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Social Isolation: An Underappreciated Determinant of Physical Health

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Highlights

- The paper adds to the current evidence documenting the influence of social factors on health and well-being.
- It argues that social isolation is a critical factor in a broader multi-factorial conceptualization of social connection that conveys significant independent risk to health and mortality.
- It proposes that social isolation, as a construct, may represent a weak social foundation leading to significant vulnerability.

Summary

While a sizable body of research demonstrates the associations between social connection and health, much of the recent focus in the broader public and to some extent among academics has been on loneliness, with more objective/structural aspects often assumed to be proxies for more influential relationship factors such as relationship functions and quality. However, evidence suggests the actual presence of others (proximity and regular contact) is essential, and many studies document these structural indicators have just as powerful and, in some cases, more potent effects on indicators of health and well-being. This paper summarizes the evidence on social isolation and health and provides a framework for why social isolation may be a powerful predictor of health and mortality.

Introduction

Over the past several decades, research has amassed documenting the long-term health effects of social relationships [1]. This research has spanned several disciplines to include diverse conceptual and measurement approaches. Despite low correlations between these approaches, converging evidence points to the protective effects of the existence of relationships (e.g., social integration, social roles, marital status), the functions they serve (e.g., social support), and high satisfaction with these relationships (e.g., relationship quality) and conversely health risks associated with corresponding deficits in each of these areas (e.g., social isolation, loneliness, interpersonal conflict)[2,3]. These findings have led some researchers to propose a multi-factorial approach to social connections, including the structure, function, and quality of relationships, which is critical in understanding the full scope of potential pathways to health risk when insufficient and health protection when present [2,4]. While this multi-factorial approach has been applied to some extent [5], much of the research does not examine the synergistic or additive influence of these components but instead examines each in parallel with some aspects more commonly examined than others [1].

When it comes to risk, the focus has been on social deficits—particularly social isolation and loneliness. Social isolation is defined and measured in various ways but generally is thought to be a relatively objective indicator of being alone, having few or infrequent social contacts or roles, and little involvement in clubs or organizations [6,7]. Loneliness is often defined as a subjective distressing feeling of isolation or the discrepancy between one's desired and actual level of social connection [8].

The evidence suggests each of the components of social connection significantly contributes to health risk or protection [2,4]. However, much of the recent concern about individual and public health within the broader public and to some extent among academics have focused on loneliness [9]. More objective/structural aspects of relationships (e.g., social isolation, network size, group membership, living alone) are often assumed to be crude indicators of "more important" relationship factors, including the functions and quality of relationships. Nonetheless, evidence suggests the actual presence of others—including the existence of relationships and roles, proximity, and regular contact-- is a powerful, in some cases stronger predictor of health than other aspects of relationships [2,10]. Thus, the relative importance of social isolation for health and well-being may be underappreciated.

This paper summarizes the evidence demonstrating the impact of social isolation on physical health and provides a framework for why social isolation may be such a powerful predictor of health and mortality. This evidence has important implications for understanding what types of interventions may be most effective in reducing risk and why some may have had disappointing results. Finally, these findings are relevant for policy and practices that limit social contact. This may be particularly important to consider in the context of the COVID-19 pandemic response and recovery efforts, including subsequent policies restricting social contact across sectors such as education, employment, and congregate housing (see Pietromonaco & Overall, this issue).

Physical Health Implications of Social Isolation

Humans are a social species, and the proximity of others and social behavior is critical for development, reproduction, health, and survival [11]. While much of the epidemiological

evidence for both health and mortality is observational, some key experimental evidence on social isolation has come from non-human animal models. These studies show that animals housed in isolation are at greater risk for various deleterious outcomes, including mortality, recovery from a stroke [12], and alterations in the gut microbiome [13]. The remainder of this paper will focus on the evidence across mortality, morbidity, and biomechanisms among humans.

