected with Resignation.

Discussion

The findings from Study 2b provide valuable insights into the multifaceted role smartphones play in migrants' lives. Expanding on the results of Study 2a, which identified patterns of smartphone use linked to socio-cultural adaptation and resignation, Study 2b replicated these findings with a larger sample of immigrants. The exploratory factor analysis confirmed the four patterns of smartphone use identified in Study 2a: (1) *pre-arrival use*, (2) *communication*, (3) *information*, and (4) *emotional regulation*. These categories emphasize the dual role of smartphones in addressing both practical and emotional needs during migration.

Correlational analyses revealed that using smartphones for *emotional regulation* was positively associated with resignation, echoing the findings of Study 2a. This suggests that while smartphones can provide short-term emotional relief, reliance on them for managing negative emotions may contribute to a deeper sense of resignation over time. Conversely, smartphone use for *information* was positively correlated with socio-cultural adaptation, reinforcing the importance of leveraging technology to build social networks and access critical resources in the host country.

Figure 3. Results of Study 2b.



Note. Standardized coefficients. * $p < .09$, * $p < .05$, ** $p < .01$, *** $p < .001$.

Correlational analyses revealed that using smartphones for *emotional regulation* was positively associated with resignation, echoing the findings of Study 2a. This suggests that while smartphones can provide short-term emotional relief, reliance on them for managing negative emotions may contribute to a deeper sense of resignation over time. Conversely, smartphone use for *information* was positively correlated with socio-cultural adaptation, reinforcing the importance of leveraging technology to build social networks and access critical resources in the host country.

Path analysis confirmed the strong link between *emotional regulation* via smartphones and resignation, highlighting potential limitations in fostering long-term emotional resilience. In contrast, the effect of information-seeking on sociocultural adaptation was not significant, mirroring the pattern observed in Study 2a. This suggests that, within Studies 2, informational smartphone use may play a less central role in facilitating migrants' sociocultural adjustment than initially expected. This finding differs from Study 1, where information-oriented smartphone use was significantly associated with better sociocultural adaptation. One possible explanation for this discrepancy lies in the different operationalizations of smartphone use across studies. Whereas Study 1 focused on broad categories of smartphone applications, Studies 2a and 2b examined how smartphones are used for specific purposes across different phases of the migratory journey. This difference may capture more context-dependent forms of smartphone use that are not directly comparable with the more general patterns assessed in Study 1.

One notable difference from Study 2a was the absence of a significant relationship between smartphone use for *communication* and socio-cultural adaptation in Study 2b. This lack of replication should be interpreted in light of important structural differences between the two samples. Study 2a included only forced migrants and no female participants, whereas Study 2b comprised both forced and voluntary migrants and a substantially higher proportion of women. These systematic differences in sample composition limit the direct comparability of the two studies. In addition, some portion of the discrepancy may also reflect random variability not accounted for in the study design. It is also possible that the effect observed in Study 2a is not robust enough to generalize across different samples. Therefore, the finding that *communication* relates to higher socio-cultural adaptation should be interpreted with particular caution.

By contrast, Study 2b revealed a marginal negative association between communicative smartphone use and resignation, a pattern that will also emerge in Study 3 with people experiencing homelessness. These findings suggest that communicative smartphone use may offer a buffer against psychological distress by maintaining connections with supportive others, even in contexts marked by severe social or economic marginalization. However, future studies are needed to confirm the robustness of this effect.

Finally, Study 2a differed from the other studies in that the relationship between resignation and socio-cultural adaptation was not significant in its final model. By contrast, in the other studies where adaptation was assessed (Studies 1 and 2b), it was consistently associated with well-being indicators. This pattern further suggests that the findings of Study 2a may be more exploratory and less stable, likely reflecting its pilot and preliminary nature.

Study 3

In Study 3 we broaden our investigation by considering another marginalized social group: people experiencing homelessness. Building on our previous work with migrants, we aim to explore how different patterns of smartphone use among people experiencing homelessness relate to their levels of physical and psychological well-being, operationalized with perceived physical health, and resignation, respectively. Importantly, we do not assume that the patterns observed among migrants necessarily generalize to this population, as different forms of social exclusion may shape the function of smartphone use in distinct ways. Prior research shows that smartphones help people experiencing homelessness obtain essential resources (e.g., health care, transport), keep social ties that boost self-esteem and curb isolation, and deliver emotional support for stress, depression, and anxiety (e.g., Adkins et al., 2017; Raven et al., 2018; Thurman et al., 2021). Although direct evidence on physical health or resignation outcomes is scarce, these findings provide a solid rationale for exploratory, theory-based testing. We therefore hypothesized that more frequent smartphone use for *communication*, *information-seeking*, and *emotional regulation* would be associated with better physical health and reduced resignation. Additionally, we aim to identify which specific smartphone usage patterns are most strongly linked to these outcomes, with the goal of generating hypotheses for future research and intervention design.

Method

Participants

The convenience sample of people experiencing homelessness comprised 91 participants, of whom 87 responded to questions about smartphone use. Of these, 71 owned a smartphone. All descriptive information regarding the sample is summarized in Table 1.

People experiencing homelessness were recruited through various associations that provide services to this population. These associations facilitated access to participants either in their facilities or during street outreach activities. Data were collected using paper-and-pencil questionnaires administered by trained research assistants. Data collection took place between June and December 2021 in Northern Italy.

Measures

Smartphone Usage Scale. An ad hoc 12-item scale was developed based on the smartphone usage scale used in Study 2a–2b. The 12 items assessed the frequency of smartphone use for various activities such as maintaining contact with family, friends, other people experiencing homelessness, and searching for work or housing. Participants rated each function on a scale from 1 (*never*) to 5 (*almost always*). A principal component analysis identified three factors: *Communication*, *Information*, and *Emotional Regulation*, which explained 63% of the variance. The *Communication* factor included four items related to communicating with family, friends, other people experiencing homelessness, and new acquaintances (factor loadings: $\lambda = .67-.78$; Cronbach's $\alpha = .73$). The *Information* factor comprised four items related to searching for services, employment opportunities, and housing (factor loadings: $\lambda = .64-.88$; Cronbach's $\alpha = .78$). The *Emotional Regulation* factor included four items related to managing negative emotions (factor loadings: $\lambda = .70-.92$; Cronbach's $\alpha = .87$). Factor scores were calculated by averaging the related items, with the overall scale showing a Cronbach's alpha of .81. For transparency, the full set of items and their factor loadings is reported in Appendix Table A5.

Physical Health. Health was assessed using the Perceived General Health subscale of the SF-36 (Ware & Sherbourne, 1992), which consists of four items measuring individuals' overall health perceptions. Responses were rated on a 5-point scale (1 = *definitely false*, 5 = *definitely true*). A principal component analysis revealed a single factor accounting for 47% of the variance (factor loadings: $\lambda = .59-.81$; Cronbach's $\alpha = .62$). The items were averaged into an index, with higher scores indicating better perceived health.

Resignation. To assess resignation, we measured its four associated dimensions: depression, unworthiness, alienation, and helplessness, using the same reduced-item approach as in Study 2b (see Study 2b for details of the scales used). After conducting a principal component analysis, we found that item (SE1R) from the Unworthiness scale did not load well and was excluded. The final analysis revealed that the remaining items loaded onto a single factor, accounting for 49% of the variance (loadings ranged from $\lambda = .22$ to $.84$; Cronbach's $\alpha = .90$). Descriptive statistics and correlations are presented in Table 5.

Results

Correlational analyses are shown in Table 5. These analyses revealed a positive correlation between using a smartphone to communicate with others and physical health. Furthermore, using a smartphone to regulate negative emotions was found to be positively associated with resignation.

To examine this relationship, we ran a path analysis specifying the *Communication, Information and Emotional regulation* factors as predictors of the two outcomes of physical health and resignation. Results are reported in Figure 4, and the full set of path coefficients is reported in Appendix Table A11.

