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Editorial

Psychosocial exposome and double precarity as emergent concepts for an old story

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Mental health is usually defined as a mental state (World Health Organization, 2001; American Psychological Association, 2020). However, it is also possible to look at mental health as an ever-changing highly dynamic process, in which a multitude of individual and environmental elements and mechanisms concur for effective coping with adversity and acute or chronic sources of stress. The interplay between non-genomic factors affecting health, including mental health, was labeled by Wild (2005) as exposome, meaning *"every exposure to which an individual is subjected from conception to death"* (Wild, 12, p.24). According to Wild (2005), there are three categories of exposome (internal, specific external, and general external), with external exposome enclosing (among other health environmental determinants): individuals' educational background, financial status, macro- and socioeconomic, healthcare inequities, political and cultural contexts, urban-rural environments, and climate conditions. All these factors interact with external chemical, biological, and physical environmental health determinants (the specific external factors of exposome), combining with individuals' internal exposome (metabolism, endogenous circulating hormones, gut microbiota, inflammation, oxidative stress, previous medical clinical history, aging), and, finally, affecting the genomic characteristics in an extraordinarily complex causality cocktail that, overall, contributes to the explanation of individuals' behavior, physical and mental health conditions. Everyone's life trajectory is, naturally, immersed in constant exposure to such combined factors, some promoting personal development and some threatening well-being. The evolutive and cumulative composite of these challenges, resulting from an interplay with the world, determines momentary states of well-being; and those fleeting, highly dynamic, states of well-being determine the way we see the next challenges that are proposed to us by the environments in which we navigate. So, instead of a specific state output, it is more heuristic to consider mental health (including emotional and cognitive processes, namely decision-making capacity) as a component of a continuous evolutive and interactive process with the self, the others, and its environment (mostly satisfying both homeostatic and allostatic principles).

In 2018, Colomina and colleagues coined the term "*psychoexposome*" as a new and comprehensive etiological paradigm for psychopathology. They defended that psychosocial environmental exposures need to be considered as the basis of psychopathology, highlighting the relevance of early life experiences on neural circuits (adopting a rather materialistic structural and mental disorder-specific approach, therefore). Later, Gudi-Mindermann and colleagues (2023) advanced the concept "*social exposome*", defending (in the same line as Vineis and colleagues, 2022) that socio-economic variables should not be considered as confounders, as normally done in

explanatory models of (physical and mental) diseases, but rather as overarching variables ("*the causes of the causes*", as stated by Wild, in 2012, p. 24). Both concepts ("*psychoexposome*" and "*social exposome*") raise attention to social, political, and economic contexts (and associated inequities) as main, overarching, determinants of mental (and physical) health. In both conceptual proposals, individuals' psychological factors appear to have a more discrete role than the social structure and social processes that impinge on the individual. Or, at least, psychological factors tend to be perceived as outcomes, i.e., products of the effects of social, economic, and political environmental factors. We believe that this perspective does not fully recognize the crucial role of intra-individual trace or state characteristics, like personality traits, coping mechanisms, self-esteem, emotional regulation capacity, self-efficacy perceptions, or beliefs about the world (resulting in more, or less, resilience). Therefore, we suggest that a more comprehensive term for this external component of exposome (to follow Wild's terminology) would be "Psychosocial exposome". By psychosocial exposome, we consider the intrinsically related interplay between human-related external (to individuals) factors (e.g., socio-economic, cultural, urban-rural environments), and individuals' psychological determinants that, ultimately, articulate with the physical, chemical, and biological agents, acting upon structural individuals' genomic and epigenetic determinants.

Regardless of the continuous challenges one faces in life, it is possible to select some environmental (i.e., out-of-individual factors) dimensions that play a major role in the psychosocial exposome, having a profound impact on an individual's lifespan mental health. In this reflection, we will focus our attention on two main dimensions of the psychosocial exposome: housing and employment, as a double precarity phenomenon.

Adequate housing is not a commodity. Nor should it be a conditional, merit-based, achievement. Indeed, housing has been a fundamental right since 1948's Universal Declaration of Human Rights, a right that was reinforced by the United Nations in 2021, stating the right to adequate housing and proposing a minimum set of conditions for its definition, including accessibility (to housing), security of tenure, habitability, and availability of services, materials, facilities, and infrastructures required for adequate housing maintenance and daily living. In the same statement, it is also highlighted that adequate housing is pivotal for ensuring several other human rights, including the right to privacy, education, work, health, and social security.

