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SHORT COMMUNICATION

Smartphone use and loneliness in life transitions: A biopsychosocial perspective

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Abstract

Major life transitions, such as entering the workforce or retirement, often disrupt social ties and increase the risk of involuntary loneliness and social isolation. Smartphone use as a coping strategy during these periods is complex, but particularly relevant for young and older adults, who are especially vulnerable. While smartphones can facilitate social connection, they also carry a substantial risk of problematic use, which has been linked to reduced offline interaction, anxiety, and depression. Clear age-related patterns emerge: young adults more often rely on impulsivity-driven coping (e.g., disordered eating or substance misuse), whereas in older adults, digital engagement more frequently intersects with health-related vulnerabilities, including sleep disturbances, cognitive decline, and gut–brain interactions. Developing a comprehensive biopsychosocial model that integrates biological (e.g., gut microbiota diversity and metabolic markers), psychological (e.g., stress and emotion regulation), and social (e.g., relationships and daily routines) levels of analysis would help distinguish protective from risky digital use. Such an approach could also enable earlier identification of at-risk individuals and support the development of tailored, age-sensitive prevention and intervention strategies during major life transitions.

Keywords: *involuntary loneliness, social isolation, smartphone addiction, biopsychosocial framework, young individuals, older individuals*

A major life transition is a significant change in a person's role, routine, identity or circumstances that requires emotional, psychological, social or practical adjustment for the person over time. A major life transition may be the beginning of a new phase of a person's life that reshapes how they live; it may bring new responsibilities or expectations, it may be planned or unplanned and can be positive, negative or mixed in terms of impact [1]. Examples of major life transitions could be entering the workforce, becoming unemployed, retiring, becoming a parent or divorcing. Life transitions often lead to increased stress and anxiety [2]. They can disrupt social connections, which can create a risk of social isolation and loneliness [3,4]. Involuntary loneliness is a subjective negative feeling linked to and arising from lacking desired social relationships and can negatively affect mental and physical health [5,6]. Social isolation refers to the objective absence of social interactions, which may not be harmful when chosen voluntarily. Both involuntary loneliness and social isolation are increasingly reported as threats to health

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for which there are no supports, impacting large numbers of young and older adults [7]. It is therefore important to examine if and how life transitions shape involuntary loneliness and social isolation, and whether particular coping mechanisms can mitigate or worsen their effects.

Longitudinal research validating life-course frameworks revealed that technology use frequency is a behaviour that changes and is influenced by the social roles encountered during the transition to adulthood [8]. Other recent studies indicate that life transitions play a role in determining whether digital engagement is problematic or purposeful [9]. In this article, we plan to focus specifically on young and older adults and their smartphone use, since they are the groups most at risk of involuntary loneliness and social isolation.

Smartphones may serve as an information and entertainment source, but may also be used as a coping mechanism for loneliness; however, dependence on digital interactions to address loneliness or isolation can potentially increase loneliness and problematic use [10,11]. Problematic patterns of smartphone use [12] are often associated with reduced offline communication, sleep disruption, anxiety and depression; problematic smartphone use is often linked to heavy engagement with social media, messaging apps and short-video platforms [13].

Among young adults, the prevalence of problematic smartphone use represents a growing public health concern [14-16], with social anxiety representing a major risk factor [17,18]. In addition, young adults are more likely to use smartphones for social networking, entertainment and academic work. This increases the risk of overuse, which can worsen stressors such as the transition from school to work, reduced physical activity, less face-to-face interaction and a lack of nurturing physical contact [19]. Studies on older adults' smartphone use during major life transitions show a lower but increasing prevalence of problematic use, with distinct psychosocial predictors such as boredom, cognitive decline and poor family dynamics [20]. Older adults typically report lower levels of dependence than young adults. Fear of missing out, while present, appears not to influence older adults' behavior as much: boredom often plays a stronger role in predicting their digital engagement [21]. Older adults often use smartphones to stay connected with family and friends during transitions like retirement [22].

The relationship between smartphone use, involuntary loneliness and social isolation is complex and may vary across age groups. Among young adults, current evidence does not establish a clear causal link between loneliness and problematic smartphone use [23]. In contrast, among older adults, smartphone use (or broader communication technology use) is more often associated with a reduced risk of loneliness and improved social connection, particularly among those who are frail or socially isolated [24]. An underresearched aspect concerns the link between problematic smartphone use and maladaptive coping mechanisms during transitions. Periods of vulnerability increase susceptibility to unhealthy behaviours such as eating disorders, preference for calorie-dense foods and alcohol misuse [25]. These behaviours often begin as coping strategies linked to transitions such as entering or leaving working life [26] or, in older adults, retirement, bereavement or declining health. Smartphones may reinforce these coping strategies through pathways including poor emotion regulation, impulsivity, low self-esteem, depression, anxiety, sleep disturbances, musculoskeletal problems, reduced physical activity and even other addictions such as gambling [7,27]. In older populations, smartphone addiction has been shown to co-occur with poorer sleep quality, elevated depressive symptoms and anxiety [28]. Notably, among smartphone owners, higher health literacy and stronger social support appear to moderate the risk of frailty [29]. These behaviours can reinforce one another, creating biopsychosocial feedback loops that alter reward and aversion processing in the brain [30]. We suggest that this feedback loop may manifest differently across age groups: in young adults, primarily through impulsive or emotion-driven behaviours; in older adults, more through compounded health decline, social isolation and cognitive risk, with partial overlap in underlying mechanisms (e.g. emotion regulation, sleep quality).

Despite growing research in this field, we argue there is still a need to develop a comprehensive biopsychosocial model to guide and facilitate the study of smartphone use in life transitions and its impact across age groups. This model should address three levels: biological (e.g. neuroendocrine and metabolic markers, cardiovascular indicators, gut health), psychological (stress, loneliness) and social (relationships, routines). It would be useful to investigate the links between, for example, smartphone use (either healthy or problematic) and gut microbiota diversity [31] or the overlap with other addictions, while taking into consideration other crucial aspects such as the interaction with other biological, psychological and social aspects. It can also help identify when smartphone use poses risks versus when it supports coping and reveal feedback loops that exacerbate vulnerabilities during transitions.

In conclusion, the interplay between smartphone use, loneliness and maladaptive coping during life transitions across age groups highlights the need for a biopsychosocial perspective that accounts for

age-related differences in vulnerabilities, coping strategies and health outcomes. Among young adults, problematic smartphone use often reflects impulsivity-driven coping (e.g. disordered eating, substance misuse), whereas in older adults, digital engagement more often intersects with existing health vulnerabilities, such as sleep disturbances, musculoskeletal complications and gut–brain interactions [25]. Smartphones can therefore both mitigate and exacerbate involuntary loneliness, supporting social connections in some contexts, while promoting problematic use in others [32]. Applying a biopsychosocial framework may help distinguish protective from risky patterns of use, enabling early identification of at-risk individuals and informing tailored, age-sensitive prevention and intervention strategies.

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