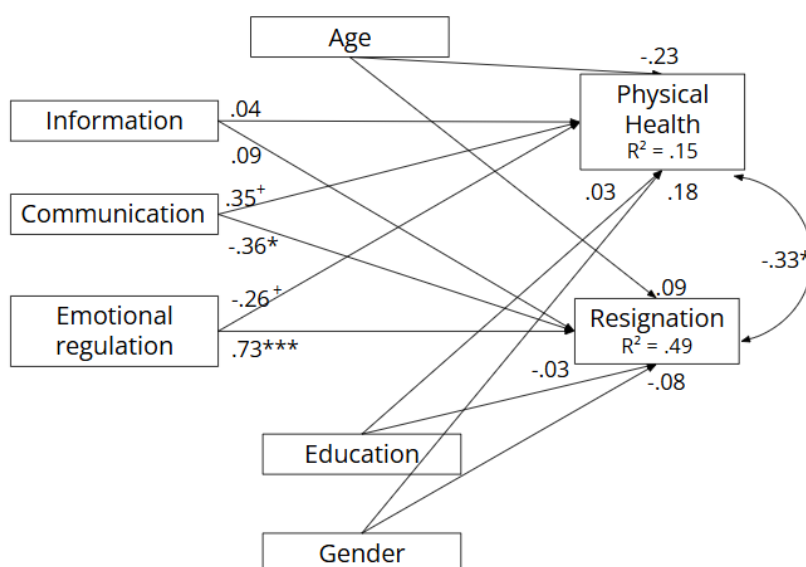
Table 5. Means, Standard Deviations, and Correlations for the Core Constructs of Study 3.

Variable	<i>M</i>	<i>SD</i>	1	2	3	4	5
1. Communication	2.41	1.00	—	—	—	—	—
2. Information	2.88	1.15	.40*** [.18, .58]	—	—	—	—
3. Emotional regulation	2.45	1.24	.27* [.04, .48]	.16 [−.08, .38]	—	—	—
4. Resignation	2.41	0.93	−.03 [−.26, .21]	.20 [−.04, .42]	.62*** [.45, .74]	—	—
5. Physical Health	3.53	0.85	.24* [.01, .45]	.02 [−.21, .26]	−.04 [−.27, .20]	−.29* [−.49, −.06]	—

Note. * $p < .05$, ** $p < .01$, *** $p < .001$. 95% CI values between brackets.

Results revealed that *Communication* was associated with lower resignation and showed a marginal positive association with physical health. Additionally, *Emotional regulation* was associated with higher resignation and exhibited a marginal negative association with physical health. Information was not significantly associated with either of the two outcomes.

Figure 4. Results of Study 3.



Note. Standardized coefficients. * $p < .09$, * $p < .05$, ** $p < .01$, *** $p < .001$.

Discussion

Study 3 investigates the relationships between distinct patterns of smartphone use and both resignation and physical health outcomes among individuals experiencing homelessness. We measured smartphone use across three primary functions—*communication*, *information-seeking*, and *emotional regulation*—aiming to understand their distinct effects on this marginalized group. The findings, derived from correlational and path analyses, offer preliminary insights into the role of smartphone use in shaping these outcomes.

The factor analysis identified two consistent functions of smartphone use: *communication* and *information-seeking*. The path analysis revealed that smartphone use for *communication* was significantly associated with lower levels of resignation and marginally associated with better physical health. This is consistent with the idea that maintaining social connections through smartphones is associated with better psychological well-being and, to a lesser extent, physical well-being among people experiencing homelessness, aligning with research on the health benefits of social interaction (Baumeister & Leary, 1995). Differently, information-seeking via smartphones was not associated with either resignation or physical health. This indicates that, although smartphones facilitate access to information, the lack of actionable resources or social and structural support may limit the effectiveness of information-seeking as a coping strategy.

Additionally, *emotional regulation* emerged as a third factor in the analysis. As in Studies 2a and 2b, using smartphones for *emotional regulation* was linked to increased resignation, suggesting a correlation between reliance on smartphones to manage negative emotions and poorer long-term psychological well-being. In this study, such use was also marginally associated with poorer physical health. This finding may indicate that the negative implications of the use of smartphones for *emotional regulation* could extend to physical health among people experiencing homelessness, potentially because this is linked to unhealthy behaviors like reduced sleep or a sedentary lifestyle in place of more adaptive coping strategies. Alternatively, it may be that people with poorer health tend to use smartphones more for emotional regulation. However, this interpretation should be considered with caution given the marginal nature of the association.

In summary, the findings highlight the dual-edged nature of smartphone use. While communication via smartphones was associated with lower resignation, the use of smartphones for emotional regulation appears to be associated with negative psychological outcomes and, to a lesser extent, poorer physical health.

Study 4

In Study 4, the focus shifts to prisoners, a uniquely marginalized group. Unlike other populations, incarcerated individuals face absolute digital exclusion due to systemic restrictions on access to digital technologies. This context precluded any investigation of how digital technologies might support or hinder well-being. However, it provided a compelling and extreme case to explore the implications of complete technological deprivation.

Building on prior research highlighting the detrimental effects of digital exclusion on well-being during incarceration (e.g., Palmer et al., 2020; Reisdorf & Jewkes, 2016; Reisdorf & Rikard, 2018), this study explores the relationship between the perception of digital exclusion, defined by limited access to technology and the inability to utilize digital resources, and the psychological and physical well-being of prisoners. We hypothesize that higher levels of perceived digital exclusion will be associated with poorer physical health and greater resignation, reflecting the well-documented costs of technology deprivation. Additionally, we aim to identify the specific dimensions of digital exclusion most strongly associated with these negative outcomes.

Method

Participants

A convenience sample of 219 prisoners from five different male prisons in Italy participated in the study. All descriptive information regarding the sample's demographic is summarized in Table 1. After giving informed consent, participants completed a self-reported paper-and-pencil questionnaire. Data collection took place between May 2022 and September 2023.

Measures

Digital Exclusion. We developed two specific scales for this study to assess different aspects of digital exclusion within prison environments: the Perceived Deprivation Scale (9 items) and the Perceived Impediment Scale (10 items). The Perceived Deprivation Scale focuses on how prisoners perceive their disadvantage compared to individuals outside of prison due to limited access to digital technologies. A principal component analysis (PCA) of this scale revealed two distinct factors. The first factor, *Access Deprivation*, reflects the sense of being deprived of access to essential technologies such as the internet, smartphones, and social media, with factor loadings ranging from $\lambda = .48$ to $.92$ (Cronbach's $\alpha = .87$). The second factor, *Ability Deprivation*, captures participants' perceived inability to effectively use digital technologies, particularly the internet and its resources, with loadings ranging from $\lambda = .57$ to $.87$ (Cronbach's $\alpha = .64$). The two-factor solution explained 62% of variance. The Perceived Impediment Scale examines the broader impact of digital exclusion on various aspects of life, such as limiting personal potential, access to critical information, fulfilling social needs, and providing opportunities for growth and learning. A PCA of this scale identified a single factor, *Digital Technology Impediment*, which encompasses feelings that digital exclusion hinders professional development, access to vital information, and overall social and personal functioning, with factor loadings ranging from $\lambda = .59$ to $.81$ (Cronbach's $\alpha = .90$). The one-factor solution explained 55% of the variance. For transparency, the full set of items and their factor loadings of both scales are reported in Appendix Table A6 and A7.

Physical Health. Health was assessed using the Perceived General Health subscale of the SF-36 (Ware & Sherbourne, 1992), which includes four items measuring individuals' overall health perceptions. After removing one poorly loading item, the remaining three items loaded onto a single factor, explaining 63% of the variance (loadings' range: $\lambda = .78$ – $.82$; Cronbach's $\alpha = .71$). Higher scores indicated better perceived health.

Resignation. Resignation was measured using the same reduced-item approach of Studies 3 & 4 covering four outcomes: depression (three items), unworthiness (three items), alienation (three items), and helplessness (two items from the Beck Depression Inventory, and one from the Beck Hopelessness Scale). A principal component analysis revealed a single factor explaining 48% of the variance (loadings' range: $\lambda = .31$ – $.81$; Cronbach's $\alpha = .90$). A composite resignation index was created by averaging the scores, with higher scores indicating greater resignation.

Results

Correlational analyses (refer to Table 6) indicated a positive correlation between resignation and both *access deprivation* and *ability deprivation*. Additionally, a negative correlation emerged between ability deprivation and physical health. *Digital Technology Impediment* was also positively associated with resignation and negatively associated with physical health.