Precarious housing conditions represent a main facet of poverty, affecting a large share of the Portuguese population. Diogo et al. (2021) presented an impressive and comprehensive sociological, though individual-focused, portrait of poverty in Portugal, describing life-long and intergenerational trajectories of poverty. Based on a mixed-methods (quantitative and qualitative) approach, their report points out the high prevalence of vulnerability in the Portuguese population. The authors conclude that, whereas 17,2% (meaning 1.77 million Portuguese) were, in 2018, at risk of poverty (21,6% were at risk of poverty or social exclusion – different definitions of poverty with different epidemiological implications), it was also estimated (by Costa et al., 2008) that almost half (46%) of the Portuguese population were living in precarious and vulnerable conditions, being highly sensible to the individual, family, societal macro-economic dynamics (i.e., individuals easily falling in scenarios of poverty).

All these data regard the period before the most recent pandemic occurred, playing a major role in the deterioration of health, social, and economic conditions, and introducing dramatic implications for a very large number of individuals and families. People who were already living near poverty easily fell into poverty when facing COVID-19 health-related events, including long-term disabilities or deaths of significant others, or deterioration of job-related or household-income conditions associated with the pandemic period (during or afterward; how many people lost their jobs without having the opportunity to get back to similar job conditions?). In addition, the after-pandemic economic scenario is being exacerbated by the emergence of armed conflicts in both Europe and the Middle East, with increased hate speech and social

and cultural divide. In the backstage, though perceived at a longer distance (in time; for many also in space), we are continuously exposed to evidence related to the global threat of catastrophic events associated to climate change. Finally, these stressful-inducing scenarios can be associated with a sharp rise in economic inflation, related to dramatic rises in mortgage interest rates, converging towards individuals' lower capacity to cope with daily living costs or, at least, to a perception of scarcity or eminent scarcity. Indeed, it is difficult to argue that this perfect storm (a pandemic plus war and geopolitical instability plus increased inflation plus expensive loan-related costs and housing unaffordability) is not associated with the fact that, in 2022, the risk of poverty was estimated to have increased to 21,2% (a notable rise of four percentual points, when compared to 2018) (Tavares & Carmo, 2023). Of course, the Portuguese traditional context of poverty asymmetries between genders (higher percentage of poverty for women), and geographic regions (26,1% for Açores), just to name a couple of inequities, makes this problem even more complex.

This burdensome context is not exclusive to Portugal (and this is not good news for our country). Indeed, the second European Barometer on Poverty and Precariousness (Mercier et al., 2023), based on information from 10 000 European citizens (including Portuguese), outlines that about one-third of Europeans self-report to be in a precarious material situation. Answers from 46% of the sample of the barometer suggested energy poverty, about one-third reported food insecurity conditions, 37% reported having interrupted health treatments due to financial constraints, and 15% reported being housed by friends or relatives because they could no longer afford their own home. Translating this worrying scenario into daily stressors, the same report indicated that a relevant percentage of Europeans was worried about their ability to cope with inflation, especially about food prices (62%), unexpected expenses (59%), and finding a new job if necessary (52%).

Double precarity and health

It is rather consensual that housing and employment are pivotal structures for the satisfaction of fundamental psychological needs, and subjective and psychological wellbeing. As Garnham et al. (2021) highlight, poverty, poor housing, and poor health (mental and physical health), are heavily interwoven. Growing scientific literature places insecure employment as associated with poorer mental health (Bentley et al., 2019). A potential mediator for this association may be housing affordability stress because in most cases household's ability to afford rent or mortgage costs depends on the household's employment security. Bentley and colleagues, following Desmond and Gershenson's (2016) rationale, proposed the concept of "double precarity" to describe the cumulative deleterious effect of struggling to obtain or maintain employment and housing (Bentley et al., 2019, Desmond & Gershenson, 2016). In a large-scale Australian cohort, Bentley and colleagues found that if household members become insecurely employed, there were at five-times greater odds of also experiencing housing affordability stress. Single parents, people who live alone, and people who were recently separated or divorced, were, of course, more vulnerable to this type of stressor; inversely, it has been also observed that changes in housing cost or affordability stress mediate insecure employment onset. Baker et al. (2020) found, with a large-scale 15-year longitudinal study, an association between experiencing prolonged affordability housing problems with depression symptoms (Baker et al., 2020). A systematic review (Virgolino et al., 2022) revealed that unemployment was associated with worse mental health, namely depression and suicidal behavior, regardless of the economic context. Finally, the association between poor housing and worse health has been found in a large-scale epidemiological study comparing all-cause and cause-specific mortality taxes over a 16.3-year follow-up (cohort design), with different housing typologies in Porto City (Ribeiro & Barros, 2020). The authors found an association between

residing in social housing and an increased relative risk of being sedentary, suffering from obesity, or having alcohol-related problems. Also, premature deaths and cardiovascular disease mortality were more frequent in individuals with poor housing, even after adjusting for social and economic factors.