Mortality

Some of the first studies examining the associations between social factors risk for premature mortality focused on social isolation [14-16]. Since then, several large-scale epidemiological studies have documented robust associations between social isolation and mortality [17-21], demonstrating effects comparable to traditional clinical risk factors [22]. These effects have been endorsed by meta-analyses [23,24]. For example, one meta-analysis of 70 prospective studies found that social isolation was associated with 29% and loneliness a 26% increased risk for premature mortality from all causes [23]. Despite these relative differences, the aggregate effect sizes were not statistically different, suggesting both social isolation and loneliness may equivalently predict mortality risk.

Since social isolation is correlated with other social factors, including loneliness [1,25], the extent to which objective isolation contributes independently to health risk is unclear unless studies have contrasted isolation with other components within the same investigation. Unfortunately, most studies examine these factors in parallel, only assessing or reporting one social variable (e.g., social isolation or loneliness); however, a few studies have examined social isolation and loneliness together [10,26-32]. In all but one of these studies [32], social isolation was demonstrated to be an independent predictor of premature mortality. For example, in the

English Longitudinal Study of Ageing (ELSA), which assessed associations with all-cause mortality over 7.25 years in 6,500 older adults, both social isolation and loneliness were related to increased mortality risk adjusting for age and sex [10]. In multivariable analyses, isolation remained significant after adjustment for sociodemographic, baseline health status, and loneliness. In contrast, loneliness was not an independent predictor of mortality after demographic and health factors were considered. Similarly, a 17-year Finnish study found that social isolation predicted future mortality after controlling for loneliness and potential confounding factors [31]. An investigation of 1,267 older people with cardiovascular disease in China reported that social isolation was linked to increased mortality risk over ten years after taking other risk factors into account, while loneliness was not [27]. By contrast, the Amsterdam Longitudinal Study of Ageing found loneliness rather than isolation predicted mortality in men but not women [32]. While not entirely consistent, growing evidence suggests that isolation predicts mortality independent of loneliness.

Morbidity

There is also a growing body of evidence relating social isolation with nonfatal physical health outcomes, including increased risk for cardiovascular disease and stroke [33], pre-diabetes and type 2 diabetes [34], and poorer cognitive functioning [35]. A meta-analysis of cohort and case-control studies involving more than 2.3 million participants found that social isolation was associated with increased risk for dementia while loneliness was not significantly associated with risk [36]. Generally, according to a recent expert consensus report, the evidence linking social isolation to morbidity outcomes is strongest for the association between social isolation and cardiovascular and mental health outcomes, with fewer studies examining relationships to other health outcomes [1].

Because poorer physical health can be both a consequence of and a risk factor for social isolation, longitudinal studies in which isolation is measured years before the onset of the health problem are stronger than cross-sectional studies. Prospective studies make it possible to distinguish whether isolation precedes disease or whether the health condition elicits social withdrawal and other changes in social activity. In a meta-analysis of longitudinal studies of social isolation and loneliness and cardiovascular outcomes, both social isolation and loneliness were found to significantly increase the risk for new CHD and stroke, with no evidence that one was more strongly related to disease incidence than the other [33]. When examining cognitive outcomes, a meta-analysis of longitudinal studies found that aspects of social isolation, including low levels of social activity and inadequate social networks, were significantly associated with poorer cognitive function in later life [35]. The data on diabetes outcomes is a bit more mixed. For example, although individual components of isolation, such as living alone, have been associated with increased risk of Type 2 diabetes [37] more comprehensive measures have not been associated with diabetes onset [38].

The evidence for an association of isolation and future disease that is independent of loneliness is mixed and complex. This may be due to the variability in morbidity outcomes, measurement approaches, and the potential differential diagnosis rates among those who are socially isolated. For example, an analysis of more than 450,000 participants in the UK Biobank tested associations between social isolation, loneliness, and acute myocardial infarction (MI). Neither factor was associated with first MI, but social isolation predicted mortality among people with a history of cardiovascular disease or stroke [29]. While additional data is needed to determine the precise nature and independence from other social factors, these findings do suggest significant associations between social isolation and nonfatal health outcomes.