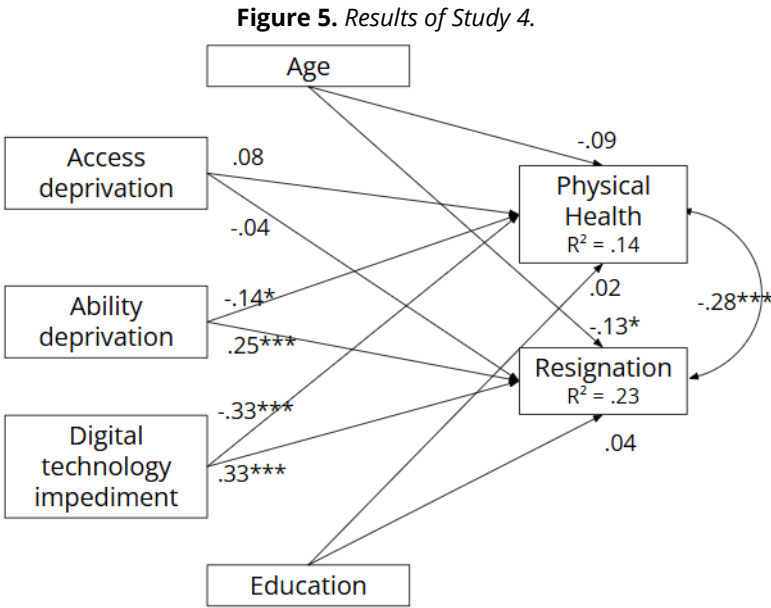
Table 6. Means, Standard Deviations, and Correlations for the Core Constructs of Study 4.

Variable	<i>M</i>	<i>SD</i>	1	2	3	4	5
1. Resignation	2.31	0.86	—	—	—	—	—
2. Physical Health	4.09	0.91	-.39*** [-.50, -.27]	—	—	—	—
3. Digital technology impediment	2.73	1.01	.40*** [.27, .51]	-.32*** [-.44, -.19]	—	—	—
4. Ability deprivation	2.12	1.06	.32*** [.18, .44]	-.22*** [-.35, -.08]	.26*** [.12, .39]	—	—
5. Access deprivation	2.59	1.23	.17* [.03, .30]	-.08 [-.22, .06]	.52*** [.41, .61]	.13 [-.01, .26]	—

Note. * $p < .05$, ** $p < .01$, *** $p < .001$. 95% CI values between brackets.

To further test these associations, we ran a path analysis specifying *Digital technology impediment*, *Ability deprivation* and *Access deprivation* as predictors of the two outcomes of physical health and resignation. Results are reported in Figure 5, and the full set of path coefficients is reported in Appendix Table A12.

Results revealed that *Digital technology impediment* was significantly associated with both resignation and physical health. Additionally, *Ability deprivation* was found to be significantly linked to resignation and to physical health. *Access deprivation* was not significantly connected to either resignation and physical health.



Note. Standardized coefficients. **p* < .05, ***p* < .01, ****p* < .001.

Discussion

Study 4 examined how digital exclusion is associated with prisoners' physical health and resignation, perhaps intensifying their marginalization. Through exploratory factor analyses of the Perceived Deprivation Scale and the Perceived Impediment Scale, three distinct components were identified: *Access Deprivation* (barriers to basic technology access), *Ability Deprivation*, (limited digital skills), and *Digital Technology Impediment* (perceived negative impact on social, educational, and professional integration). These findings build on first- and second-level digital divide frameworks (Norris, 2003; Van Deursen & Van Dijk, 2011), showing that digital exclusion extends beyond access to include skills and broader life consequences.

A key finding of our study is the positive association between resignation and all identified components of digital exclusion. The path analysis further elucidated these relationships, showing that both *Digital technology impediment* and *Ability deprivation* are significantly associated with resignation. These associations may reflect that perceiving oneself as digitally constrained or technologically incapable is linked to greater feelings of resignation, possibly reflecting increased feelings of helplessness within the prison environment.

Additionally, a negative relationship was found between both *Ability deprivation* and *Digital technology impediment* and physical health. The path analysis confirmed that both factors are associated with poorer physical health outcomes. This may indicate that digital exclusion limits access not only to information but also to resources that support health maintenance, such as health-related knowledge, services, and communication channels. For instance, limited access to digital tools may prevent incarcerated individuals from staying informed about health guidelines or accessing health-promoting resources, thereby indirectly affecting their physical well-being.

These findings can be further understood in light of prior research showing that restricted digital access in correctional facilities constrains communication, education, and personal development opportunities (Farley & Hopkins, 2017; Hofinger & Pfegerl, 2024; Reisdorf & Jewkes, 2016). Such constraints are particularly relevant for reintegration processes, as individuals are often released without sufficient digital literacy to navigate increasingly technology-dependent systems (Farley & Hopkins, 2017; Reisdorf & Jewkes, 2016). From this perspective, the negative association between digital exclusion and both resignation and health may reflect not only immediate functional limitations, but also a cumulative process in which prolonged exclusion reduces opportunities for social participation, autonomy, and access to essential resources. Moreover, limitations in digital communication may weaken prisoners' ability to maintain contact with family and friends, thereby reducing emotional support and reinforcing social isolation (Imandeka et al., 2024; Johnson, 2013). This social dimension is particularly relevant for understanding resignation, as reduced interpersonal connection may contribute to

feelings of detachment and diminished future orientation. Similarly, exclusion from digital information flows, such as updates on health guidelines, public services, or institutional procedures (Watts & Erdman, 2020), may further exacerbate both perceived vulnerability and a sense of disconnection from the broader social environment. In this sense, digital exclusion may contribute to subjective experiences of being “second-class citizens” in an increasingly digital society (Imandeka et al., 2024), reinforcing both psychological withdrawal and perceived health vulnerability.

In contrast, *Access deprivation* was not significantly related to physical health, either in correlational analyses and the path model, nor to resignation in the path model. This suggests that lack of access alone is less impactful than the perceived inability to use technology effectively.

Overall, Study 4 extends existing literature by demonstrating that digital exclusion in prison contexts is a multidimensional phenomenon with distinct psychological and health-related correlates. The findings highlight the importance of moving beyond access-based interventions and addressing digital skills and perceived competence as key components of digital inclusion strategies in correctional settings.

General Discussion

This research investigated how smartphone use and digital exclusion are associated with some measures of physical, psychological, and social well-being of marginalized populations, focusing on migrants, people experiencing homelessness, and prisoners. Across five studies, distinct patterns of smartphone use and digital exclusion emerged, offering insights into the dual role of technology as a resource for integration and a potential source of exclusion. Table 7 summarizes the path analysis results across the five studies.

Patterns of Smartphone Use and Digital Exclusion Across Studies

The findings revealed common themes in smartphone use among marginalized groups. Migrants and people experiencing homelessness consistently relied on smartphones for three primary functions: communication, information access, and emotional regulation. Migrants predominantly used communication apps to maintain ties with loved ones in their home countries, while people experiencing homelessness used similar functions to build and sustain connections with local networks, including peers and support services. Both groups also relied on smartphones for information-seeking, such as accessing resources like housing, employment, and healthcare. For migrants, these efforts extended to connecting with local Italians, reflecting a proactive drive toward integration. Their digital behavior was often more instrumental, aimed at navigating systems and accessing new opportunities. In contrast, people experiencing homelessness’ use of smartphones was more relational, focused on preserving existing relationships and fostering emotional support. Finally, smartphones, in both cases, were also used for emotional regulation, helping them manage negative emotions.

Study 4 focused on digital exclusion in prisons, where the absence of digital technologies created a unique scenario of total deprivation. Prisoners experienced digital exclusion not just as a lack of access but as an acute sense of being left behind in a digitally connected world. This deprivation has specific dimensions such as *Ability Deprivation* (lack of digital skills) and *Digital Technology Impediment* (perceived barriers to social and professional integration).