Double precarity and the sense of self

Housing stability is a highly relevant determinant of positive well-being. It has been found that tenants' financial stability and resilience to overcome unstable economic-real-estate markets undermine individuals' sense of home (Garnham et al., 2021). This is understandable because this sense of home depends, and is implied on individuals' identity formation, sense of privacy, comfort, and stability (Garnham et al., 2021). Besides housing material dimensions, a symbolic dimension representing it as a place of refuge appears to be fundamental for acknowledging the sense of identity, attributing meaning to the environment and, intertwined, for the sense of self (Otavova et al., 2022). According to Soleimani and Gharehbaglou (2021), "home" provides *ontological security*, a place where one can exercise autonomy and explore identity.

Within contexts of double precarity, the level of one's autonomy related to housing and home, seems, besides entangled, heavily threatened. Therefore, it can be hypothesized that one's sense of self is, also, threatened; living in poor housing or in a poor neighborhood environment not only install chronic stress and personal dissatisfaction (affecting physical and mental health) (Otavova et al., 2022) but also undermines healthy interactions with environments (Soleimani & Gharehbaglou, 2021). Therefore, when tackling double precarity, we need to consider that we are not only tackling housing and household economic stability, but we are also tackling individuals' ability to develop their identity and meaningful lives.

Double precarity and cognitive resources for decision-making processes

There is substantial evidence about the association between poverty or financial stress and health. The seminal work from Marmot and colleagues (e.g., Marmot, 2005) changed the way public health and epidemiology were thought of, spotting social and economic disparities as main drivers of human disease, for both physical and mental health. Adding to that, and in the field of psychology, there is a substantial body of research contributing to robust evidence about the impact of scarcity on deliberative (executive) cognition, on rational and individual-protective choices (namely on health behavioral choices), and, ultimately, on mental and physical health. This area of research is embedded in the dual cognitive process paradigm, supported on the pioneering work of Tversky and Kahneman (1974) but also aligned with the construct of ego depletion; Baumeister, 1998). In the next section, we will summarize some of that literature. For now, it is relevant to highlight that scarcity as a concept (Mani et al, 2013; Mullainathan & Shafir, 2013; Sha et al., 2012) relates more to the reduced cognitive capacity to avoid narrowed impulsive decisions or actions (and, instead, to activate higher-spectrum attention-driven deliberative decisions) than to poverty or other types of real-world scarcity. In other words, it is the perception of scarcity (e.g., of goods, of time to complete a task, or of attention capacity) that "shrinks" the focus of deliberative cognition, rather than real-world scarcity. The interpretation of "less" (time, money, etc.) induces stress. And the physiological mechanisms of stress, with suppression of pre-frontal and hippocampus activity, impairing large-band attention, learning, and memory consolidation) (De Alcubierre et al., 2023; Blankenship et al., 2019; Souza-Talarico et al., 2011), provide additional explanation, as structural correlates, of the well-established scarcity effect. However, stress is not limited to scarcity situational contexts. Indeed, it would be interesting to pursue a line of research where the integrated combination of stressors is considered a global determinant of the performance of executive cognitive functions and, ultimately, of rational choices (healthy choices, clever use of finances, adequate interpersonal behavior, less biased decisions, etc.). Our challenging times, when social, economic, and geopolitical adversities are combined and intensified by globalization (namely, with continuous and massive exposure to information, both

accurate and misleading information), offer a new look at the concept of scarcity and its impact on psychological outcomes, justifying what can be called as a psychosocial exposome paradigm. Individuals' emotions, decisions, and acts can result (not only but also) from scarcity related to housing conditions and precarious job conditions (meaning, double precarity). Instead of looking at each of these factors as isolated constraints, it is necessary to consider the integrated, combined, and, eventually, cumulative stressors, buffered by resilience factors (self-esteem, self-efficacy, and social support perception, among many others). All these factors constitute the complex matrix that, ultimately, may explain intra- and inter-individual variability in choices and mental health.