Biomechanisms

There is also a growing body of evidence documenting the association between social isolation and biological mechanisms that elicit the development of health conditions, including cardiovascular, neuroendocrine, metabolic, immune functioning [5], and molecular epigenetic underpinnings[39]. For example, research demonstrates social isolation modulates immune responses and induces inflammation [40,41]. In one study, social isolation (as indicated by small network size) and loneliness were both independently associated with lower antibody responses to an influenza vaccine; however, those who were both lonely and isolated had the lowest antibody response[42]. Additional evidence further suggests aspects of social isolation were associated with higher levels of inflammation, whereas loneliness was associated with poorer regulation of inflammation, suggesting objective and subjective aspects of social connections may influence different biological pathways [43]. Together these findings suggest that isolation may contribute significantly to our understanding of the biomechanisms involved in disease development and progression.

Why is social isolation such a powerful predictor of health?

The existence of social relationships and roles, and frequency of contact with others, provides the foundation for how relationships can potentially influence health (see figure 1). The functions and quality of relationships may be conceptualized as downstream effects that may mediate the influence of relationships on health status [44]. If this social foundation is absent because few relationships exist or there is little contact with others (i.e., social isolation), there may be little or no opportunity for these other relationship components (functions and quality) to influence health. In other words, the structural foundation is necessary but may not be sufficient. Social relationships affect health and well-being via fulfilling a variety of physical, emotional,

and cognitive needs. Thus, social isolation reduces the opportunity for these needs to be met. As shown in figure 1, individuals may vary in how wide this structural foundation may be, and there may be gaps in that foundation (e.g., lives alone, but wide social network). The narrower the foundation and/or the wider any gaps, the more socially isolated an individual is, and the more tenuous and vulnerable the other social components may become. When this foundation is slim, any threats to existing relationships, roles, or contact (e.g., death, relocation, pandemics, etc.) can eliminate potential sources of downstream support, tangible resources, influence, satisfaction, and purpose.

Another reason that social isolation may be such a powerful predictor of health outcomes is because structural aspects of relationships may be relatively more stable and enduring over time than measures of functions and quality of relationships. For example, measures of social isolation often assess marital status, living alone, religious attendance, group memberships, and frequency of contact with children, family, and friends. Data from three waves of nationally representative data shows size of one's network, non-kin ties, and community involvement to be stable [45]. The more chronic a component of social connection is, the greater the potential for enduring effects on health. However, data directly examining the stability of these features relative to other social assessments are relatively sparse. The enduring nature of many features of social isolation also may make them very difficult to modify to reduce health risks.

The full picture of why social isolation influences health is not yet fully understood. This is perhaps not surprising given the variation in isolation measures and the meaning of isolation relative to loneliness in different cultures and across generations and time. Additional research is needed to understand the precise role of social isolation relative to other social components in the development of physical health problems.

Implications for Intervention

Social isolation may have received less attention because it is viewed as less modifiable and may be more complicated. Many interventionists and clinicians prefer not to assess markers of social isolations such as marital status, living alone, and religious involvement because these are both difficult to modify, and modification may not respect an individual's autonomy of personal choice. Although it may be difficult to modify these indicators of social isolation, when change does occur, these changes may be sustained longer-term relative to changes in relationship function and quality; thus, they may hold promise for societal level approaches such as policies or built environment that may remove systemic barriers. Interventions that modify the frequency of social contact and participation in social groups may be more feasible. Interventions involving social groups demonstrate effects of greater social connection, better mental health [46], and better management of mild-moderate depression [47]. However, the evidence on group-based interventions is mixed [1] and may need to be tailored to be more responsive to individual needs [1].

Conclusion

Evidence across diverse disciplines and diverse outcomes demonstrate the importance of social isolation in understanding the full scope of influence that relationships have on health risk, chronic illness, and all-cause mortality. The evidence does not diminish the importance of relationship functions (e.g., social support) or quality (e.g., relationship satisfaction, loneliness). Instead, it underscores the evidence supporting the inclusion of social isolation as a significant and necessary component of the multi-factorial understanding of social health and health risk. No one component will adequately capture the full scope of social influence on health. Still, social

isolation may be a critical component because a weak structural foundation may limit the potential of other social connection factors to have downstream effects on health.

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