The observed patterns of smartphone use and digital exclusion align with existing literature while adding new insights into the experiences of marginalized populations. Research highlights smartphones as critical tools for maintaining connections and accessing resources during the migration process, spanning pre-departure planning, the journey itself, and settlement in the host country (Mallett, 2022). Migrants frequently use smartphones to stay connected with their home countries and access essential information to facilitate integration, such as resources for housing and employment (Dekker & Engbersen, 2014; Lorenzana, 2016). Similarly, studies on homelessness emphasize the importance of smartphones for maintaining social connections and providing emotional support, helping individuals without stable housing stay in touch with family and friends and cope with loneliness (Leinen, 2017; Thurman et al., 2021).

Table 7. *Comprehensive Summary of the Key Results Across the Five Studies. Predictors Measured in Each Study Are Reported in Rows, Outcomes in Columns.*

		Physical well-being	Psychological well-being indicators		Social well-being
			Basic needs satisfaction	Resignation	
Study 1 (migrants)	Communication	ns.	ns.		ns.
	Information	+	+		+
Study 2a (migrants)	Communication			ns.	+
	Information			ns.	ns.
	Emotional regulation			+	ns.
	Pre-arrival use			ns.	ns.
Study 2b (migrants)	Communication			–*	ns.
	Information			ns.	ns.
	Emotional regulation			+	ns.
	Pre-arrival use			ns.	ns.
Study 3 (homeless people)	Communication	+*		–	
	Information	ns.		ns.	
	Emotional regulation	–*		+	
Study 4 (prisoners)	Access deprivation	ns.		ns.	
	Ability deprivation	–		+	
	Digital technology impediment	–		+	

Note. * = marginally significant relationship; + = positive significant relationship; – = negative significant relationship; ns. = not significant (i.e., effects with p -value > .09).

Beyond these immediate functions, the findings of this research can also be interpreted through the lens of digital capital (Ragnedda, 2018), a concept that complements Van Dijk's framework. Digital capital refers to the accumulation of digital competencies and access, which individuals can leverage to achieve social inclusion, economic advancement, and personal development. Our results suggest that while smartphones offer marginalized individuals critical tools for accessing resources and maintaining connections, disparities in digital skills and agency influence the extent to which these technologies can be effectively converted into broader social or economic benefits. Future research should more systematically examine how digital capital is built, deployed, and sustained among marginalized groups, and how it moderates the relationship between digital engagement and well-being. Beyond social connection, smartphones are often employed to manage internal states, distract from stressors, or regulate negative emotions. This aligns with the Compensatory Internet Use Theory (Kardefelt-Winther, 2014), which posits that individuals turn to digital tools to address offline deficits. For example, Pancani et al. (2020) found that smartphones are frequently used to manage stress and escape unpleasant emotions, while Grellhesl and Punyanunt-Carter (2012) noted that "relaxation and escape" are prominent motivations for texting. Similarly, Panova and Lleras (2016) showed that smartphone use can initially reduce stress following anxiety-inducing events. However, the studies show an association between over-reliance on digital tools for emotional regulation and indicators of frustration and resignation among migrants and people experiencing homelessness. While this could suggest that such usage contributes to negative feelings, it is also possible that individuals turn to their phones more when experiencing frustration or low well-being.

For incarcerated populations, this study provides valuable contributions by conceptualizing digital technology deprivation as a multidimensional phenomenon that extends beyond mere access to include both skill-related limitations and differences in how technologies are used to support social and functional participation. This pattern aligns with and extends existing frameworks on first- and second-level digital divides (Norris, 2003; Van Deursen & Van Dijk, 2011), suggesting that even when access is available, the ability to effectively use digital tools and derive meaningful benefits remains uneven. The present findings further refine this perspective by showing that the psychological and functional implications of digital inequality are closely tied to how individuals experience and internalize these constraints. In this sense, the identification of Ability Deprivation and Digital Technology Impediment highlights that the absence of digital engagement can be experienced not only in material terms, but also as a subjective sense of being left behind in an increasingly digitalized world. These findings extend

existing literature by demonstrating that, in highly restrictive environments, digital exclusion goes beyond access deprivation to encompass perceptions of inadequacy and limited agency. This is particularly relevant given that correctional settings often provide minimal opportunities to engage with digital technologies (Hofinger & Pfeferl, 2024; Reisdorf & Jewkes, 2016), thereby amplifying the challenges associated with social reintegration and access to essential resources.

Impact on Physical, Psychological, and Social Well-Being

The findings from the studies converge around three macro-dimensions of well-being—physical, psychological, and social—revealing both shared patterns and notable divergences across the groups studied.

In terms of physical well-being, smartphone use may be associated with access to essential resources. Results from Study 1 showed that migrants, for example, might benefit from information-seeking behaviors that can help them access healthcare, and employment, with potential beneficial effects for their physical health. However, for people experiencing homelessness, the relationship between information-seeking and physical well-being was not statistically significant. This difference may suggest that, despite similar efforts to access information, structural barriers or limited service availability may prevent these behaviors from translating into tangible well-being benefits for people experiencing homelessness. Furthermore, it is also possible that information-seeking among this group is contingent on negative events and driven by urgent needs rather than strategic health-related goals. Additionally, among people experiencing homelessness, the use of smartphones for emotional regulation was marginally associated with negative outcomes for physical health. This may be due to the passive nature of emotional regulation through digital distractions, which may provide a temporary alleviation of distress without addressing the root causes of psychological or physical suffering. It is possible that smartphone-based emotional coping could replace healthier coping strategies, for instance by disrupting sleep or inducing a sedentary life-style, with ultimate negative repercussions for physical health (Kushlev & Leita, 2020). At the same time, smartphone use for communication also exhibited a marginal association with physical health. One possible explanation for this finding lies in the well-established link between social connection and health outcomes. Even in contexts of severe marginalization, maintaining interpersonal contact through smartphones may positively influence health. However, the marginal nature of this association suggests that these benefits may be limited or indirect. In the context of homelessness, structural constraints, such as limited access to healthcare, unstable living conditions, or lack of material resources, may attenuate the extent to which social connectivity can translate into tangible physical health improvements. Thus, while communication via smartphones may represent a relatively adaptive coping strategy, its impact on physical health may remain modest unless supported by broader social and structural resources.

Psychological well-being emerged as another critical dimension associated with smartphone use and digital exclusion. In line with Williams' (2009) model of social exclusion, which posits that chronic threats to fundamental psychological needs, such as belonging, self-esteem, control, and meaningful existence, may culminate in resignation, the present findings suggest that distinct patterns of smartphone use are differentially associated with basic need satisfaction and resignation. Emotional regulation through smartphones was consistently associated with higher resignation. Given the cross-sectional nature of the data, it is unclear whether smartphone use contributes to resignation or whether individuals experiencing more resignation tend to use smartphones for emotional support. Migrants and people experiencing homelessness both relied on smartphones to manage stress and negative emotions, but this pattern may reflect either reliance on smartphones during periods of distress or the possibility that such use is associated with less effective coping over time. While smartphones may temporarily alleviate negative emotions and prevent rumination (Riva, 2016), research shows that over-reliance on this strategy often leads to long-term frustration and worsened psychological states (Shi et al., 2023). This aligns with the "security blanket effect" (Panova & Lleras, 2016), where smartphones provide initial comfort but hinder the development of healthier coping mechanisms. Conversely, the relationship between smartphone use for information-seeking and migrants' psychological well-being was not as straightforward. In Study 1, a positive association was found, with the use of specific apps for information-seeking seen as efforts to reduce resource gaps and foster a sense of stability. However, in Studies 2a and 2b, this association did not replicate and was found to be non-significant. This shift may be attributed to a broader conceptualization of smartphone use in these studies, where the focus moved away from specific apps used for information-seeking to a more general understanding of smartphone usage.