Inevitably, double precarity not only promotes mental suffering and undermines the sense of home but also implies, of course, financial constraints that might relate to the sense of self; altogether, this seems to be in line with Mani and colleagues' (2013) study on poverty and cognitive function whereas poverty concerns related to finances leave fewer cognitive resources for decision-making processes. The authors defined poverty as *"the gap between one's needs and the resources available to fulfill them"* (Mani et al., 2013, p. 976) highlighting its subjective dimension. In the same work, the authors considered attentional capture (e.g., financial difficulties capture attention and, so, reduce cognitive resources) to be the most compelling explanatory mechanism.

If we consider that double precarity operationalizes Mani and colleagues' (2013) definition of poverty, then, double precarity can be considered a form of poverty. In this regard, affordable housing might not only be key to tackling health and social inequities but, also, a fundamental social determinant of mental (and physical) health (Garnham et al., 2021).

If poverty impairs cognitive function and, double precarity is a form of poverty, and, alone or together, they might result in poorer mental health and less well-being, could double precarity be influencing decision-making processes reinforcing the cycle of poverty and poorer health?

Double precarity, food insecurity, and binge eating: not eating enough and not stopping eating

A relevant field of application of the paradigm of scarcity, namely within the context of double precarity as a nuclear stressor of the whole psychosocial exposome, is health psychology and, more specifically, food behavior.

Although at first glance it may seem paradoxical, food insecurity and binge eating are not always two opposing currencies; on the contrary, they can be two sides of the same coin - especially in situations of financial hardship underlying double precarity. In this regard, Abene and colleagues (2023) recently conducted the first meta-analysis demonstrating that food insecurity is also associated with binge eating. Their data indicated that the odds of suffering from binge eating were 2.7 higher in the group of adults exposed to food insecurity when compared with the group of adults of the food secure group. The authors highlight that these results are congruent with dietary restraint theories of binge eating.

Food for thought and future directions

Mani and colleagues (2013) concluded, from a very elegant experimental study, that the simple fact of evoking financial concerns has a cognitive impact comparable to losing a full night of sleep. What might then be the cognitive and mental health effects of suffering from financial concerns, due to double precarity, for a lifetime? And on top of several other environmental stressors? What are the mental health effects of intergenerational double precarity? Double precarity represents a context of continuous stress, causing negative affective states, that may lead to short-sighted and risk-averse decision-making, associated with automatic and impulsive behaviors (namely, habits), at the expense of goal-directed ones (Haushofer, 2014). Contrary to what is known about the deleterious effects of chronic stress on health, little is known about the effects of acute or chronic (e.g., due to material scarcity) stress on economic choices. This is an important area to explore, preferably with longitudinal real-world designs.

Even more difficult to assess (though highly relevant): how much does double precarity explain the association between psychosocial exposome and biased (and unfavorable) decision-making processes (driving into inadequate economic, interpersonal, or health-related behaviors)? And what about its association with subjective and psychological well-being? How do social inequities mediate these associations?

These are obvious additional research avenues to pursue. Some of them require innovative methods. Indeed, the characterization and impact-assessment of exposome raises issues such as: how to measure (how to ensure psychometric quality in massive, intra-, and inter-measurements, namely when having access to big data), when and how frequently should we measure psychosocial determinants (in cross-sectional, retrospective, and prospective designs)? How to choose between the best network science techniques and conduct adequate data interpretation?

It is widely recognized that economic and social development depends on the average individual capacity for rational and creative decision-making, as well as on the health and well-being status of the population. In that sense, maybe the most crucial questions should address the evaluation of social, educational, economic, environmental, and mental health policies (especially when integrated) aiming to reduce negative-charged psychosocial exposome, including double precarity exposure, and to mitigate the deleterious short and long-term effects of such stressors. We need to know more about welfare programs or intervention characteristics that are most effective in mitigating the psychological negative impact of poverty, including the double precarity marker, in the long term. There is evidence on how individual interventions can have positive effects on mitigating poverty effects (Haushofer, 2014), though difficult to translate to interventions targeting large communities. Of course, remediation should be the last resource and, therefore, the main issue brings us to an old question: how to ensure that stakeholders (at different levels of society) prioritize double precarity reduction (if not extinction) and promote mental health and well-being as main tools for environmental and economic synergic development. This is a main social contract issue, as recognized by the United Nations, nearly one century ago.

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