This shift may have diluted the psychological relevance of purposeful, goal-directed use. As a result, the link between motivated information-seeking and psychological well-being may have become less visible. For people experiencing homelessness, however, the relationship was different. Communicative use of smartphones was positively associated with higher psychological well-being. This finding suggests that, unlike migrants who may benefit from information-seeking behaviors, people experiencing homelessness derive more psychological benefit from using their smartphones to maintain social connections. Migrants, too, may experience psychological benefits from communicative smartphone use, although to a lesser extent, as reflected in the marginally significant association found in Study 2b. These connections, whether with family, friends, or support networks, can provide a sense of belonging and emotional support, which are critical for coping with the psychological challenges of homelessness. For this group, maintaining social ties and receiving emotional support via communication plays a more significant role in improving mental health. Smartphones help reduce isolation and connect individuals to their support networks, offering both emotional relief and practical assistance, such as shelter or food. As a result, the psychological benefits of smartphone use for people experiencing homelessness are more closely linked to communication than to information-seeking, which is less effective due to limited access to stable resources or their inability to act on the information they find. These patterns of results also suggest the possible specificity of each sample in how smartphone use links to psychological well-being, reflecting the unique contexts and challenges faced by each group.

Prisoners' experiences highlight how subjective feelings of deprivation and technological incompetence, rather than mere lack of access, undermine psychological and physical well-being. These findings highlight the importance of subjective perceptions of technological deprivation, as inmates compare their circumstances to the outside world, intensifying feelings of exclusion. The social relativity of digital exclusion framework (Helsper, 2017) helps interpret these findings, emphasizing that well-being is influenced not only by absolute deprivation but also by one's standing relative to others. Prisoners' awareness of the essential role of digital skills in modern society reinforces their sense of being "left behind", contributing to anxiety and resignation.

Social well-being appeared to be linked to the communicative and informational functions of smartphones. For migrants, communication apps were primarily used to maintain emotional ties with loved ones in their countries of origin. While these connections provided important emotional support, they were generally less effective in fostering integration into the host society and offered limited practical benefits in everyday life. Indeed, it is reasonable that migrants' digital close relationships, including those far away in their home countries, might convey little, if any, support to navigate and adjust to the host societal context. Notably, the only study showing a significant association between communicative smartphone use and social well-being was Study 2a, which was exploratory in nature, had the smallest sample size and as such might provide unstable results. Moreover, the sample in Study 2a consisted exclusively of asylum seekers and refugees, whose pronounced vulnerability may lead them to rely more heavily on digital close relationships even for seeking support in adjusting to the host context. In contrast, migrants' chronic lack of essential resources may make instrumental smartphone use, such as seeking information, more impactful than purely communicative use. Consistent with this idea, Study 1 revealed a positive association between information-oriented smartphone use and social well-being. However, this pattern did not replicate in Studies 2a and 2b. A likely explanation lies in differences in how smartphone use was operationalized. While Study 1 captured broad engagement with information-oriented applications, Studies 2a and 2b focused on specific, context-bound behaviors during settlement in Italy (e.g., searching for a job or housing, or communicating with locals). This narrower focus may have captured situational actions constrained by immediate opportunities, rather than a more general orientation toward instrumental use, thereby weakening its link to overall adaptation. Moreover, although social connections are central to well-being (Baumeister & Leary, 1995), under conditions of severe resource deprivation digital communication may be insufficient to satisfy belonging needs. Language barriers can further limit interactions to similarly marginalized peers or distant ties, reducing access to meaningful support, as such contacts often lack the local integration required to offer effective instrumental or social assistance. In contrast, more general use of applications that provide access to diverse information resources may more directly support social well-being, suggesting that the adaptive value of smartphone use emerges more clearly at a higher level of abstraction than through narrowly defined, situation-specific behaviors.

Together, these findings highlight the nuanced role of smartphones in promoting physical, psychological, and social well-being among marginalized groups. The interplay between context, purpose, and access to resources shapes the outcomes of smartphone use, emphasizing the complexity of its impact on marginalized populations. It is important to note, however, that the observed effect sizes were modest, suggesting that smartphones may

provide only partial support rather than substantially transforming the well-being of marginalized individuals. However, in populations with limited access to institutional support or formal inclusion pathways, even modest digital effects may hold meaningful implications for everyday functioning and psychosocial coping. At the same time, we fully acknowledge that digital technologies can reproduce or intensify vulnerabilities. As the data on resignation suggest, emotional regulation via smartphones may reflect not only a coping mechanism but also a signal of distress and structural abandonment. Moreover, while digital tools can help mitigate some barriers to information, communication, and emotional support, they do not address the deeper structural inequalities, such as institutional discrimination, economic precarity, and housing insecurity, that fundamentally shape marginalization. Furthermore, digital inclusion involves not only access to smartphones, but also to a wider range of digital tools, such as laptops, tablets, and e-learning platforms, as well as infrastructural elements like stable internet connections, public Wi-Fi, and the availability of digital services. As such, effective inclusion policies must go beyond simply ensuring device access or promoting adaptive smartphone use; they must also address systemic issues related to connectivity, accessibility, and internet quality, factors that are especially crucial for marginalized communities.

Taken together, these findings speak directly to current debates on digital inclusion by supporting a multidimensional view that goes beyond access to digital devices. In line with digital inequality frameworks (Ragnedda, 2017; Van Dijk, 2020), our results show that smartphones can function as partial inclusion tools, but their benefits depend on how they are used and on the structural constraints faced by marginalized individuals. While digital access enables communication, information seeking, and coping, it does not guarantee positive outcomes across domains of well-being, particularly when digital use reflects emotional compensation or occurs in contexts of severe deprivation. The findings from incarcerated populations further highlight that digital exclusion operates not only through lack of access, but also through subjective perceptions of being left behind in a digital society. Overall, this study reinforces a critical understanding of digital inclusion as a necessary but insufficient condition for social inclusion, underscoring the need to situate digital technologies within broader social and structural inequalities.

Limitations and Future Directions

This research has several limitations. First, the cross-sectional design of the studies precludes causal inferences, leaving the directionality of relationships between smartphone use, digital exclusion, and well-being being uncertain. Longitudinal research is needed to track how these variables evolve over time, assessing the long-term impact of sustained patterns of smartphone use and digital exclusion on marginalized populations.

Second, the reliance on self-reported measures may introduce social desirability and recall biases. Future research could integrate objective indicators of digital behavior, such as usage logs or behavioral assessments, to strengthen measurement accuracy. Additionally, third-party assessments or behavioral observations could complement self-reported data, particularly for populations with limited literacy or digital access.

Another limitation pertains to sample size. In particular, in Studies 2a and 3, the relatively small number of participants—75 migrants and 71 people experiencing homelessness, respectively—may restrict the generalizability of the findings, particularly concerning smartphone ownership within these populations. In addition, the exclusive inclusion of male participants in some studies (2a and 4) restricts generalizability and precludes conclusions about gender differences. In Study 2a, the lack of female participants may have resulted from the recruitment sites (e.g., male-only hosting centers or shelters), while in Study 4 this imbalance is explained by data collection being conducted exclusively in male prisons. Future research should rely on larger, more diverse, and gender-inclusive samples. Furthermore, the use of convenience sampling through service organizations, while necessary to access hard-to-reach populations, limits representativeness. As a result, the findings may not capture the full diversity of experiences, and caution is warranted when generalizing beyond the recruitment contexts.

We also acknowledge that our focus on smartphone use does not fully capture the broader spectrum of digital deprivation. Digital exclusion may also stem from infrastructural barriers (e.g., limited connectivity, lack of access to other devices and structural constraints like state censorship and digital surveillance), which are particularly salient in institutional settings and low-connectivity contexts.

An important theoretical limitation of our study concerns the predominant focus on digital inequality at the level of physical access. While our research explicitly addressed the first-level digital divide, namely, disparities in access

to smartphones and digital resources, access alone is insufficient to guarantee genuine inclusion or empowerment. Differences in digital literacy, emotional regulation patterns involving smartphone use, and individuals' ability to benefit from digital engagement underscore the importance of considering not only access but also skills and outcomes in digital experiences (Van Dijk, 2020). A key limitation of our study is the lack of a detailed assessment of participants' digital literacy. Higher digital competence likely enables more effective smartphone use for informational and social purposes, with positive effects on well-being and integration. Future research should more systematically examine digital skills and autonomy of use to better capture digital inequality and its implications for well-being. Nevertheless, the risk of socioeconomic bias is partly mitigated in our samples of migrants and people experiencing homelessness, who generally share similar conditions of economic hardship and limited digital access.

A particularly relevant issue is platform-based discrimination: in some cases, digital access may actually heighten vulnerability, especially for migrants engaged in informal or gig economy labor. Future research should examine more closely the intersections between digital exclusion and precarious platform work, in order to understand how these dynamics may reinforce marginalization. Moreover, our findings indicate that second- and third-level digital divides are equally critical for understanding the well-being of socially disadvantaged groups.

While this research focused on migrants, people experiencing homelessness, and prisoners, other marginalized groups, such as elderly individuals, low-income populations, people with disabilities, rural communities, and ethnic minorities, also experience significant digital exclusion. Future research should expand the scope to explore how digital exclusion and smartphone use affect these groups, providing a broader understanding of its impact across diverse populations.

Additionally, the study examined a limited set of variables, overlooking potential moderating or mediating factors. Aspects such as the quality of online interactions and pre-existing mental health conditions may shape the relationship between smartphone use, digital exclusion, and well-being, warranting further investigation.

Cross-cultural studies are also needed to investigate how cultural contexts shape the interaction between marginalized groups and technology, as these contexts may significantly influence the impact of digital exclusion.

Finally, future research should more systematically integrate structural and sociological perspectives on digital inequality. Frameworks such as social capital theory (Bourdieu, 1986) and the network society (Castells, 1996) may help clarify how economic, cultural, and social resources shape individuals' ability to convert digital access into meaningful social participation. Integrating these perspectives would allow for a more comprehensive understanding of how digital inclusion is embedded within broader dynamics of social inequality.

Finally, the PCA approach was exploratory and aimed to assess item performance in hard-to-reach populations. Although the resulting scales showed acceptable reliability, item removal raises questions about measurement robustness. Future studies should further validate these measures across diverse marginalized groups.

The findings underscore the need for tailored strategies to maximize the benefits of smartphone use while reducing risks. Migrants may benefit from information-oriented approaches to bridge resource gaps, people experiencing homelessness from strengthened local communication networks, and incarcerated individuals from digital literacy training and controlled technology access to support reintegration. Beyond identifying digital disparities, future efforts should evaluate and support targeted initiatives, such as digital literacy programs by the International Organization for Migration (2023) and the Fondo per la Repubblica Digitale (2024)¹, as effective models for promoting inclusion among marginalized populations.

Practical Implications

The present findings highlight several actionable implications for different stakeholders:

- For marginalized individuals: Interventions should support not only access to smartphones but also the development of digital skills and the ability to use technology in goal-directed ways (e.g., accessing services, information, and opportunities).
- For social support services and NGOs: Programs should be tailored to the specific needs of different groups. For instance, migrants may benefit from information-oriented digital support (e.g., job and housing platforms), whereas people experiencing homelessness may benefit more from tools that strengthen local social connections and access to nearby services.

- For mental health professionals and support workers: Given the association between smartphone use for emotional regulation and negative psychological outcomes, digital practices should be integrated with offline psychosocial support to prevent maladaptive coping patterns.
- For correctional institutions: Introducing controlled access to digital technologies, alongside digital literacy training, may reduce the gap between prison environments and digital society, facilitating post-release reintegration.
- For policymakers: Digital inclusion strategies should adopt a multidimensional approach that goes beyond device provision, incorporating access to stable internet, digital education, and broader structural interventions addressing poverty, housing instability, and social exclusion.

Conclusion

This paper highlights the complex and context-dependent relationships between smartphone use, digital exclusion, and well-being among migrants, people experiencing homelessness, and prisoners. Across five studies, the findings indicate that the effects of smartphones may differ significantly depending on their usage patterns and the specific circumstances of each group. While smartphones appear to facilitate social connections and access to vital resources, their use for emotional regulation was often associated with heightened resignation, although the cross-sectional design does not allow us to determine whether this use reflects maladaptive coping, a response to pre-existing distress, or both. Importantly, smartphones alone cannot resolve systemic exclusion. Their impact is shaped by broader structural conditions that require targeted policy, economic, and social interventions. Digital exclusion remains linked to isolation and poor well-being, underscoring the need for equitable access and improved conditions of use. These findings underscore the importance of context-sensitive strategies that promote adaptive smartphone use while also tackling the systemic barriers that perpetuate marginalization. This includes advocating for policies that improve internet affordability, expand digital literacy programs, and promote equitable access to devices and connectivity. Existing initiatives (e.g., the International Organization for Migration or the Fondo per la Repubblica Digitale) offer valuable models for designing inclusive, community-based interventions that enhance digital participation and reduce inequality. Governments, NGOs, and private actors all have a role in tackling both technological and socio-economic barriers. Future research should evaluate how such interventions impact the digital divide and well-being among marginalized groups.

Footnotes

¹ *Fondo per la Repubblica Digitale (Fund for the Digital Republic)* is a social enterprise established through a partnership between the Italian government and private foundations, which promote inclusive digital policies and community-based programs aimed at enhancing digital literacy and access in underserved communities.

Conflict of Interest

The authors have no conflicts of interest to declare.

Use of AI Services

During the preparation of this work, the authors used OpenAI's ChatGPT to refine phrasing and improve the readability of the text. After utilizing this tool, the authors thoroughly reviewed and edited the content as necessary and took full responsibility for the content of the published article.

Data Availability Statement

The datasets, analytic code, and study materials supporting the findings of this research are openly available on the Open Science Framework (OSF) at: <https://osf.io/e2tfv/>.

Authors' Contribution

Ilenia Gasparini: conceptualization, methodology, formal analysis, data curation, resources, validation, visualization, writing—original draft. **Marco Marinucci:** conceptualization, methodology, investigation, formal analysis, data curation, resources, software, validation, visualization, writing—review & editing. **Luca Pancani:** conceptualization, methodology, supervision, project administration, funding acquisition, validation, writing—review & editing. **Paolo Riva:** conceptualization, methodology, supervision, project administration, funding acquisition, validation, writing—review & editing.

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Appendix

Table A1. *Smartphone Applications Usage Scale: Items and Factor Loadings (Study 1).*

Codice	On average, how often do you use the following Apps on your smartphone?	Communication factor	Information factor
appUse1	Texting apps (WhatsApp, Messenger, Telegram, ...)	0.86	0.02
appUse2	Social Network (Facebook, Twitter, Pinterest, Instagram, ...)	0.81	0.01
appUse3	Phone calls	0.64	-0.01
appUse5	E-mails	0.18	0.64
appUse6	Calendar & Notes	-0.02	0.75
appUse7	Location apps (Google Maps, Waze, ...)	0.13	0.66
appUse8	Entertainment apps (music, videos, films, sports events, ...)	0.24	0.53
appUse9	Game apps (Pinball, Angry Birds, ...)	0.05	0.55
appUse10	News apps (BBC, CNN, Rai News)	-0.12	0.77
appUse11	Dating apps (Meetic, Tinder, ...)	-0.08	0.62
appUse12	Travel and food apps (JustEat, The Fork, TripAdvisor, Yelp, ...)	-0.16	0.66
appUse13	Online shopping apps (eBay, Amazon, Zalando, ...)	0.11	0.54

Table A2. *Basic Psychological Needs Satisfaction Scale: Final Items and Factor Loadings (Study 1).*

Item Code	Item Text	Dimension	PCA Loading
nsms_belong4	I felt I belonged to a group	Belonging	0.43
nsms_belong5	I felt the other people interacted with me a lot	Belonging	0.53
nsms_sesteem1	I felt good about myself	Self-esteem	0.70
nsms_sesteem2	My self-esteem was high	Self-esteem	0.67
nsms_sesteem3	I felt liked	Self-esteem	0.66
nsms_sesteem5	I felt satisfied	Self-esteem	0.61
nsms_meanexist4	I felt important	Meaningful existence	0.71
nsms_meanexist5	I felt useful	Meaningful existence	0.70
nsms_control1	I felt powerful	Control	0.70
nsms_control2	I felt I had control over the course of events	Control	0.64
nsms_control3	I felt I had the ability to significantly alter events	Control	0.65

Table A3. *Smartphone Usage Scale: Items and Factor Loadings (Study 2a).*

	Before leaving for your journey to Italy, did you use a SMARTPHONE...	Pre-arrival use Factor	Communication Factor	Information Factor	Emotional Regulation Factor
SM1	To get information about the possibility of being welcomed in Italy?	0.62	-0.12	0.34	-0.24
SM2	To get information about the possibility of finding a job in Italy?	0.64	-0.03	0.22	-0.24
SM3	To get information about the dangers and difficulties of the journey to Italy?	0.69	-0.23	0.33	-0.05
SM4	To get information about the means and ways to travel to Italy?	0.64	-0.33	0.40	0.02
SM5	In general, how useful was the smartphone in helping you prepare for your journey to Italy?	0.68	0.04	-0.03	-0.13
	During your journey to Italy, did you use a SMARTPHONE...	Pre-arrival use Factor	Communication Factor	Information Factor	Emotional Regulation Factor
SM6	To look for travel information?	0.78	0.11	0.00	-0.02
SM7	To get to ask for help or call emergency services?	0.85	0.06	-0.25	0.06
SM8	To keep in touch with other migrants?	0.71	-0.03	0.09	0.10
SM9	To keep in touch with your family?	0.81	0.14	-0.09	0.13
SM10	To keep in touch with your friends?	0.79	0.07	0.01	0.12
SM11	To look for shelter, food, and water?	0.77	0.00	-0.10	0.06
SM12	To take photos and videos of your travel experience?	0.78	0.22	-0.05	-0.04
	In Italy, do you use a SMARTPHONE...	Pre-arrival use Factor	Communication Factor	Information Factor	Emotional Regulation Factor
SM13	To keep in touch with your country of origin?	0.11	0.83	-0.04	-0.05
SM14	To keep in touch with your family?	0.18	0.70	0.07	0.01
SM15	To keep in touch with your friends?	0.02	0.82	0.20	-0.08
SM16	To keep in touch with other migrants?	-0.08	0.69	0.30	0.13
SM19	To look for information about Italy?	-0.02	0.27	0.78	-0.02
SM20	To communicate with Italians?	0.22	0.09	0.63	-0.01
SM21	To try to make friends with Italians?	-0.05	0.11	0.80	0.15
SM22	To look for a job in Italy?	0.06	0.05	0.58	0.26
SM25	When you don't know what to do?	0.21	0.36	-0.23	0.46
SM26	When you feel sad?	0.08	0.12	-0.07	0.85
SM27	When you feel depressed?	-0.02	-0.07	0.10	0.88
SM28	When you want to distract yourself from your problems?	-0.02	-0.17	0.16	0.81

Table A4. Smartphone Usage Scale: Items and Factor Loadings (Study 2b).

	Before leaving for your journey to Italy, did you use a SMARTPHONE...	Pre-arrival use Factor	Communication Factor	Information Factor	Emotional Regulation Factor
SM1	To get information about the possibility of being welcomed in Italy?	0.79	-0.13	0.15	0.05
SM2	To get information about the possibility of finding a job in Italy?	0.81	-0.21	0.08	0.05
SM3	To get information about the dangers and difficulties of the journey to Italy?	0.77	-0.22	0.09	-0.01
SM4	To get information about the means and ways to travel to Italy?	0.83	-0.20	0.18	0.04
SM5	In general, how useful was the smartphone in helping you prepare for your journey to Italy?	0.80	0.01	0.09	0.04
	During your journey to Italy, did you use a SMARTPHONE...	Pre-arrival use Factor	Communication Factor	Information Factor	Emotional Regulation Factor
SM6	To look for travel information?	0.71	0.22	-0.02	-0.02
SM7	To get to ask for help or call emergency services?	0.74	0.11	-0.08	0.02
SM8	To keep in touch with other migrants?	0.53	0.34	0.03	0.00
SM9	To keep in touch with your family?	0.62	0.49	-0.24	-0.02
SM10	To keep in touch with your friends?	0.59	0.48	-0.19	-0.05
SM11	To look for shelter, food, and water?	0.50	0.27	0.13	0.09
SM12	To take photos and videos of your travel experience?	0.58	0.42	-0.21	0.08
	In Italy, do you use a SMARTPHONE...	Pre-arrival use Factor	Communication Factor	Information Factor	Emotional Regulation Factor
SM13	To keep in touch with your country of origin?	-0.06	0.78	0.12	0.10
SM14	To keep in touch with your family?	0.03	0.76	0.17	0.12
SM15	To keep in touch with your friends?	-0.07	0.66	0.26	0.06
SM16	To keep in touch with other migrants?	-0.15	0.50	0.38	0.12
SM19	To look for information about Italy?	0.17	0.32	0.57	0.09
SM20	To communicate with Italians?	0.07	0.31	0.69	-0.06
SM21	To try to make friends with Italians?	0.00	0.19	0.71	-0.19
SM22	To look for a job in Italy?	0.16	-0.04	0.70	0.20
SM23	To look for a house in Italy?	0.18	-0.14	0.62	0.15
SM25	When you don't know what to do?	0.00	0.15	-0.06	0.74
SM26	When you feel sad?	-0.04	-0.06	0.05	0.89
SM27	When you feel depressed?	0.00	-0.07	0.06	0.86
SM28	When you want to distract yourself from your problems?	0.04	0.11	-0.13	0.83

Note. The same pool of items used in Study 2a was employed. As in Study 2a, exploratory factor analysis suggested excluding items 17, 18, and 24, while retaining item 23.

Table A5. Smartphone Usage Scale: Items and Factor Loadings (Study 3).

	If you have a smartphone, how much do you use it to...	Communication Factor	Information Factor	Emotional regulation Factor
SMT1	Keep in touch with your family?	0.76	-0.11	-0.10
SMT2	Keep in touch with your friends?	0.78	0.02	0.01
SMT3	Keep in touch with other homeless people?	0.70	0.14	0.13
SMT4	Keep in touch with the organizations you rely on?	0.16	0.71	-0.07
SMT5	Try to make new friends?	0.67	0.04	0.04
SMT6	Look for services that may be useful to you (e.g., food aid)?	-0.09	0.88	-0.03
SMT7	Look for a job?	0.00	0.79	0.09
SMT8	Look for housing?	0.13	0.64	0.01
SMT9	When you don't know what to do?	0.05	-0.07	0.70
SMT10	When you feel sad?	0.03	-0.07	0.92
SMT11	When you feel depressed?	-0.05	0.09	0.89
SMT12	When you want to distract yourself from your problems?	0.01	0.01	0.86

Table A6. Perceived Deprivation Scale: Items and Factor Loadings (Study 4).

	Compared to people who are NOT in prison, HOW DISADVANTAGED DO YOU FEEL because...	Access Deprivation Factor	Ability Deprivation Factor
LackDT_1	You don't have access to the internet	0.86	0.00
LackDT_2	You don't have access to a smartphone (mobile phone)	0.92	-0.01
LackDT_3	You cannot access social media (Facebook, Instagram, TikTok)	0.89	-0.02
LackDT_4	You cannot make video calls	0.61	0.13
LackDT_5	You cannot play videogames	0.48	0.16
LackDT_6	You cannot send instant messages (WhatsApp)	0.86	0.04
LackDT_7	You don't know how to use the Internet and its devices (e.g., computer, smartphone, social media)	0.07	0.81
LackDT_8	You don't know how to take advantage of the resources available on the internet	0.10	0.87
LackDT_9	Once released from prison, you will struggle to keep up with the technological progress related to the Internet	0.00	0.57

Table A7. Perceived Impediment Scale: Items and Factor Loadings (Study 4).

	THE LACK OF INTERNET AND RELATED DEVICES (computer, phone)	Digital Technology Impediment Factor
LackDT_10	Limits my potential	0.77
LackDT_11	Is something I often think about	0.81
LackDT_12	Cause me suffering	0.71
LackDT_13	Prevents me from meeting my social needs (staying in regular contact with my family, friends, etc.)	0.77
LackDT_14	Prevents me from learning new things or developing professionally	0.73
LackDT_15	Prevents me from finding the information I need	0.76
LackDT_16	Prevents me from relaxing and having fun	0.75
LackDT_17	Makes my life unfairly harder	0.77
LackDT_18	It is an overly harsh restriction of the prison	0.59

Table A8 presents all regression paths and covariances among the outcome variables. It includes unstandardized coefficients (b), standard errors (SE), exact p-values, and 95% confidence intervals (95% CI). Age, education, and gender were included as covariates in all analyses.

Table A8. Results of the Path Analysis (Study 1).

Outcome	Predictor	<i>b</i>	<i>SE</i>	<i>z</i>	<i>p</i>	95% CI
Sociocultural adaptation	Communication Applications	0.056	0.054	1.03	.302	[-0.050, 0.161]
	Information Applications	0.365	0.058	6.24	< .001	[0.250, 0.480]
	Age	0.005	0.005	1.08	.278	[-0.004, 0.014]
	Education	0.005	0.008	0.56	.575	[-0.012, 0.021]
	Sex	-0.068	0.104	-0.65	.512	[-0.272, 0.136]
Physical health	Communication Applications	-0.069	0.061	-1.14	.255	[-0.188, 0.050]
	Information Applications	0.184	0.066	2.79	.005	[0.055, 0.314]
	Age	-0.012	0.005	-2.38	.018	[-0.022, -0.002]
	Education	0.010	0.010	1.03	.303	[-0.009, 0.028]
	Sex	-0.231	0.118	-1.97	.049	[-0.462, -0.001]
Basic psychological needs	Communication Applications	-0.042	0.058	-0.73	.469	[-0.156, 0.072]
	Information Applications	0.338	0.063	5.35	< .001	[0.214, 0.461]
	Age	0.008	0.005	1.66	.098	[-0.002, 0.018]
	Education	-0.018	0.009	-1.99	.047	[-0.036, -0.000]
	Sex	-0.003	0.113	-0.02	.980	[-0.223, 0.218]
Covariances						
Sociocultural adaptation ↔ Physical Health		0.106	0.029	3.73	< .001	[0.050, 0.162]
Sociocultural adaptation ↔ Basic psychological needs		0.145	0.028	5.12	< .001	[0.090, 0.201]
Physical Health ↔ Basic psychological needs		0.084	0.030	2.76	.006	[0.024, 0.143]

Table A9 presents all regression paths and covariances among the outcome variables. It includes unstandardized coefficients (b), standard errors (SE), exact p-values, and 95% confidence intervals (95% CI). Age and education were included as covariates in all analyses.

Table A9. Results of the Path Analysis (Study 2a).

Outcome	Predictor	<i>b</i>	<i>SE</i>	<i>z</i>	<i>p</i>	95% CI
Resignation	Communication	−0.104	0.071	−1.47	.140	[−0.243, 0.034]
	Information	−0.102	0.077	−1.33	.182	[−0.252, 0.048]
	Emotional regulation	0.290	0.065	4.47	< .001	[0.163, 0.417]
	Pre-arrival	−0.021	0.074	−0.28	.781	[−0.166, 0.124]
	Age	−0.013	0.010	−1.22	.224	[−0.033, 0.008]
	Education	−0.055	0.019	−2.90	.004	[−0.092, −0.018]
Sociocultural adaptation	Communication	0.363	0.079	4.62	< .001	[0.209, 0.517]
	Information	0.078	0.083	0.94	.348	[−0.085, 0.240]
	Emotional regulation	−0.044	0.069	−0.64	.521	[−0.180, 0.091]
	Pre-arrival	−0.079	0.078	−1.02	.310	[−0.232, 0.074]
	Age	−0.009	0.011	−0.80	.426	[−0.030, 0.013]
	Education	0.070	0.021	3.34	.001	[0.029, 0.111]
Variables						
Resignation ↔ Sociocultural adaptation						
		−0.032	0.038	−0.84	.403	[−0.108, 0.043]

Table A10 presents all regression paths and covariances among the outcome variables. It includes unstandardized coefficients (b), standard errors (SE), exact p-values, and 95% confidence intervals (95% CI). Age, education, and gender were included as covariates in all analyses.

Table A10. Results of the Path Analysis (Study 2b).

Outcome	Predictor	<i>b</i>	<i>SE</i>	<i>z</i>	<i>p</i>	95% CI
Resignation	Communication	−0.158	0.087	−1.81	.070	[−0.329, 0.013]
	Information	−0.057	0.090	−0.63	.526	[−0.233, 0.119]
	Emotional regulation	0.275	0.069	3.99	< .001	[−0.140, 0.410]
	Pre-arrival	−0.001	0.070	−0.02	.986	[−0.138, 0.135]
	Age	−0.002	0.007	−0.30	.764	[−0.016, 0.012]
	Education	−0.020	0.016	−1.27	.205	[0.050, 0.011]
	Gender	−0.008	0.156	−0.05	.961	[−0.313, 0.297]
Sociocultural adaptation	Communication	0.024	0.096	0.25	.805	[−0.165, 0.213]
	Information	0.136	0.099	1.38	.167	[−0.057, 0.329]
	Emotional regulation	0.050	0.076	0.66	.512	[−0.099, 0.199]
	Pre-arrival	−0.038	0.077	−0.49	.624	[−0.189, 0.113]
	Age	0.001	0.008	0.18	.856	[−0.014, 0.017]
	Education	0.022	0.017	1.30	.193	[−0.011, 0.056]
	Gender	0.263	0.171	1.54	.124	[−0.072, 0.597]
Variables						
Resignation ↔ Sociocultural adaptation						
		−0.266	0.068	−3.89	< .001	[−0.400, −0.132]

Table A11 presents all regression paths and covariances among the outcome variables. It includes unstandardized coefficients (b), standard errors (SE), exact p-values, and 95% confidence intervals (95% CI). Age, education, and gender were included as covariates in all analyses.

Table A11. *Results of the Path Analysis (Study 3).*

Outcome	Predictor	<i>b</i>	<i>SE</i>	<i>z</i>	<i>p</i>	95% CI
Resignation	Communication	−0.338	0.133	−2.53	.011	[−0.599, −0.076]
	Information	0.076	0.099	0.76	.445	[−0.119, 0.270]
	Emotional regulation	0.530	0.086	6.13	< .001	[0.360, 0.699]
	Age	0.007	0.010	0.76	.447	[−0.012, 0.026]
	Education	−0.038	0.143	−0.26	.791	[−0.318, 0.242]
	Gender	−0.184	0.255	−0.72	.471	[−0.683, 0.315]
Physical health	Communication	0.289	0.150	1.93	.054	[−0.005, 0.582]
	Information	0.028	0.111	0.25	.803	[−0.191, 0.246]
	Emotional regulation	−0.166	0.097	−1.71	.087	[−0.356, 0.024]
	Age	−0.017	0.011	−1.59	.111	[−0.039, 0.004]
	Education	0.036	0.160	0.22	.823	[−0.278, 0.350]
	Gender	0.351	0.286	1.23	.220	[−0.210, 0.911]
Covariances						
Resignation ↔ Physical health		−0.163	0.075	−2.16	.031	[−0.310, −0.015]

Table A12 presents all regression paths and covariances among the outcome variables. It includes unstandardized coefficients (b), standard errors (SE), exact p-values, and 95% confidence intervals (95% CI). Age and education were included as covariates in all analyses.

Table A12. *Results of the Path Analysis (Study 4).*

Outcome	Predictor	<i>b</i>	<i>SE</i>	<i>z</i>	<i>p</i>	95% CI
Resignation	Access Deprivation	−0.023	0.053	−0.44	.660	[−0.126, 0.080]
	Ability Deprivation	0.215	0.055	3.92	< .001	[0.108, 0.322]
	Digital Technology Impedimenti	0.311	0.075	4.14	< .001	[0.164, 0.458]
	Age	−0.008	0.004	−1.91	.056	[−0.017, 0.000]
	Education	0.080	0.084	0.95	.343	[−0.085, 0.245]
Physical health	Access Deprivation	0.058	0.059	0.98	.325	[−0.057, 0.172]
	Ability Deprivation	−0.135	0.061	−2.20	.027	[−0.255, −0.015]
	Digital Technology Impedimenti	−0.324	0.085	−3.82	< .001	[−0.490, −0.158]
	Age	−0.006	0.005	−1.32	.185	[−0.016, 0.003]
	Education	0.006	0.095	0.06	.953	[−0.180, 0.192]
Variables						
Resignation ↔ Physical health		−0.171	0.049	−3.53	< .001	[−0.267, −0.076]

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